

# Sustainable and digital infrastructure for the post-COVID-19 economic recovery of Latin America and the Caribbean: a roadmap to more jobs, integration and growth

Tomás Serebrisky | Juan Pablo Brichetti | Allen Blackman | Mauricio Mesquita Moreira





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Sustainable and digital  
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# Preface

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The COVID-19 pandemic has created the greatest challenge to public policies in Latin America and the Caribbean in a generation, forcing us to rethink priorities from a new perspective that only a few months ago was unimaginable. The pandemic has brought about unprecedented situations, not only due to its magnitude and impact but also to the degree of uncertainty under which citizens, governments and businesses must now make decisions with far-reaching consequences on life, social well-being and the future of our societies.

The COVID-19 pandemic is having severe effects not only on the health of the population but also of the economy, as a result of the restrictions on circulation of individuals and merchandise that are necessary measures to combat the pandemic. In this context, the immediate response of the region's governments has been to focus on mitigating the pandemic's devastating consequences using tools such as money transfers to vulnerable populations, credit and guarantees to businesses to sustain the productive fabric and protect jobs, and reinforcement of health system infrastructure and capacity to meet the demand for service during the health crisis. The IDB has not been indifferent to these needs, and we have rapidly adapted our loan portfolio, developing new loan prototypes to streamline financing, and mobilizing more than USD 12 billion to strengthen the governments' responses in the region. The contribution has not been only financial; the IDB has also offered technical support to strengthen crisis management.

Support from the IDB has not been limited to these dimensions. To effectively combat the pandemic requires thorough understanding of the gaps in public policies that governments must address. To this end, Bank experts have recently drafted two documents aimed at helping to diagnose the situation each government in the region is facing and identify immediate actions to mitigate the consequences (IDB, 2020a), as well as identify actions in public policies necessary to face the period of economic recovery once the severe health crisis has been overcome (IDB, 2020b). The present paper complements the Bank's vision with respect to actions needed for post-pandemic economic recovery, focusing on investment in infrastructure as a mechanism to drive job creation, regional integration, and inclusive environmentally sustainable economic growth.

Latin American and Caribbean countries face major challenges and when the crisis recedes, the region will be left with pressing social grievances, greater debt, and limited fiscal space to address these problems. Every crisis, however, is an opportunity. Today we have the opportunity and duty to propose alternatives to construct a better future (socially / economically / environmentally) for the region. Investing in infrastructure is essential for building it and should play a key role in the region's economic plans. To invest in infrastructure more widely and more wisely will be urgent and necessary. To make it possible is a challenge for us all.

José Agustín Aguerre

Juan Pablo Bonilla

Fabrizio Opertti

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## Executive summary

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**The COVID-19 pandemic has generated an economic crisis of enormous proportion in the Latin American and Caribbean region.** According to available estimates, the region's GDP will contract more than 9% in 2020. This technical note argues that, after a stage in which governments concentrate their efforts on mitigating the immediate impacts with tools such as money transfers to vulnerable populations and credits and guarantees for businesses, the countries of the region should invest in infrastructure to promote regional integration and sustainable economic growth and reduce inequality. Stimulus packages should have a clear sense of direction: it is not about returning to the pre-crisis world but rather taking advantage of the opportunity to *build back better* for a more socially and environmentally sustainable future.

**The region should avoid errors of the past in which economic crises left an enduring legacy of low investment in infrastructure.** In previous economic crises in the region, the needs for fiscal consolidation were mostly addressed by reducing capital spending, especially public investment in infrastructure. When the COVID-19 crisis has passed, it will leave a region with greater social grievances, significant employment problems and greater inequality. To overcome these challenges the region will need to boost inclusive economic growth with greater regional integration, more robust resistance to climate change, and less environmental degradation. It is not possible to envision future development with these features without investing in infrastructure that enables modernization and expansion of infrastructure services. To meet these challenges requires that planning begin today to ensure the effectiveness of the response.

**Investment in infrastructure should be a central part of economic stimulus plans because it spurs economic growth.** Infrastructure investment directly impacts economic growth because it increases the quantity of assets vital for competitiveness, such as highways, ports and electricity generation facilities, and because it stimulates increased private investment in productive activities. Multiple studies have shown significant multiplier effects of infrastructure investment. It is estimated that in Latin America and the Caribbean, for each dollar of investment in infrastructure, the GDP increases approximately 1.5 dollars in a period of five years.

**Investing in infrastructure can be especially beneficial to overcome crises situations.** Evidence exists that investments during recession double their multiplier effect with respect to times when the economy expands, enabling the role of infrastructure to promote growth after

the pandemic-provoked recession. In turn, infrastructure increases productivity by allowing more efficient combinations of capital and work. This is particularly important for the region because its productivity continues to lag; evidence shows that this is in part due to the shortage of infrastructure services.

**Infrastructure drives job creation and improves income distribution, key in one of the most unequal regions in the world.** Multiple studies have shown that investments in infrastructure and improving productivity and efficiency in infrastructure services increase inclusive economic growth, benefiting low-income households more. According to DIA2020 (Cavallo et al., 2020), an increase of 5% in productivity and efficiency of delivery of infrastructure services in the region can raise approximately USD 200 billion of increase in GDP over a decade, which is equivalent to 6% of the regional GDP. Additionally, there is ample literature on the effects of infrastructure investment, on employment, especially in the areas of renewable energy and energy efficiency. Recent IDB estimates show that investment in infrastructure generates on average, 36,000 new jobs per USD 1 million invested, although this number can multiply if investments are made in intensive work activities such as road maintenance or improvements in housing and buildings to increase their energy efficiency.

**Investment in infrastructure fosters integration and international trade.** Economic theory and empirical evidence are clear with respect to the potential benefits of international trade on growth. Latin America and the Caribbean have commercial costs almost 60% higher than in Asia, in part due to deficiencies in infrastructure and facilitation of commerce. Reductions of these costs would have a significant impact on exports. For example, recent estimates for the countries of the Pacific Alliance found that a 1% decrease in logistical costs would increase exports at levels ranging from 1.3% in Mexico to 4.5% in Chile. Although some logistical challenges require elevated investments, others depend only on political will and widely available technical knowledge.

**Latin America and the Caribbean need to invest more. They should address and resolve the fiscal and management constraints that have been an obstacle to infrastructure investment, and that will be exacerbated by COVID-19.** From 2008 to 2018, the countries of the region invested an average of 2.8% of GDP in infrastructure, significantly below that in other emerging regions. In part, this is due to the fact that public spending in the region shows a bias against investment and in favor of current expenditure so it is recommended to use flexible fiscal rules.

Also it is crucial to find alternatives that enable expansion of investment in infrastructure without compromising the limited fiscal space that the region will face as a result of expansion of spending to attend to the health emergency, the drop in collection of revenues due to the recession and the uncertainty in government's financial capacity. In this sense, improving the targeting mechanisms for subsidies to infrastructure services, increasing the efficiency and transparency of state owned service providers and involving the private sector are all possible avenues to free resources that enable investing more in the post-COVID-19 economic recovery.

Increasing investment will not be sufficient. **Latin America and the Caribbean must invest better.** Latin America and the Caribbean dedicate on average 2.3% of the GDP to investment in public infrastructure, of which 0.65% of the GDP is lost in inefficiencies. To invest better requires, first, **improving planning to choose the correct project and then implement it correctly.** Latin America and the Caribbean should **minimize the preventable overruns and delays;** the region could save up to 0.45% of the regional GDP annually, if all the projects are executed following quality standards of MDB-funded projects, and up to 0.2% of the GDP if the preventable delays of construction are minimized. The region should also deepen the **reforms tending to prevent corruption and increase transparency** through use of innovative technology in order to prevent the waste of public resources that do not reach the citizens. Finally, underscore the importance of **investing in maintenance** to lengthen the service life of the assets and improve services.

Investing better not only require improving the efficiency of investments in infrastructure but also changing the type of investments made. **Specifically, the countries of Latin America and the Caribbean should invest in infrastructure that is sustainable.** Sustainable infrastructure has three features: it minimizes the emissions of greenhouse gases that cause global warming, it is resilient to the effects of climate change and natural disasters, and it minimizes local pollution of air, water and solid wastes and dangers. It is imperative to ensure that the infrastructure is sustainable since this can have adverse effects on the environment that persist for decades and extend beyond the geographic and sectoral borders of the investment. The planners in Latin America and the Caribbean do not need to sacrifice the short- and medium-term financial returns to make the infrastructure be sustainable. For example, at three cents per kilowatt-hour, that is the value observed in the bidding of energy in several countries of the region for 2020, solar energy and wind

energy already are the cheapest form of generating energy. In addition, the experience of recovery from the 2008–2009 financial crisis indicates that stimulus policies that emphasize sustainability have greater return than those that do not.

**Investment in infrastructure can minimize greenhouse gas emissions by promoting the four pillars of decarbonization: renewable energy, electrification, public (and non-motorized) transportation, and ecosystem conservation and restoration.** Ensuring that the infrastructure is resilient to the effects of climate change and natural disasters requires a careful analysis of risk from the steps of design and planning of any new project and improvements to the policies of disaster management. Limiting the adverse affects on the local environment typically brings with it the same type of investments that mitigate the emission of greenhouse gases, and can have enormous benefits in terms of improvements in human health and provision of valuable ecosystem services. Finally, decision-makers in Latin America and the Caribbean should consider investments in natural infrastructure such as corals, constructed wetlands, and green roofs that in certain conditions can provide infrastructure services as cost-effective as the traditional gray infrastructure of concrete and steel.

**It is necessary to take advantage of new technologies to underpin the impact of infrastructure investment.** The crisis is a clear opportunity to build back better, especially taking into account the major progress in more efficient and clean service delivery. In energy, the changes are driven by two concurrent trends that are mutually reinforcing: decentralization in generation and digitization. In the transport sector, the most disruptive change will be automatization, the advance of which will depend in large measure on digitization. In water and sanitation, the technology can support integrated management of water resources. The technological disruption will also impact on the construction and maintenance of infrastructure: emerging technologies can reduce construction costs from 10% to 50%.

**The digitization of services has the potential to boost inclusive economic growth.** According to recent estimates, investment in digitization of infrastructure services increase the population's income in general, but in addition it does so in an inclusive manner: for each 1% increase in income of the 40% highest-income population, the increase of the two poorest quintiles is 1.16%. To take advantage of advanced technology, Latin American and Caribbean countries will have to develop their digital connectivity structure, which requires the development of a digital agenda and national plans with broadband.



As the region finds itself in a much weaker fiscal situation to respond to this crisis than during the 2008–2009 financial crisis, **it is essential to correctly sequence the investments in post-COVID-19 infrastructure**. This document advocates to prioritize shovel-ready projects as a first step -while the terrain is prepared to make longer-term investments more viable. To improve the quality of investment, it is recommended that the investments be accompanied by reforms in policies, regulations and institutional frameworks, making it possible for the creations of planning organisms and auditing of the infrastructure and in the formulation of national infrastructure plans. The IDB has recent experience in support of Peru and the Dominican Republic for the formulation of these plans, exercises that enable improved quality of investment.

Surely the public sector will continue assuming the cost of the greatest part of the investment in infrastructure, but the magnitude of the economic challenges ahead requires **involvement of private investment**. An alternative is to explore the use of public-private partnerships (PPPs), having evidence for the region that the PPPs have successfully lowered the costs and improved the quality of investments. Increasing investment by PPP will enable the freeing up of scarce public resources to reallocate to other social needs and will require even further development of the institutions needed for the PPPs. This document discusses the potential for asset recycling, the need to have a well prepared pool of projects and the importance of accurate determination of risk, so that the multilateral development banks play an important role, in addition to being able to be a catalyst for private investment.

In conclusion, this technical note argues that investment in infrastructure plays a relevant role in the region's economic recovery plans. The COVID-19 crisis presents challenges but also opportunities: we should act today, to ensure that the region constructs a better future (economically / socially / environmentally) with efficient sustainable digital infrastructure.

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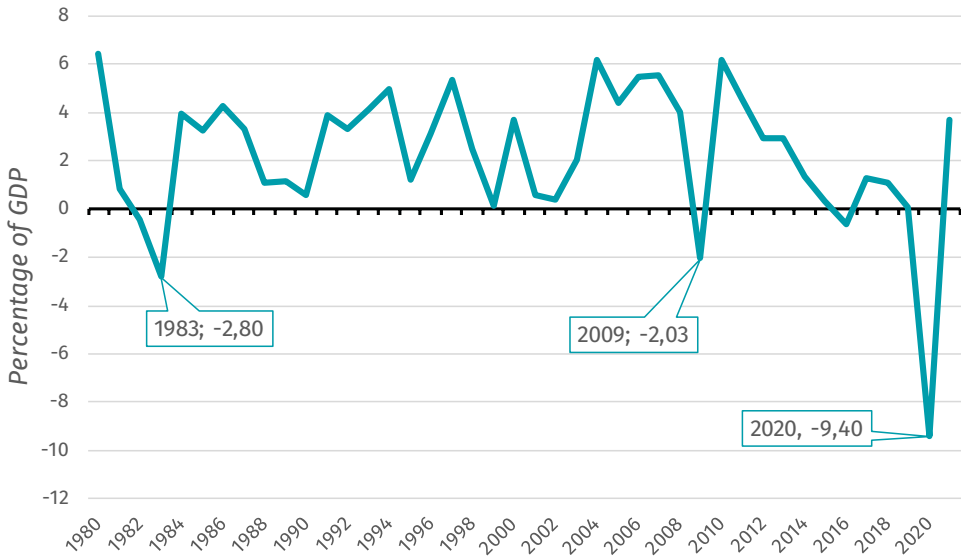


# 1 Introduction

The COVID-19 pandemic has generated an economic crisis of enormous proportions in Latin America and the Caribbean. This document argues that infrastructure must play a key role in the economic recovery plans because it enhances long-term economic growth and can lay the foundation for more environmentally and socially sustainable growth.

Although we still do not know the magnitude and duration of the crisis, available estimates suggest that the region's Gross Domestic Product (GDP) will contract more than 9.4% in 2020 (IMF, 2020a). This will have severe consequences on unemployment levels, household consumption, business investment, exports and government revenues. Faced with the economic contraction, governments have concentrated their effort on mitigating the immediate impacts of the crisis using instruments such as money transfers to vulnerable populations; loans and guarantees to businesses to prevent them from going bankrupt and keeping their jobs; and strengthening the infrastructure and capacity of their health systems.<sup>1</sup>

**Figure 1.** The economic impact of the crisis: the fall of GDP in Latin America and the Caribbean



<sup>1</sup> See IDB (2020a), which summarizes policy interventions in Latin America and the Caribbean in immediate response to the COVID-19 crisis.

Once the urgency has passed, it is essential to look up and aim for the longer term. As the pandemic's effects on health and health systems are controlled, there is an imperative to focus attention on policies that allow for a faster and more lasting economic recovery.<sup>2</sup> Economic recovery cannot be limited to policies that promote economic growth without questioning what kind of economic growth is desirable. The economic crisis is extremely serious, of unprecedented proportions, but at the same time it will enable initiatives to transform the economy of the region in ways that promote inclusion, reduction of inequality and more sustainable economic growth from an environmental point of view.

Stimulus packages must be informed by the scale and urgency of the challenge, and must have a clear sense of direction: it is not about returning to the pre-crisis situation, but about seizing the opportunity to build better infrastructure (*“build back better”*) for a socially and environmentally more sustainable future. Investment in long-term capital should be a clear protagonist of fiscal stimulus plans to promote employment and growth, and infrastructure is one of the components of investment with the greatest multiplier effect on growth in Latin America and the Caribbean. At the same time, the infrastructure components of the stimulus programs must be focused on the provision of services to improve access, quality, and the affordability for households and companies that depend on infrastructure to be competitive and insert themselves in the global economy. They must also minimize negative impacts on the environment, including the impact of climate change, local pollution, and degradation of natural resources, as well as maximizing positive impacts, including increasing resilience to climate change and natural disasters. This requires support plans for sustainable infrastructure, pricing that encourages efficiency and responsible consumption, and regulations that promote technological adoption.

The need to build back better infrastructure to encourage socially and environmentally sustainable growth has been a concept that has gained increasing popularity since its launch by the United Nations in 2015. However, the urgent need to promote post-COVID-19 economic recovery has consolidated and expanded support for these guidelines, ranging from multilateral credit banks (World Bank, 2020; Asian Development Bank,

<sup>2</sup> See IDB (2020b), which sets out a series of policy recommendations for Latin American and Caribbean countries to face the subsequent phases of post-COVID-19 economic recovery.

Economic recovery cannot be limited to policies that promote economic growth without questioning what kind of economic growth is desirable.

2020; International Monetary Fund, 2020b) and multilateral organizations (United Nations, 2020; IEA, 2020a) to local governments (C40 Cities, 2020) and different private sector actors (DCED, 2020; McKinsey 2020). These guidelines are also a central part of the policies of the European Union to promote post-COVID-19 economic recovery (European Council, 2020.)

A very clear lesson from the 2008-2009 financial crises is that stimulus policies with an emphasis on sustainable interventions have advantages over traditional fiscal stimulus (Hepburn et al., 2020.) Likewise, the IEA (2020b), compiling the lessons of the stimuli applied during the financial crisis, points out that “green” investments were more efficient in boosting economic growth when they encouraged the use of mature sustainable technologies and were based on pre-existing sustainable policies for which the institutional capacity for project planning and execution was developed. An example of this type of stimulus could be investment in renewable energy, whose characteristics make it attractive both in the short and long term. Renewable energy generates more jobs in the short term than non-renewable energy,<sup>3</sup> which translates into a greater multiplier of jobs and GDP in the short term. In the longer term, however, renewable energy requires less labor for its operation and maintenance, which means freeing up labor as the economy returns to capacity. The more efficient use of labor and the saving in fuel means that renewable energies can also offer greater multipliers in the long term (which are derived from the expansion of the supply). Investing in sustainable options equates to investing in the jobs and skills of the future, the only real path to proper jobs and job security; instead, less clean investments will not only generate stranded assets but also stranded workers.

The crisis generated by COVID-19 has made the deep deficiencies of infrastructure in Latin America and the Caribbean more evident, amplifying some of the problems suffered by water, energy, transport and communications services: operational inefficiencies, low quality of assets and services, insufficient maintenance, obsolete pricing and management schemes, informality, high logistics costs and lack of planning. These problems, in turn, lead to poor reinvestment and little space to adequately incorporate vulnerabilities to climate change and the risks of natural disasters in planning. In this sense, the crisis presents an opportunity to pay off the region’s outstanding debts in terms of

<sup>3</sup> See McKinsey (2020), which shows recent evidence for European countries on the differential impact on employment creation of investments in renewables and in energy efficiency compared to other traditional energy investments (oil, coal).

sustainability, to take advantage of the potential of intraregional trade and enhance natural capital.

This note argues that investment in infrastructure should be a fundamental component of the stimulus packages against COVID-19, and guidelines on how to prioritize and execute it are detailed. After this introduction, in the second section it is stated that investment in infrastructure must be present in the stimulus packages in Latin America and the Caribbean because it enhances economic development, increases productivity, fosters integration and foreign trade, drives generation of employment and improves income distribution. The third section discusses how the region can cope with the challenges that threaten to limit investment in infrastructure during the COVID-19 crisis exit, and outlines ways to invest more and better in infrastructure, including efforts to improve planning, minimize avoidable cost overruns and delays and improve maintenance. The fourth section focuses on preparing the economy of the future today, with investments in infrastructure that advance towards environmental sustainability and digitization of services. The fifth section sets out the institutional and political mechanisms that allow adequate prioritization to effectively sequence investments in the region. The sixth section explains the financing and funding mechanisms for the execution and recovery of investment costs. Finally, the seventh section concludes the document with a call to action.

Investing in sustainable options equates to investing in the jobs and skills of the future

## 2 Investment in infrastructure must be a central part of economic stimulus plans

Governments have multiple tools at their disposal to face the economic crisis caused by the COVID-19 pandemic and thus promote recovery. For developing countries, the challenge is more complex since the decline in tax collection and the limited capacity to borrow will force them to choose carefully the most effective tools to face multiple economic policy objectives. Here it is argued that investment in infrastructure provides an attractive alternative because it advances simultaneously on several fronts: it enhances economic growth by boosting demand, increases productivity, increases the competitiveness of economies, generates sustainable jobs, and improves income distribution.

### Infrastructure powers economic growth

Investment in infrastructure enhances economic growth through multiple channels. First, increasing investment in infrastructure has a direct impact on economic growth because it increases the available assets that the economy has for producing and, potentially, by increases in complementary private investment.

For example, the construction of a new airport leads to the development of new commercial passenger and cargo transport services, which generates new income for service providers, encourages private investment in aircraft to provide new services, and improves quality of life of users who now have new alternatives to mobilize and distribute their products. The effects of the construction of an airport on economic activity do not end with making new and more varied services viable; to build such infrastructure, inputs such as cement, asphalt and construction services are needed, which increases the income of the companies and people who provide them. These companies and people now have new income, and they will prepare to consume them in other goods and services or to invest them in other productive activities, thus mobilizing other economic sectors. This side effect on the demand for other goods and services is known as the multiplier effect.

For decades, attempts have been made to measure the direct and indirect effects of investment on growth (see Aschauer, 1989, for example). These efforts have focused on evaluating how much additional investment in infrastructure is required to increase growth and to close infrastructure gaps in countries that have lagged behind. There are multiple econometric studies showing that there are significant multiplier effects

of infrastructure investment. Recent IMF work (IMF, 2015) shows that an unanticipated increase of 1% of GDP in public investment in infrastructure produces an increase of 0.4% of GDP in the same year it occurs and after four years accumulates an additional GDP growth of 1.5%, consistent with medium-term multipliers greater to the unit.<sup>4</sup>

Along the same lines, a meta-study (García et al., 2017) identified more than 150 studies published since the 1990s that estimate the effects of increases in infrastructure investment on the growth rate of the economy. The results of that exercise reveal, consistent with the IMF study, positive spending multipliers. The study also shows that the conditions in which investments are made matter significantly in the results obtained. These conclusions are similar to those reported by the World Bank (Timilsina et al., 2020) based on an exhaustive review of the recent literature on the impacts of infrastructure investment on different economic variables. In this sense, the results of both studies show that infrastructure is not a homogeneous good and that therefore the characteristics of the infrastructure in particular, when, in what and how it is invested are fundamental variables to maximize the benefits of investment in infrastructure (as will be seen, moreover, in the following sections.)

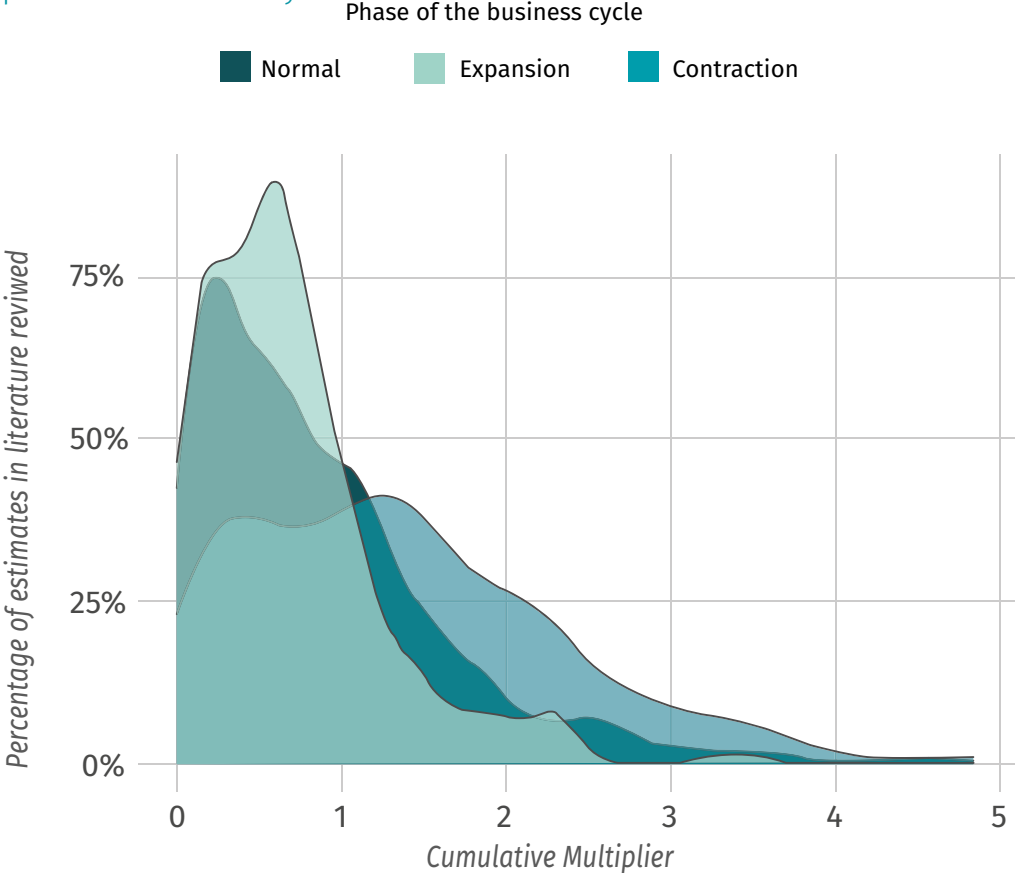
The potential of infrastructure investment to boost economic activity depends on the moment in the economic cycle in which such investments are made. The gains in terms of economic growth are comparatively higher when investment mobilizes idle resources (typically during recessions) and lower when investments involve reallocating resources from other productive activities.<sup>5</sup> At the empirical level, a recent literature review conducted by the Global Infrastructure Hub (GIH, 2020) shows that the differences in the estimates of the multipliers of public investment are significant depending on the economic cycle (Figure 2); the study finds that, on average, the multipliers of public investment are double during the contractionary phases (1.6) compared to the expansionary phases (0.8).

<sup>4</sup> Several econometric studies that show high multipliers of capital spending are mentioned in the present work; however, these values are not independent of the calculation methodologies used or the present circumstances in which investments are made or the effectiveness / efficiency in planning / execution of investment projects. The high values of investment multipliers reported in this report should not be interpreted as an unrestricted justification for making investments without considering these factors.

<sup>5</sup> Auerbach and Gorodnichenko (2013) and Riera, Vegh and Vuletin (2015).



**Figure 2.** Estimated effect on GDP of public investment multipliers by phase of business cycle



Source: GIH (2020)

Can these conclusions be extrapolated from economic crises that occurred prior to the COVID-19-provoked crisis? This is a valid question; the present economic crisis has as a differential characteristic with respect to other recessions of the past as a result of drops in demand or financial crises, that its primary trigger is linked to a supply shock. Addressing the health crisis caused restrictions on the movement of people and merchandise, affecting supply chains, restricting the ability of workers to get to their jobs and the ability of consumers to go to their usual consumption points. The unprecedented circumstances make it difficult to draw forceful conclusions.

However, in this context, investment in infrastructure has some advantages over other ways of stimulating demand. In the first place, investment in infrastructure is materialized through the activities of the construction industry, which, due to its procyclical nature, faces its particularly underutilized capacity. Secondly, the construction industry has been one of the industries that due to its characteristics (it allows establishment of social-distancing protocols, many of its activities take place outdoors, among other reasons) suffered fewer restrictions regarding requirements to resume activities. In this sense, investment in infrastructure makes it possible to take advantage of the capacity of an underutilized industry, with great diversification in its suppliers and ready to take action, all factors that influence maximizing multipliers in the short term compared to other stimulus alternatives more affected by the restrictions imposed by the COVID-19.

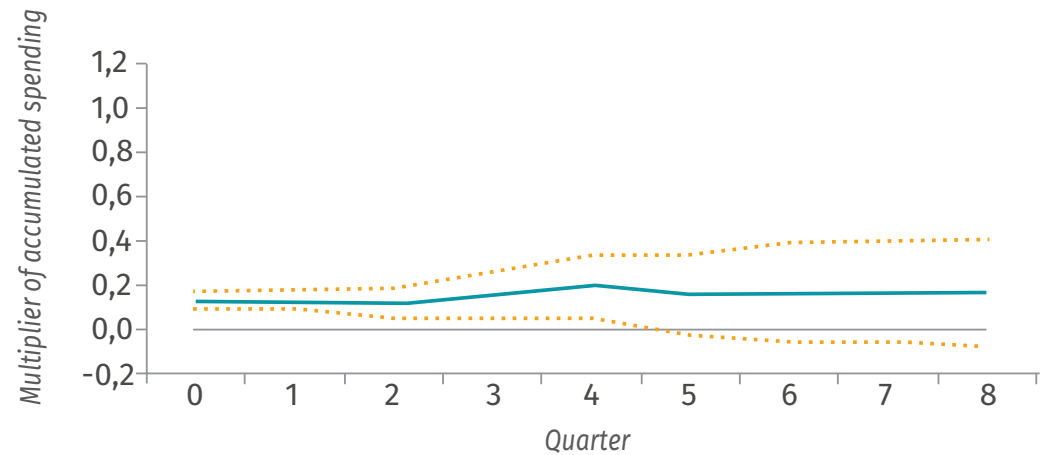
The reasoning that investing during recessions generates a greater multiplier effect has been present, for example, in the IMF's policy recommendation to its member countries to increase investments in infrastructure during the global financial crisis of 2008-2009 (IMF, 2009; IMF, 2014). Unfortunately, the region made partial use of this recommendation in response to the financial crisis; although it expanded public capital expenditures (of which investment in infrastructure explains a significant part), it did so accompanied by a strong expansion in current spending.

This choice of policy has had lasting consequences. Current expenses have been more difficult to adjust in the post-financial crisis period, which contributed to increasing the procyclicality of public spending, increased debt levels and, ultimately, decreased the ability of governments to finance today public policies aimed at reducing the economic effects of COVID-19. Additionally, this choice has been a missed opportunity in terms of economic growth: the multipliers of capital investment are significantly greater than those of current expenses (Figure 3). The lesson of this episode should not be to avoid expanding spending in times of crisis; on the contrary, the lesson is that it must be done intelligently and consistently with the maintenance of a consistent fiscal policy throughout the economic cycles and seeking to maximize the impacts on long-term growth and the objectives of transformation of the economy.

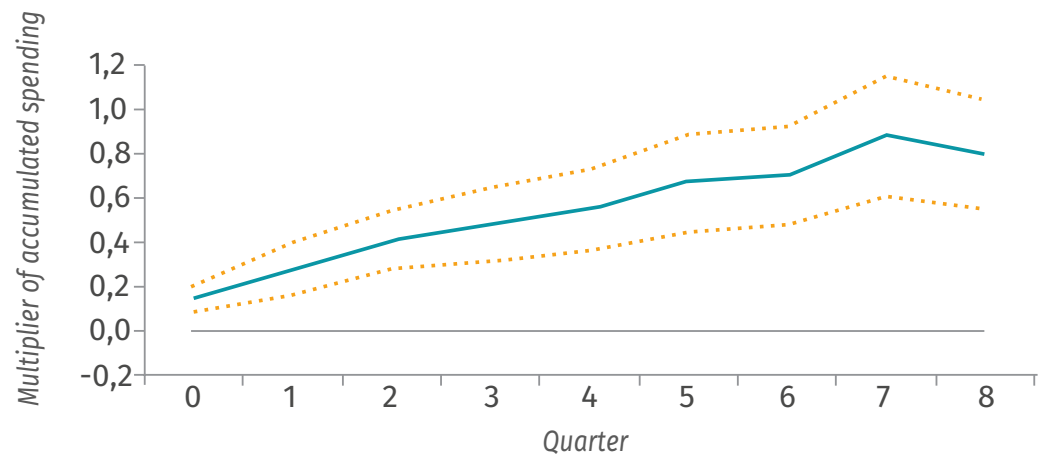
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**Figure 3.** Multipliers of current and capital spending in Latin America and the Caribbean

A. Multiplier of current primary spending



B. Multiplier of public investment



**Note:** The dotted lines indicate a 95% confidence interval for the effect of capital expenditure and current expenditure.

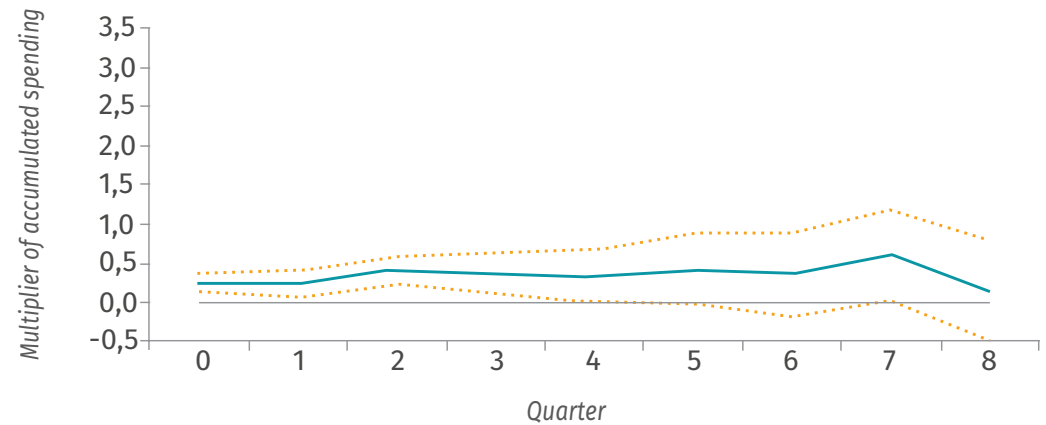
**Source:** Izquierdo, Lama et al. (2018).

The impact of the shock in infrastructure investment also depends on local components. Recent work by the IDB shows that, when well implemented, investment in infrastructure in the region can have a strong impact. Izquierdo et al. (2019) analyzes a group of countries and sub-national divisions of developed countries and the region and shows that

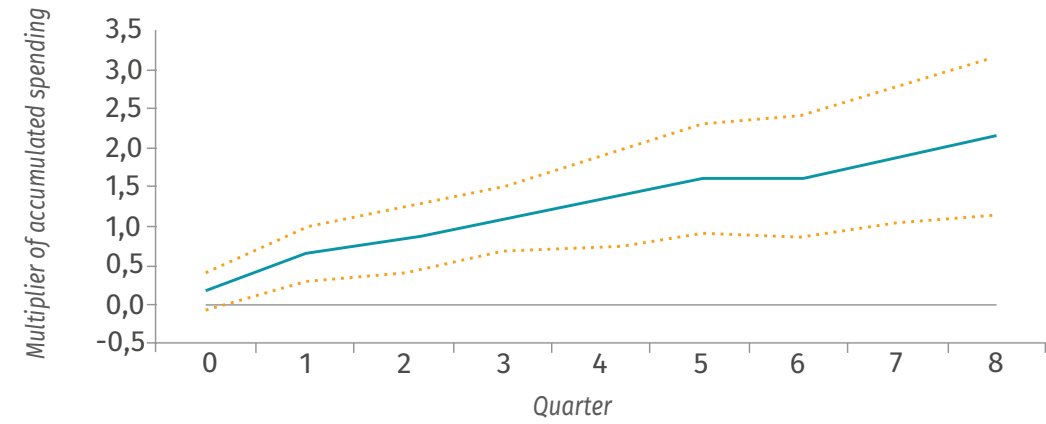
the multipliers of public investment are significantly higher in places with lower initial capital stock (Figure 4). In fact, when analyzing the specific case of the Argentine provinces, the study suggests that the effect of public investment in provinces with the lowest capital stock may have an even greater effect, implying that the effect of public investment could be more than proportional over growth.

**Figure 4.** Multipliers of capital spending based on initial capital stock

A. Subject to high initial stock of public capital in relation GDP



B. Subject to low initial stock of public capital relative to GDP

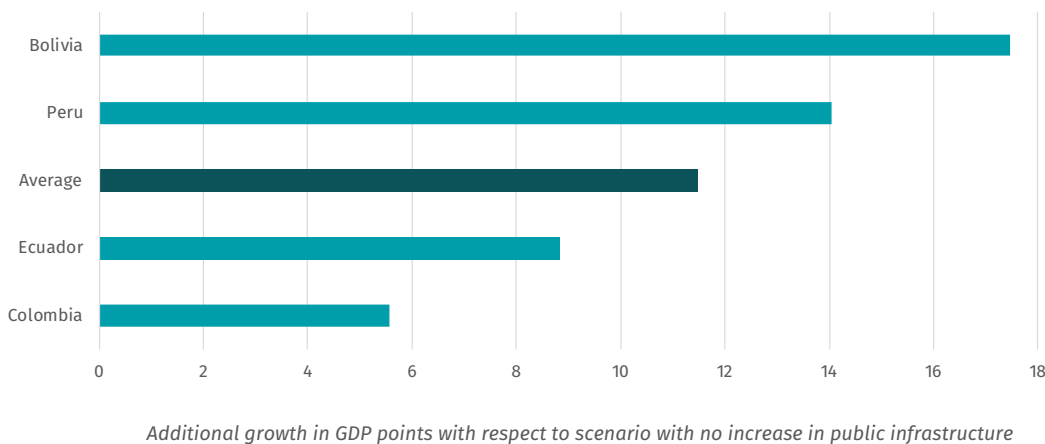


**Note:** The dotted lines indicate a 95% confidence interval for effect of capital expenditure.

**Source:** Izquierdo, Lama et al. (2018).

The previous analysis reveals that the conditions under which infrastructure investments are made are important to determine their expected results. What are the achievable impacts on growth of driving an increase of public investment in infrastructure in Latin America and the Caribbean? A recent IDB study (De la Cruz et al., 2020) seeks to answer this question for four economies in the Andean region (Peru, Bolivia, Ecuador, and Colombia) using computed general equilibrium models. The study simulates the impact on growth of promoting an investment program in public infrastructure with a fiscal cost of 3.8% of annual GDP<sup>6</sup> over the next 20 years to close the estimated infrastructure gaps with respect to more advanced countries (OECD). The simulations also evaluate various alternatives to finance the proposed program: external financing, tax increases and a combination of tax increases and reallocation of spending. The results of this exercise are promising; reveal that the public infrastructure investment program can increase growth on average by 11.8% of GDP over a period of 20 years (Figure 5), representing an increase of between 5% and 15% higher than the prevailing trend growth if said investment program were not carried out.

**Figure 5.** Impact on GDP growth of the proposed plan for public investment in infrastructure in the Andean countries



**Note:** The reported values refer to the financing scenario for the infrastructure shock through increases in tax rates.

**Source:** De la Cruz et al (2020).

<sup>6</sup> Average for the four countries in the study.

Ultimately, what the empirical evidence indicates is that investment in infrastructure has the potential to positively impact growth in the countries of the region; It can help sustain aggregate demand in times of recession, encourage complementary private investment, and maximize the impact of public spending. Additionally, by increasing the capital stock available to the economy, increasing investment in infrastructure drives the supply of related services and eliminates restrictions that limit the development of the region.

Infrastructure increases the productivity of the economy

The productive capacity of an economy is determined by its endowment of productive factors (the quantity and quality of workers, machinery and available capital) and by its productivity;<sup>7</sup> that is, by the ability to combine them to produce the goods and services that people and companies need. Investment in infrastructure has the potential to increase the productivity of the economy by allowing new, more efficient combinations of capital and labor. The construction of a bridge linking two towns, for example, allows workers to mobilize to find the most productive and therefore better-paid job opportunities. Likewise, the electrification of rural areas allows the use of new, more efficient machinery that increases production and allows workers to produce more in less time.

A specific case of a loss of productivity due to lack of adequate infrastructure services is the increase in absenteeism due to illness or due to the need to care for sick children due to the lack of reliable drinking water and sanitation services. Lack of additional adequate drinking water service results in less potential for income generation due to the time spent obtaining water from some reliable source distant from the home. Multiple studies indicate, for example, that in low-density and rural areas, the greatest economic benefit of water availability is given by the savings in carrying time that can be spent on productive activities capable of generating income for the family (Hutton and Haller, 2004; Pickering and Davis, 2012.)

During the last decades, Latin America and the Caribbean have had positive economic and social progress, increasing average incomes and

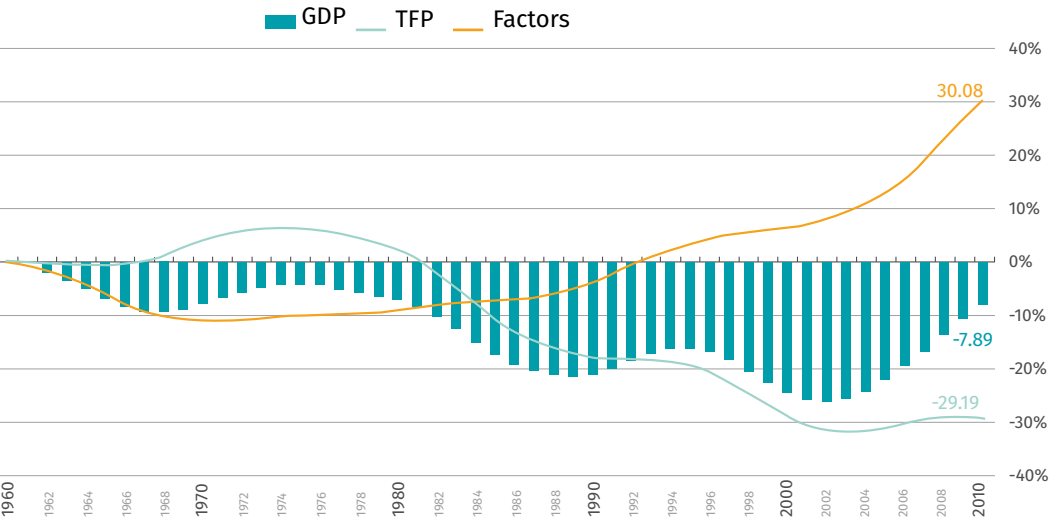
<sup>7</sup> Although this is technically known as total factor productivity (or TFP), it is not the purpose of this document to elaborate on the various measures of productivity but to explain the importance of infrastructure in the productivity of an economy.



improving countless social indicators from infant mortality to access to basic services of drinking water and electricity. At the same time, however, the lag in increasing productivity has been a constant in the economic development of the region. Looking at it in relative terms, Figure 6 shows that the expansion of the region's economies has been due to the accumulation of productive factors (more and better educated workers, more capital), but not because of finding more efficient ways to combine them (measured in the Figure 6 by TFP, that is, total factor productivity.)

**Figure 6.** Latin America and the Caribbean have faced serious difficulties in boosting their productivity.

Relative evolution of GDP, productivity and productive factors in Latin America and the Caribbean compared with the United States.



Source: OCDE and IDB (2016).

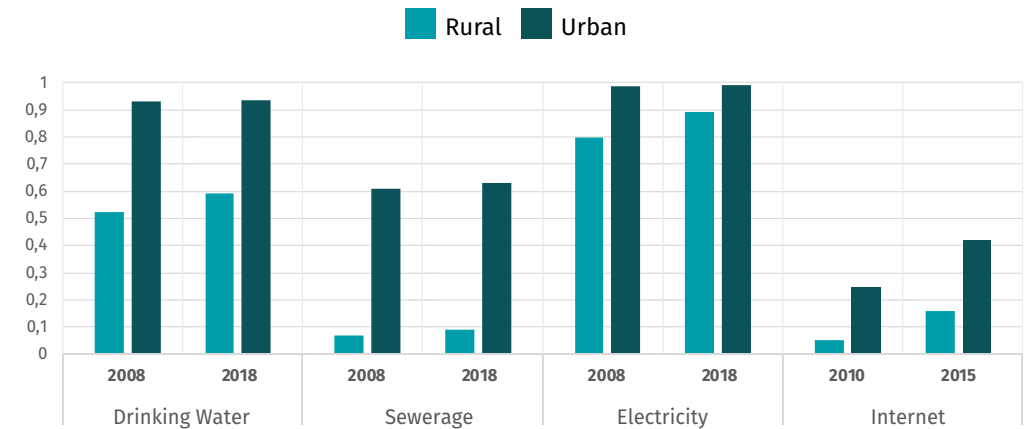
OECD and IDB (2016) explains that part of the reasons why the region has not been able to advance its productivity is related to the deficiency in the provision of quality infrastructure services. In particular, the study shows that infrastructure is a particularly pressing constraint when countries pass the lowest stages of development. The idea behind this reasoning is that to advance to higher stages of economic development, countries face challenges of increasing complexity.

Initially, development is conditioned by the need to have healthy and educated workers and, therefore, investments in providing quality education and health should be the focus. Once these objectives have been achieved, the limitations become linked to the development of functional labor markets that allow educated workers to find the most productive jobs in which to use their skills; and in the expansion of markets for goods and services through integration and trade to place the new, more complex and specialized production that can now be produced by the companies that employ them.

Once this stage of development is over, the limiting factors become linked to the development of more efficient capital markets that allow the savings and investment of households and companies to be intermediated; and in the provision of adequate infrastructure to take full advantage of the integration of trade and the new well-being of workers.

Most of the region's economies are precisely in this last stage of development; although there have been significant advances in access to infrastructure services, particularly in electricity and drinking water (Figure 7), their quality still has significant deficiencies and a slow evolution compared to other developing regions (Figure 8). Investing in infrastructure, both in assets and in better procedures and regulations to improve services, is an important part of the solution to overcome these limitations and, therefore, for many middle-income countries to make the leap to higher levels of development.

**Figure 7.** Access to infrastructure services, 2008 and 2018



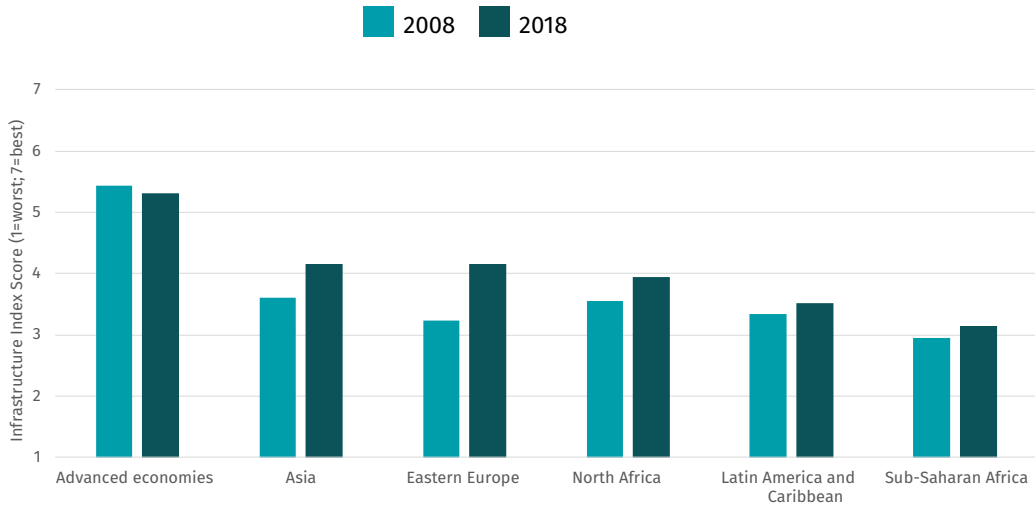
Source: DIA 2020 (Cavalo et al, 2020.)

**Note:** Data on access to potable water, sewerage and electricity are based on countries' household surveys and come from SEDLAC. Data include percentage of households with access to the respective services. Information on the Internet comes from the ITU and refers to percentage of the population with access to the Internet.

**Note:** The information in this figure is based on the “general infrastructure quality” indicator of the WEF Global Competitiveness Report. The indicator ranges from 1 (lowest quality) to 7 (highest) and is product of answers to the following question: “How do you assess the general state of infrastructure (transportation, communications, energy) in your country? [1 = Extremely underdeveloped/among the worst in the world; 7 = Extensive and efficient/among the best in the world.]”

**Source:** DIA 2020 (Cavalo et al., 2020.)

**Figure 8.** Evolution of infrastructure quality by world regions, 2008 and 2018



**Infrastructure facilitates integration and foreign trade**

The previous sections show that infrastructure investments can play an important role in the economic recovery by operating on the three main growth engines of the region: stimulation of demand, accumulation of physical capital and growth of productivity. The positive effects go beyond those direct and indirect impacts; an increase in the quantity and quality of infrastructure and its services (especially in less developed regions) can stimulate growth through another important channel: international integration and foreign trade.

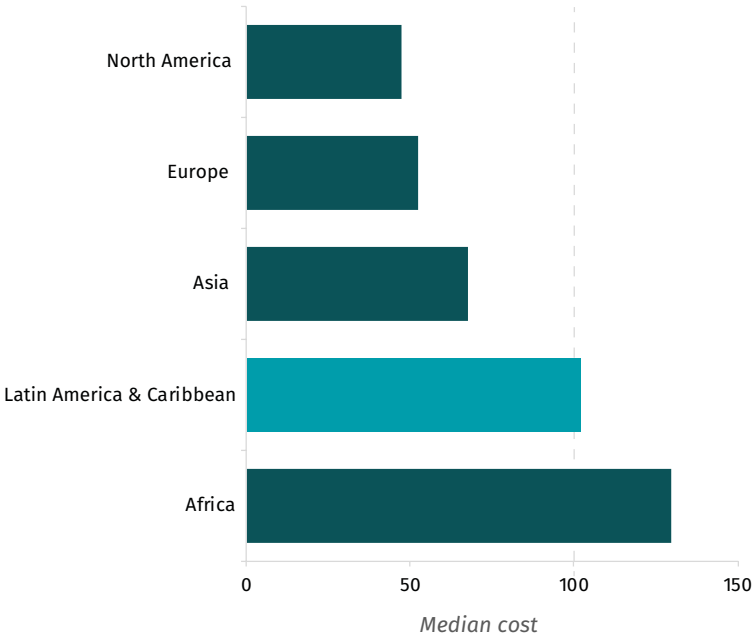
Infrastructure acts as a basic axis of integration of the national territory, allows the insertion of economies in international trade, minimizing cost and time of transportation, and promoting the circulation of goods and services, information and knowledge. At the same time, it is a pillar and a necessary condition for the success of decentralization processes, which have become widespread in Latin America and the Caribbean (Serebrisky, 2014.)

The economic theory is very clear regarding the potential benefits of foreign trade for growth through a reduction in the costs of investment in physical capital, the increases in productivity that allow greater

economies of scale and incentives for innovation and access to technology (Grossman and Helpman, 2015.) Empirical evidence goes in this same direction, particularly when it comes to the region. As a recent IDB study revealed, the “Great Liberalization” of the late 1980s made a decisive contribution to overcoming the stagnation of previous years in Latin America and the Caribbean, accelerating the growth of per capita income by 0.6 % to 0.7% per year.

However, the growth figures driven by economic openness also reveal, with equal forcefulness, that the benefits obtained were well below potential, among other reasons, due to the high costs of logistics, customs processing and connectivity in the region, fruit of the deficiencies of its infrastructure services. These infrastructure-related costs — which, when added to tariff and non-tariff barriers complete the so-called “trade costs” — thus become a formidable competitive gap. Figure 9 provides a first approximation of the size of the problem, estimating the export costs of manufactured products to eight of the largest economies in the world (Germany, Canada, China, the United States, France, Italy, Japan and the United Kingdom.)

**Figure 9.** Export costs of goods manufactured in Latin America and the Caribbean and in other regions, 2015



**Note:** The above figure shows an index in which the median export costs of manufactured goods from Latin America and the Caribbean to the 8 largest economies in the world is equal to 100.

**Source:** Mesquita Moreira and Stein (2019), Chapter 7.

there is significant room for improvement which can translate into recovery and growth.

The estimates show that Latin America and the Caribbean region has higher costs than the global average and may be nearly 60% higher than those of Asia. Given that tariffs in those markets are relatively low, the gap is fundamentally explained by geographical factors such as distance or geographical accidents, but is magnified by deficiencies in infrastructure and trade facilitation. For example, it is estimated that in 2014 average maritime freight costs in the region were 50% higher than in North America. It is unlikely that these costs would have decreased much since then. Investments in transport infrastructure continue to be relatively low (Serebrisky et al., 2018) and the quality indicators available do not suggest a radical improvement in the last decade.

While these figures are certainly of concern, they also reveal that there is significant room for improvements that can translate into recovery and growth. Empirical estimates point to a significant impact on the level, diversification and subnational distribution of exports from the countries of the region. For example, Mesquita Moreira et al. (2008) estimate that a 10% reduction in international freight costs would boost export values by an average of 30% and increase the number of products exported by 25%, both within the region and to the United States.

Reductions in domestic transport costs would have a similarly powerful impact. A study of five Latin American countries (Brazil, Chile, Colombia, Mexico and Peru) found that a 1% cut in factory-to-port freight rates might increase exports from municipalities benefitting from the reduction in logistical costs by an average of 4.5% (Mesquita Moreira et al., 2013). Along the same lines, a study by Molina et al. (2016), using data that covers both domestic and international transport costs of the Pacific Alliance countries, found that a 1% reduction in logistical costs would increase exports per municipality in a range of between 1.3% in Mexico and 4.5% in Chile.

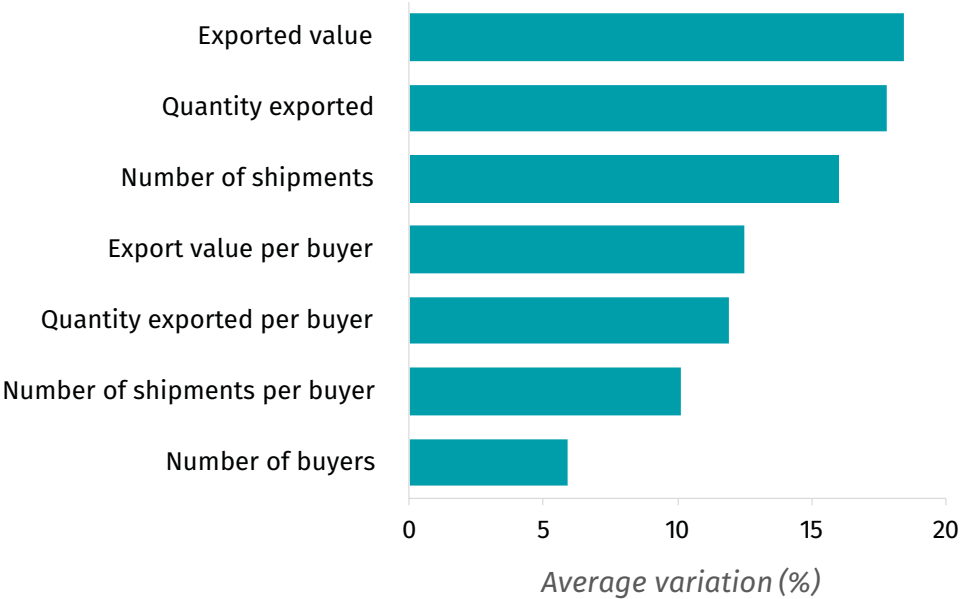
Depending on how these cost reductions are spread over the territory of each country, they could also have large distributional effects, contributing to an inclusive recovery. For example, Volpe Martincus et al. (2013) estimate that investments that benefit the poorest regions, with the least access to infrastructure, would boost their exports by 13% on average, and would increase the number of products exported by as much as 30% in some cases.

There are also major potential benefits from investing in both physical infrastructure and administrative procedures at ports and border crossings, one of the key components of logistical costs. For example,

Peruvian data on maritime imports for 2013 reveal that, on average, total border times and port and custom processing times, respectively, accounted for 37.3% and 21.9% of the total time between departure from the country of origin's port and release from customs (Volpe, 2017).

At the end of the 1990s, and particularly after the mid- 2000s, countries began to introduce substantial organizational changes to their border and customs agencies, using information and communication technologies to allow for digital completion of forms and procedures, and to implement initiatives to facilitate cross-border shipments. However, much still remains to be done. The degree of progress made in implementing these initiatives, which are explicit commitments in the WTO's Trade Facilitation Agreement, has been relatively low in the region. Figure 10 uses the case of Uruguay to illustrate the significant benefits to international trade resulting from these types of innovations.

Figure 10. Impact of trade facilitation measures on Uruguayan exports



**Note:** The figure above shows estimated percentage change in value of exports, quantity (weight) exported, number of shipments, export value per shipment, quantity exported per shipment, number of buyers, value of export per buyer, quantity exported per buyer, number of shipments per buyer and unit value in response to a 1% decrease in customs processing times.

Source: Volpe, 2017.

Many of the challenges and opportunities identified may require major investments that are not easily reconciled with the fiscal restrictions in most countries. Making such investments viable will depend on the re-allocation of public resources or on a greater participation by private



investors. However, many of the advances needed will depend solely on political will and widely available technical knowledge, since they require institutional reforms and transparent regulatory frameworks that encourage competition. The same may be said of the actions required to optimize customs procedures. Given the expected scale of the impacts on foreign trade and their importance in promoting the recovery of growth, these are opportunities that governments cannot afford to ignore.

Infrastructure and its impact on income distribution

Despite the progress made in recent decades, Latin America and the Caribbean is still one of the planet's most unequal regions in terms of income distribution. This phenomenon is largely associated with the major difficulties the region has faced in creating formal, well-paid jobs. Investing in infrastructure can help to create high-quality jobs and promote inclusive growth in different ways.

One concrete approach to studying the impacts on income distribution and job creation is through the use of computable general equilibrium models (CGE models). In a novel exercise presented in the book *Development in the Americas, 2020* (DIA; Cavallo et al., 2020), simulations using general equilibrium models were carried out to understand how income distribution is affected by improvements in the efficiency of infrastructure services provided in eight countries of the region (Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Jamaica and Peru). This exercise shows that modest improvements in the productivity and efficiency<sup>8</sup> of infrastructure services (improvements of 5%) increase economic growth in an inclusive manner, benefiting low-income households more than high-income households (Figure 11). The difference in relative growth in favor of the poor is 28% on average. This effect is particularly noteworthy in Chile (where increases in the incomes of the poorest 40% of the population exceed those of the wealthiest by 70%) and in Peru (by 40%).

8 The study refers to *productivity* as maintaining the production level in a particular industry by reducing the requirements of productive factors; and *efficiency* as maintaining the production level by reducing consumption of intermediate inputs.

Figure 11. Relative improvement in population's income through improvements in productivity and efficiency of infrastructure services



Source: DIA 2020 (Cavallo et al., 2020).

Several factors interact to explain why the real incomes of the poor increase more than those of the wealthy. On the one hand, household expenditure on infrastructure services represents a larger proportion of the incomes of the poorest quintile than those of the wealthiest quintile; therefore, poor households benefit more from lower prices generated by greater efficiency in the infrastructure sectors. Furthermore, the labor markets are fired up in the measure that the economy grows more rapidly, further increasing real incomes, especially those of the poor because they obtain a larger proportion of their incomes from work.<sup>9</sup> Finally, all the countries analyzed have some type of conditional cash transfer (CCT) program targeted at the poorest populations. These targeted transfers increase in the measure that revenues increase through greater economic growth, thereby benefiting the population that receives the transfers.

9 On average, the two poorest quintiles of the population of the countries analyzed obtain 72% of their income from work and cash transfers while the wealthiest quintile receives only 47% of its income from those sources.

infrastructure services play a crucial role in social inclusion and the quality of life of the population, especially of the poorest sectors.

In addition, DIA 2020 (Cavallo et al., 2020) emphasizes the importance of adequate regulation of infrastructure services to balance the distribution of benefits from investment between investors and consumers of the services. To demonstrate the importance of this point, a simulation was carried out in which service providers were allowed to establish rates that would yield profits above the market equilibrium for their investments.<sup>10</sup> The results of this exercise revealed a regressive effect, since the owners of the investment capital, typically belonging to the wealthiest quintiles of income distribution, benefited at the expense of higher service rates for consumers. Beyond the redistributive effect, the impact of a lack of adequate regulation on growth was negative, strongly reducing the benefits attainable through improvements in productivity and efficiency.

Aside from their inclusive impacts on incomes, infrastructure services play a crucial role in social inclusion and the quality of life of the population, especially of the poorest sectors. Infrastructure has helped to reduce inequality through various channels simultaneously: by increasing connections to infrastructure services (households that receive access tend to be much poorer than those that already have basic services), allowing small and medium-scale businesses - the main source of job creation in Latin America and the Caribbean (IDB, 2010) - to be more productive, effectively integrating regions that lag behind and promoting innovation and productivity by adopting communications technologies. However, despite receiving growing attention, the full inclusion of consumers with disabilities and the gender dimension are components that lag behind in the infrastructure agenda of Latin America and the Caribbean.

To maximize its impacts on tackling inequality, it is essential to understand the relationship between infrastructure and people, in other words, the users, but also with all those who participate in the investment and supply chain of infrastructure services. To be inclusive, infrastructure must be designed to meet the needs of existing and potential users; improving the quality of life of users with disabilities implies thinking about the accessibility of public transport systems; improving safety measures such as efficient urban lighting and upgraded public spaces; and improving the efficiency of public transport routes requires studying and consulting users about better alternatives to satisfy their needs.

<sup>10</sup> This exercise was based on the assumption that rates for infrastructure services were established using a 15% mark-up over the cost of providing the service.

## Investment in infrastructure and job creation

The construction of infrastructure generates direct employment in the planning, supervision and execution of the works; at the same time, it creates indirect jobs as a result of demand for associated inputs and services. The capacity of infrastructure investment to drive employment is one of the main benefits it offers to meet the needs of the post COVID-19 economic recovery. Restrictions on the population's mobility has had a particularly severe impact on employment rates in the region, and the as yet undetermined damage suffered by the productive fabric threatens to prolong the duration and consequences of the abrupt decline in jobs. Quantifying the enormous potential of infrastructure to tackle this problem is, therefore, central to the task of economic recovery.

Although these impacts are highly relevant from the perspective of policymakers, few recent studies measure the effects of investment in infrastructure on creation of jobs. In order to remedy this shortcoming, IDB (2020c) has tried to estimate the impact on employment by reviewing administrative information from a basket of investment projects co-financed by the IDB and executed between 2015 and 2020, in the energy / transport / water / sanitation sectors.<sup>11</sup> This basket includes diverse projects, ranging from improving energy efficiency in public buildings to building electricity transmission lines, from the construction waste water treatment plants to the development of potable water connections, and from the expansion of airports to the maintenance of rural roads. The preliminary information from this exercise indicates that approximately 36,000 jobs are created in the region for every USD 1 billion invested in the construction of infrastructure. Direct jobs account for two-thirds of the total jobs created.

A similar study by the World Bank (Schwartz et al., 2009) found that investment in infrastructure has considerable potential - 10 per cent higher - to generate direct and indirect employment, averaging around 40,000 jobs annually per USD 1 billion invested in Latin America and the Caribbean. This study also found that the employment gains may be even greater in maintenance projects than in new construction works: maintenance projects for rural roads, for example, could generate between 200,000 and 500,000 direct jobs annually for every USD 1 billion invested.

<sup>11</sup> Projects analyzed to date are those financed with the following operations: CR-L1032, CR-L1065, GY-L1041, PR-1145, PR-L1029, PR-L1060, PR-L1080, NI-L1097, BA-L1025, GY-L1040, BR-L1491, BO-L1102, BO-L1186, BO-L1075, BO-L1095, BO-L1076, HO-L1121, HO-L1104, EC-L1147, EC-L1160, EC-L1219 and AR-X1013.

investment in sustainable and energy-efficient infrastructure has the potential to create twice the number of jobs compared with the traditional equivalents.

One particularly promising area in relation to job creation is investment in renewable energy and energy efficiency. A study by McKinsey (2020), which focused on European countries, found that investment in sustainable and energy-efficient infrastructure has the potential to create twice the number of jobs compared with the traditional equivalents. The same study also shows that a portfolio of sustainable investments in the energy and transportation sectors has the potential to generate 25,000 jobs per USD 1 billion invested. These projections are particularly attractive, considering that the estimates were made for advanced economies, where construction processes are more capital-intensive than in Latin America and the Caribbean.

In addition, investments in renewable energy, particularly those associated with distributed generation of wind and solar power, have the potential to generate major impacts in rural areas, traditionally the most backward and neglected areas in Latin America and the Caribbean. By facilitating the decentralization of investment, these interventions create jobs, increase access to infrastructure services, improve the incomes of citizens in rural areas and make the investments more equitable.

In conclusion, investment in sustainable and energy-efficient infrastructure not only serves to address the great environmental challenges facing this planet but also has the potential to support the creation jobs.

Figure 12. Impact on job creation of 12 types of investments in sustainable infrastructure

Estimated capital mobilized and impact of low- carbon stimulus measures for European country			
Stimulus measure by sector	Capital mobilized	Jobs per € million	Jobs created
	€ billion	number	thousand
Industry			
Improve industrial energy efficiency	1-5	~14-20	15-100
Build carbon-capture-and-storage infrastructure	1-4	~15-20	30-80
Buildings			
Retrofit houses for efficiency	50-80	~16-21	800-1.700
Install smart buildings systems	0,1-2,0	~14-19	2-40
Energy			
Reinforce the electricity-distribution grid	5-10	~15-20	75-200
Expand energy storage	1-5	~14-19	15-95
Accelerate build-out of wind and solar power	10-20	~13-18	130-360
Accelerate rollout of LED street lightning	0,1-0,2	~130-360	35-70
Transport			
Expand electric-vehicle charging networks	3-5	~13-18	40-90
Create bus rapid transit urban rail system	2-8	~20-25	40-200
Scale up electric-vehicle manufacturing	1-2	~14-19	20-40
Develop active-transport infrastructure	0,5-5,0	~20-25	10-130

Source: McKinsey (2020).



### 3 Constraints to investment in infrastructure: Latin America and the Caribbean need more and better investment in infrastructure

The preceding section showed that there are good arguments for prioritizing investment in infrastructure as a key component of the post-pandemic economic recovery plans. Investment in infrastructure has the potential to increase growth and boost productivity in the region in an inclusive manner. However, despite all the benefits of investment, the region's performance in this regard has been poor compared with other developing regions - and even with itself at other historic moments. Latin American and Caribbean countries have encountered serious difficulties in overcoming their fiscal shortcomings to increase public investment and have proved inefficient in transforming their resources into assets that improve the services provided to citizens and businesses. These limitations will undoubtedly be exacerbated during the post COVID-19 economic recovery, in light of the increased spending required to address the health emergency, the reduced tax income resulting from the recession, uncertainty over the capacity to finance the fiscal deficits and urgency of the actions required to emerge from the crisis. However, it is essential that these constraints do not result in decreased investment in infrastructure, as has occurred in the past. The region now faces the challenge of returning to the path toward growth in an inclusive and sustainable manner. To achieve those goals, it is impossible to envisage an alternative that does not include upgrading and improving the region's existing infrastructure. In order to maximize potential benefits from investing in infrastructure, Latin America and the Caribbean countries must invest more and better.

#### Fiscal constraints: How to invest more

Between 2008 and 2018, LAC countries invested on average 2.8% of GDP in infrastructure (2.3% from the public sector and 0.5% from the private sector).<sup>12</sup> Investment in infrastructure in Latin America and the Caribbean is well below that of other emerging economies: it stands at 5.7% in East Asia and the Pacific, 4.8% in the Middle East and North Africa and 4.3% in South Asia (Fay et al., 2017). The absolute figures help to put these differences into perspective. Between 2008 and 2018, Latin America and the Caribbean invested almost USD 125 billion annually, while China, a country

that has given top priority to its policy for investment in infrastructure, invested USD 450 billion annually during the same period. In per capita terms, China invests USD 330 annually in infrastructure, 65% more than the USD 200 invested by Latin America and the Caribbean. In this region, investment in infrastructure is low, using nearly all possible metrics: it is a small percentage in relation to regional GDP; it is a lower percentage of total investment (13.3%); and public investment in infrastructure accounts for only 7.4% of public expenditure.<sup>13</sup> Regional figures help to gauge the level of resources allocated to investment in infrastructure, but the specificities must be analyzed at the level of each country. Countries need to prepare and update their own estimates of their infrastructure investment requirements based, initially, on a realistic assessment of the available resources and setting priorities that reflect the social aspirations for development. Those estimates and priorities must result in the creation of a "bank" of investment projects. Unfortunately, few countries prepare estimates of their infrastructure investment needs on a regular basis, and the estimates that do exist largely come from academics or private companies, not from governments. Among the more recent examples, it is worth citing the estimates of the annual investment requirements for Bolivia (9% of GDP), Chile (5% of GDP), Colombia (4.5% of GDP) and Peru (4% of GDP).<sup>14</sup>

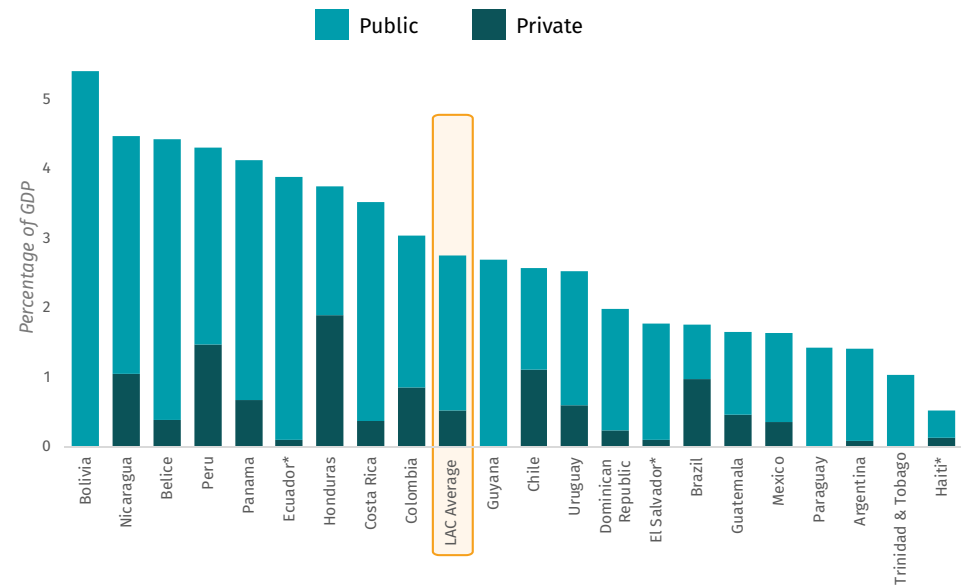
Between 2008 and 2018, investment levels fluctuated widely between countries (Figure 13); while some countries invested significant amounts (Belize, Bolivia, Nicaragua and Peru), the largest economies (Argentina, Brazil and Mexico) invested far less as a percentage of GDP.

<sup>12</sup> No data on public investment is available using a comparable methodology for a large sample of LAC countries prior to 2008. See Infralatam ([www.infralatam.info](http://www.infralatam.info)). The level of private investment was obtained from the Infrastructure Journal Database and from the Private Participation in Infrastructure (PPI) Database of the World Bank. The figure is a simple regional average.

<sup>13</sup> The ratios represent average total investment in infrastructure for 2008–2017, as reported by Infralatam, over gross (fixed) capital formation reported by ECLAC and investment in public infrastructure reported by Infralatam, over consolidated public expenditure in 2017, as reported by the IDB (2018).

<sup>14</sup> The references for reported investment requirements are: Bonifaz (2016), Bonifaz et al. (2015), Grijalva et al. (2017), Chilean Construction Chamber (2018), Bonifaz et al. (2019) and Yepes (2014). In 2019, the Government of Peru (Government of Peru, 2019) published results of an updated version of the study by Bonifaz et al. (2015) reporting an infrastructure gap of 8% of GDP. Estimates of investment requirements in infrastructure were reduced to 4% per year. This is due to several years of investment above 5% of GDP, which allowed for a significant reduction of the gaps in access to infrastructure in Peru.

**Figure 13.** Average investment in infrastructure, 2008–2017 (percentage of GDP)

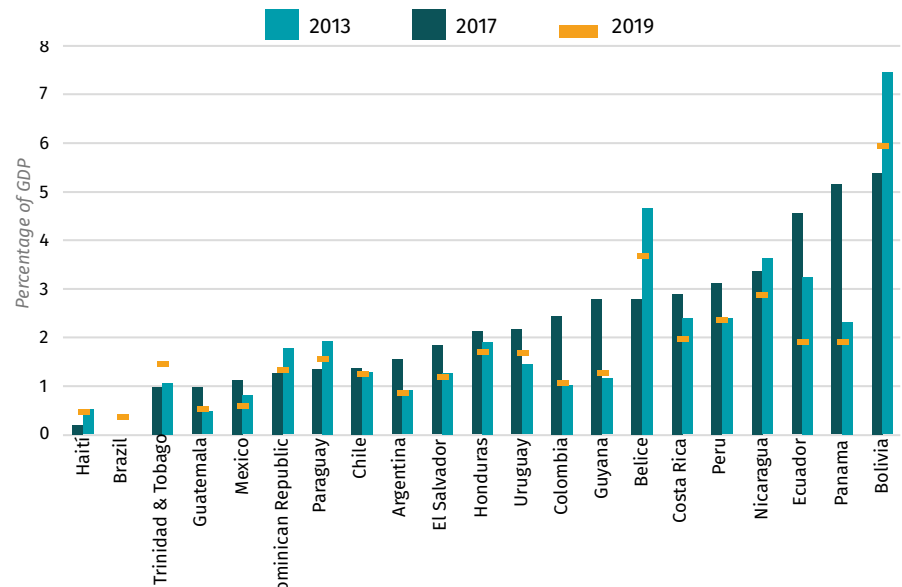


**Note:** Public investment data for all the countries between 2008 and 2017, with exception of Ecuador (2008–2016), El Salvador (2008–2015), Haiti (2012–2016) and the Dominican Republic (2009–2017).

**Source:** Infralatam ([www.infralatam.info](http://www.infralatam.info)) on public investment and database on private investment in infrastructure (PPI).

Figure 13 also shows that investment in infrastructure is primarily public investment in the great majority of the region’s countries, making it particularly sensitive to the cycles of expansion and contraction of public expenditure. In this regard, one of the root causes of the problem of low investment in infrastructure is that in Latin America and the Caribbean the record of public expenditure shows a bias against investment, one of its main components being, precisely, infrastructure. From 1995, current expenditures in the region have increased almost without interruption. By contrast, investment has been more volatile and has suffered prolonged periods of cutbacks. Between 2000 and 2016, total primary government expenditure (i.e., excluding the amounts allocated to servicing the public debt) in the region increased by 5.2% of GDP, with 88% of that figure corresponding to current expenditures; only 12% was allocated to longer term investments (Izquierdo et al., 2018). In fact, infrastructure expenditure in the region is procyclical and is subject to disproportionately large cutbacks in times of fiscal adjustment (Ardanaz and Izquierdo, 2017). Consequently, this results in a tendency to reduce public investment in infrastructure: in 2019, 70% of the countries in the region invested less than in 2013 (Figure 14).

**Figure 14.** Public investment in infrastructure in Latin America and the Caribbean, 2013–2019



**Source:** Infralatam ([www.infralatam.info](http://www.infralatam.info)).

What can governments do to eliminate the bias against public investment? One alternative proposed by Ardanaz et al. (2019) is to use flexible fiscal rules that protect public investment during periods of spending cutbacks. According to this study, since the mid-1980s, more than 90 countries (including 14 in Latin America and the Caribbean) have implemented fiscal rules to strengthen the public accounts. Fiscal rules have been effective in efforts to maintain fiscal deficits lower, but they have not been equally effective in mitigating the bias against public investment. This deficiency can be tackled by using fiscal rules that incorporate certain design features that safeguard public investment. These features include cyclically-adjusted fiscal targets, well-defined escape clauses in the event of unforeseen shocks, and provisions that favor investment, which are rules that exclude capital expenditures from the numerical targets imposed on fiscal aggregates. In countries with fiscal rules that lack those features, fiscal consolidation is associated with a 10% cut in capital expenditure, on average, while in countries whose fiscal rules include at least one of the flexible features mentioned previously, the decrease in investment is close to zero. Therefore, the design of fiscal rules can improve public investment results in the region.

The downward trend in public investment in infrastructure was already a matter of concern prior to the appearance of COVID-19, but the need for urgent expenses associated with the acute phase of the pandemic threatens to reduce the fiscal space necessary to even be able to maintain preexisting levels of investment. The immediate priorities for addressing the COVID-19 crisis are clear: cash transfers to vulnerable populations; credits and guarantees to businesses to help avoid bankruptcy and preserve jobs; and reinforcing the infrastructure and capacity of the region's health systems. Financing these urgent actions will imply expanding public spending and a significant reallocation of budget in a context in which revenues will decline due to the economic downturn and uncertainty about the capacity to finance the resulting deficits will increase.

However, in this crisis, it is essential to prevent a repetition of the previous cycles of compression in public investment. Therefore, it is crucial that the region find ways to maintain and aspire to increase - to the extent that specific circumstances in each country allow - investment in infrastructure.

A first option for increasing public investment in infrastructure without affecting the fiscal space is to reassign financial resources currently devoted to subsidize infrastructure services. According to recent estimates by Brichetti and Rivas (2020), in 2018 Latin America and the Caribbean allocated 0.6% of GDP to provide operating subsidies for transport, energy, water and sanitation services. Although the re-allocation of resources devoted to subsidize services can be a politically challenging task in the context of COVID-19, there are good arguments for exploring this alternative. Subsidies for infrastructure services are allocated mainly to the supply with low conditionality in relation to the performance of the services provided, and even the smaller proportion assigned to support demand lack effective targeting mechanisms; these allocation mechanisms result in leakages of resources to high-income users, reducing their effectiveness in guaranteeing affordable services to low-income users (Brichetti, 2020; FIEL, 2015).

The abovementioned estimates also underestimate the scale of the resources disbursed by the public sector to subsidize infrastructure services, since they do not calculate the totality of the resources assigned to state owned service providers. In this sense, it is important to take note of the limited transparency of the mechanisms for allocating subsidies in the region, ranging from fiduciary funds divested of their original purposes

to an inadequate classification of public expenditures (Brichetti and Rivas, 2020). Identifying and quantifying the amounts assigned to public utilities that provide infrastructure services is an urgent task, necessary to fully grasp the scale of inefficiencies in expenditure. To accomplish this objective, it is not only essential to ensure transparent mechanisms for the administration of public funds, but also to reform the governance of the region's public companies with the aim of increasing their efficiency and holding them accountable for the results obtained.

Finally, another option for boosting investment in infrastructure is to increase private sector involvement. The requirements for achieving this objective are many and encompass aspects ranging from governance and sector-specific regulatory frameworks to the adaptation and updating of financing and funding mechanisms. These challenges are described in detail in the penultimate section of this document. However, on this point it is important to emphasize a key factor for the viability of private participation in projects and the provision of infrastructure services: the need to renew the legitimacy of private sector participation as a valid alternative to achieve policy objectives. Past experiences of different modalities of private participation have varied in terms of their success; however a certain stigma exists at regional level regarding their effectiveness in obtaining benefits for the population. Combating that bias will be crucial during the post COVID-19 recovery if the private sector is to have a significant role in promoting investment in infrastructure.

### Governmental capacity challenges: How to invest better

The foregoing analysis shows the region's limited investment in infrastructure. To improve the performance of its economies, Latin America must invest more in infrastructure. But this is not achieved solely by increasing public and private resources allocated to infrastructure investment; it is also necessary to make more efficient use of the resources available. To understand the scale of the prevailing inefficiencies, it is worth mentioning that of the 2.3% of GDP in public investment in Latin America and the Caribbean, 0.65% of GDP is lost in inefficiencies (Serebrisky et al., 2017). In other words, nearly 35% of the investment is lost through inefficiency. Unless the region improves its investment efficiency, the infrastructure gap will be harder to close, will take longer and will cost more money. In other words, Latin America must invest more and must invest better in infrastructure.

*the need to renew  
the legitimacy  
of private sector  
participation  
as a valid  
alternative to  
achieve policy  
objectives*

When done properly, planning enables countries to select the projects with the highest economic and social rates of return.

There is no single recipe for investing better; doing so involves efforts to tackle several aspects simultaneously. A consistent plan to improve the efficiency with which public and private funds are transformed into assets and infrastructure services must contemplate, at minimum, the following actions: improving the planning of infrastructure projects, updating technical standards, reducing cost overruns and avoidable delays and improving the maintenance of existing assets.

#### Improving the planning of infrastructure projects

Investing better in infrastructure requires a more efficient public sector that can optimize the project cycles and attract the private sector at points where it can add value. Efforts to “invest in the investment process” can play a key role in increasing the returns on public and private investment and ensuring that investment generates benefits for growth, while at the same time maintaining fiscal sustainability. Selecting the appropriate combination of projects to deliver the infrastructure services required by countries’ economies depends on robust planning. When done properly, planning enables countries to select the projects with the highest economic and social rates of return.

The importance of planning goes far beyond the mere selection of projects with the greatest economic profitability, given that social demands are increasingly important. The best way to prevent conflicts and mitigate the negative effects of infrastructure projects is to integrate the social aspects from the initial stages of the planning process. The costs of ignoring the social dimension in planning have been quantified by Watkins et al. (2017). In a sample of 200 investment projects in Latin America and the Caribbean, social conflicts led to the cancelation of 36 projects, delays in 162 and cost overruns in 116 projects. The same is true of environmental demands. Considering the threats posed by climate change to infrastructure assets, project planning should include elements associated with decision-making in scenarios of deep uncertainty.

Awareness of the need to reinforce planning from the outset and incorporate essential elements such as environmental, social, and economic sustainability and governance, is gaining momentum. The international community is developing standards for building more sustainable infrastructure. During its Presidency of the G-20 in 2019, Japan put the spotlight on the importance of quality infrastructure, a concept that in practical terms implies adopting high standards to build resilient

and inclusive infrastructure. Aside from defining sustainability and its components, the focus is on planning and selecting the appropriate project and then taking the necessary steps to implement it correctly.

#### Adapt the scale of projects and modernize technical standards

Following the planning process, which should produce the best possible infrastructure projects, the first stage of a project where efficiency gains can be generated is defining the project scope and technical specifications. Will countries in the region use the most up-to-date engineering specifications to match supply with demand? There is no way to answer this question definitively, but data from case studies indicate there is plenty of room for improvement. A study on engineering designs for water purification plants in South America (Páez et al., 2019) indicates that assumptions about demand contained in regulations establishing engineering specifications are outdated. As a result, over-investment in infrastructure in the countries studied ranged from 12% to 26%. In turn, over-investment in capacity increased maintenance costs by 10%. The conclusion is clear: proper definition of technical specifications of the projects to match demand could be a source of efficiency and savings in the region’s infrastructure investment process.

#### Minimize avoidable costs overruns

Cost overruns are generally attributed to perverse incentives and illegal conduct, such as below-cost bidding and corruption before and during the construction. But the cost of overruns is not always due to corruption or inefficiency in the public agencies involved. The serious and varied risks inherent in infrastructure development often create contingencies that are difficult to anticipate at the start of a project. These risks range from more complex geological conditions than anticipated and previously unknown archeological sites, to lack of well-defined property rights, which can delay land acquisition. It is clear that these contingencies can be partially anticipated and mitigated by proper project evaluation and inclusion of forecasts in the contract; however, residual risks that can cause cost overruns may persist.

Cost overruns are a widespread reality in infrastructure development although there are a few studies that provide evidence of cost overruns



for comparable projects in different countries or regions.<sup>15</sup> Flyvbjerg (2016) estimated that global cost overruns represent 28% of total infrastructure investment cost. This means that the average infrastructure project could be built with 28% less financial resources. Even countries such as Australia, which is considered to have high performance in infrastructure development from a wide range of indicators, incurs cost overruns from 12% to 35% for public private partnerships (PPPs) and public procurement contracts, respectively (Duffield and Raisbeck, 2007).

How do Latin America and the Caribbean compare with the rest of the world in terms of cost performance? The answer is not encouraging. Cost overruns of 48% in the region nearly double the global average of 28% (Flyvbjerg, 2016). In fact, Latin America and the Caribbean is the only region in the world where cost overruns have been rising systematically over time; in Europe and Asia, cost overruns have decreased (Flyvbjerg and Sustain, 2016).<sup>16</sup> Other sources confirm the region's unfavorable position. According to Guasch et al. (2016), 75% of infrastructure projects in Latin America experience cost overruns. Dams projects have the highest cost overruns, at 95% worldwide and 103% in Latin America and the Caribbean. The greatest difference in cost overruns between Latin America and the Caribbean and the rest of the world is found in road construction: 23% worldwide and 53% in LAC (Flyvbjerg and Sustain, 2016). Bonifaz (2019) confirms excessive cost overruns in the region.

However, these estimates do not provide information on what percentage of cost overruns are avoidable. Attempting to answer this question, DIA 2020 (Cavallo et al., 2020) studied cost overruns in infrastructure projects financed by multilateral development banks (MDB), understanding that an overrun can be indicative of a necessary minimum deviation from the investment budget. The MDBs have high standards and safeguards for project design and implementation, which result in stricter practices with respect to feasibility, procurement, transparency, and oversight than in most national systems in the region. In projects developed under this

<sup>15</sup> Extensive literature indicates that infrastructure construction is associated with considerable cost overruns (Flyvbjerg, 2007, 2016; Flyvbjerg et al., 2002, 2003, 2004; Ashan and Gunawan, 2010; Cantarelli et al., 2010). This literature points to four dimensions that explain cost overruns in infrastructure projects: technical, economic, political and sociological (Flyvbjerg and Sustain, 2016). Technical factors in cost overruns are errors in forecasts and risks, which are complex and difficult to specify and quantify in infrastructure projects. Economic factors include the problems of principal-agent between public officials who decide what projects to build and the society that will be the beneficiary. The objectives of public agents and societies are not always aligned, so the decisions of public agents may not maximize social well-being. There is a sociological/psychological factor, known as the "optimistic valuation." Agents tend to believe that project costs, risks and delivery times will be less or shorter than they have been in other similar projects. (Flyvbjerg et al., 2004).

<sup>16</sup> See Flyvbjerg (2016) for a description of the database.

stricter regulation, contingencies should be better identified, measured and managed.<sup>17</sup> Accordingly, cost overruns of MDB-financed projects could be expected to be a lower bound, at least when compared to those implemented without using standards as stringent as the MDB standards. The second step in the exercise is to compare the cost overruns of MDB-financed projects with the cost overruns in the specialized literature. The difference provides an estimate of how much could be saved through more efficient infrastructure investment. Thus, the exercise provides a quantification of the inefficiency of public investment in infrastructure in Latin America and the Caribbean.<sup>18</sup>

The sample of MDB-financed projects includes 83 IDB-supported infrastructure projects executed between 1996 and 2015 and another 148 World Bank-supported projects executed between 1985 and 2010.<sup>19</sup> A comparison of cost overruns reported in the literature (48% on average) with the MDB-funded projects (20%) observed that if all public investment had the quality standards equivalent to MDB-funded projects (such as standardized project preparation processes and high-quality monitoring throughout the project cycle), Latin America and the Caribbean could save close to 25% of total project costs.<sup>20</sup> In recent years, the region's public investment in infrastructure reached an average of 2.3% of the GDP per year. Extrapolating from that level, preventing 25% of cost overruns could represent a savings of up to 0.45% of the regional GDP each year. In other words, keeping cost overruns to a minimum, LAC would have to spend only 1.85% of GDP to achieve the same result (measured in terms of construction of assets) currently obtained from an investment of 2.3% of GDP. The opportunity is broad and has great potential benefits.

<sup>17</sup> As an example, throughout the cycle of an infrastructure project, the MDBs use standardized processes to generate construction cost estimates at the planning stage and are mandated to report actual construction values at the end of the construction phase. Some countries produce similar information, but national systems rarely report data on actual cost of construction or evaluate the performance of infrastructure projects.

<sup>18</sup> Since the sample only includes public financing of infrastructure (loans awarded to governments and whose repayment has sovereign guarantee), the calculation of inefficiencies corresponds to public investment.

<sup>19</sup> Geographic distribution of the IDB sampling is as follows: 35% of projects were in Brazil, 7% in Colombia, 6% in Haiti, 6% in Peru, 6% in Uruguay, and 5% in Bolivia. The remaining 35% were in Argentina, Bahamas, Barbados, Belize, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, and Trinidad & Tobago. The geographic distribution of the World Bank projects: 26% were in Brazil, 10% in Argentina, 7% in Colombia, 6% in Peru, 5% in Honduras, 4% in Haiti and 4% in Mexico. The remaining 29% was distributed among Belize, Bolivia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Guyana, Jamaica, Nicaragua, Panama, Paraguay, Dominican Republic, Santa Lucia, Uruguay, and Venezuela.

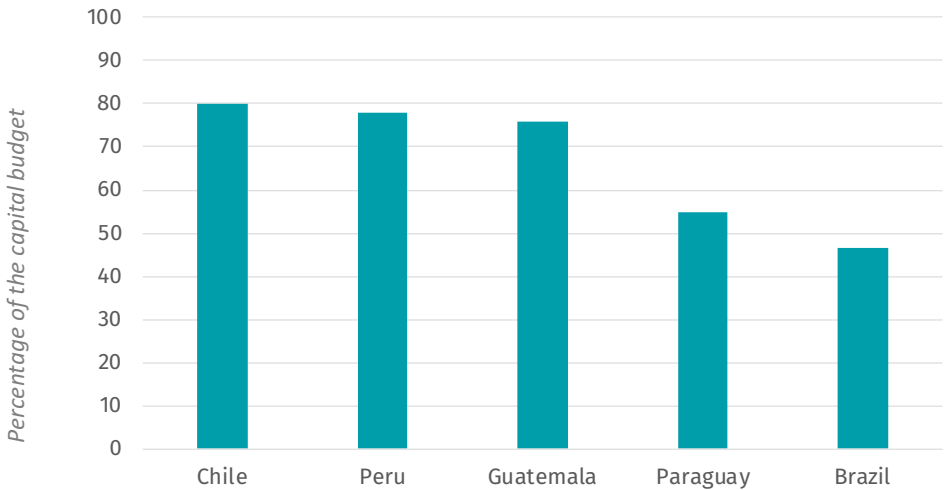
<sup>20</sup> The 25% saving is the rounded difference in cost overruns in the literature (48%) and that observed in the World Bank- and IDB-funded projects (20%).

Minimize preventable delays in project implementation

How much is lost when infrastructure assets take longer to build than expected? This question is relevant to Latin America and the Caribbean because, as has been pointed out, the region has invested much less than it needs in infrastructure. The best option for a region that invests little is to do so efficiently, and delays reflect inefficiency in spending.

Spending less than budgeted is a clear sign that investment projects are being delayed. It is also a symptom of poor planning. Izquierdo et al. (2018) argue that under-execution of budgets in the region is not infrastructure-specific, but covers all public investment. The difference between budget allocations and capital expenditure executed is considerable in the region, ranging from 20% to 53% (Figure 15).

Figure 15. Execution of capital expenditure budgets in five Latin American countries, 2015.



**Note:** Brazil and Guatemala data include federal and central governments only, respectively.

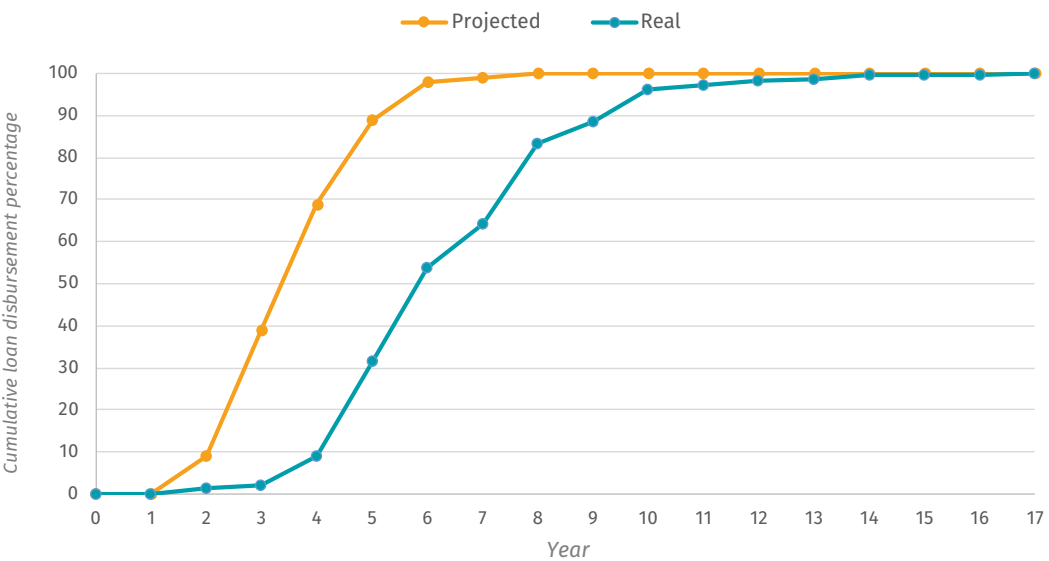
**Source:** Boost Open Budgets Portal, World Bank, Ministry of Economy and Finances of Peru, Integrated Budget Planning System of Brazil, Ministry of Public Works of Chile (2012–2014).

Delays in the infrastructure project cycle time frame are common. Causes include cumbersome permit and approval procedures and contingencies that arise during construction, either due to poor planning, strategic behavior of construction companies, poor supervision, or unforeseen events (physical obstacles not shown on maps, etc.). Delays tie up valuable resources, including physical and financial capital, and increase project’s financial costs in a variety of ways. And as delays grow, they can increase

costs, the most qualified staff can be reassigned to another project, and the needs and priorities of the beneficiaries might change (Leurs, 2005).

To assess the cost of delays, in DIA 2020<sup>21</sup> (Cavallo et al., 2020) an exercise was conducted based on IDB data on implementation of infrastructure projects to compare the theoretical disbursement curve with actual spending. Comparing these curves allows a monetary value to be assigned to the savings that could be achieved if disbursements for infrastructure projects stick to the schedule prepared when the works were planned. The projected disbursement curve was developed after a review of more than 100 project-planning documents (executed between 2003 and 2016) containing detailed information on implementation schedules. The second curve was constructed from actual disbursement patterns of a sample of 137 infrastructure projects. All disbursements were standardized using their approval dates as year 0, following disbursements annually. Figure 16 compares the curves and shows the gap between the theoretical and the real. For example, the projected curve predicts that in the fifth year, almost 90% of the loan should be disbursed. In practice, however, an average of only 30% had been disbursed at that time.

Figure 16. Projected and real cumulative disbursement curves, 2003–2016



**Note:** The two curves form an “S” that graphically illustrates how the infrastructure projects are conducted over time. The start of the curve is moment 0, the year of approval. The curve initially takes a little time while implementation is getting started. That period, which extends between approval and eligibility (government ratification or congressional authorization), takes approximately two years. Once disbursement begins, the curve’s slope rises, reflecting project implementation. It then decreases in later years, toward the end of the implementation cycle because much of the works were completed, leaving little disbursement remaining for work items.

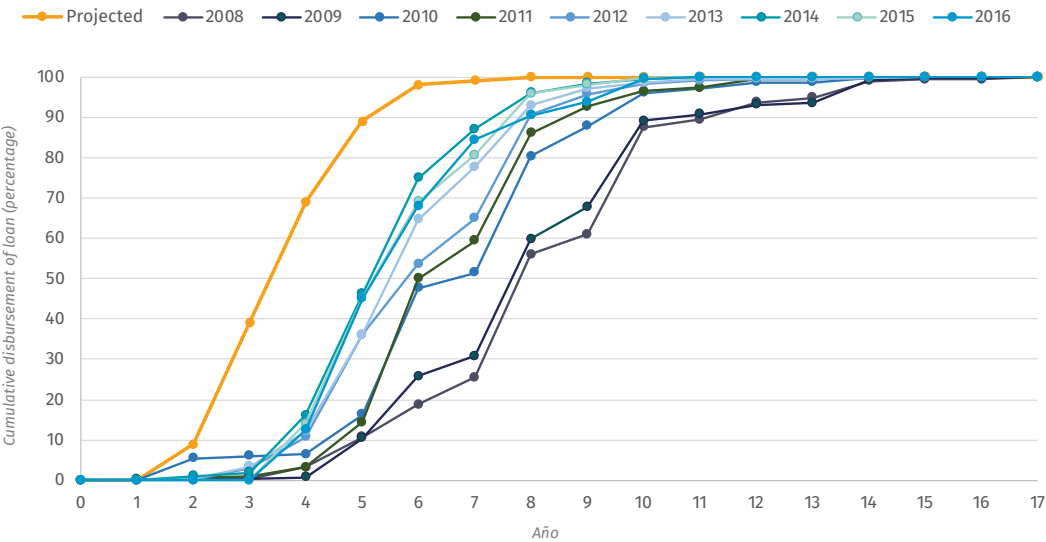
**Source:** DIA 2020 (Cavallo et al., 2020)

21 Estimates based on Serebrisky et al. (2018).

Deviation from the schedule set at the time of project approval has costs of lost opportunity in terms of resources that could have been allocated to other uses. One way to measure such costs is the interest that could be derived from immobilized capital. To estimate the financial costs of delays, the difference between the actual and theoretical disbursement curve is compared and current IDB interest rates are applied. Based on average interest rate over the analysis period (4.2%), disbursement inefficiencies add 10.5% to project costs. Depending on the interest rate, these costs range from 2.8% with the lowest rate the IDB has charged since 1997 (0.99%) to 19.7% with the highest rate (7.03%). Using the average between the minimum and maximum interest rates, a potential saving of 10% of total project amount is observed. Since 2.3% of the public investment in Latin America and the Caribbean has gone to infrastructure in recent years, avoiding delays could result in savings of up to 0.2% of regional GDP per year.

The good news is that recent performance has been improving. Between 2008 and 2016, the actual disbursement curve was approaching the theoretical curve (Figure 17). If the results of IDB-funded projects reflect a similar improvement in execution time of all infrastructure projects implemented by countries, the forecast is good: With the same budget, more infrastructure can be built.

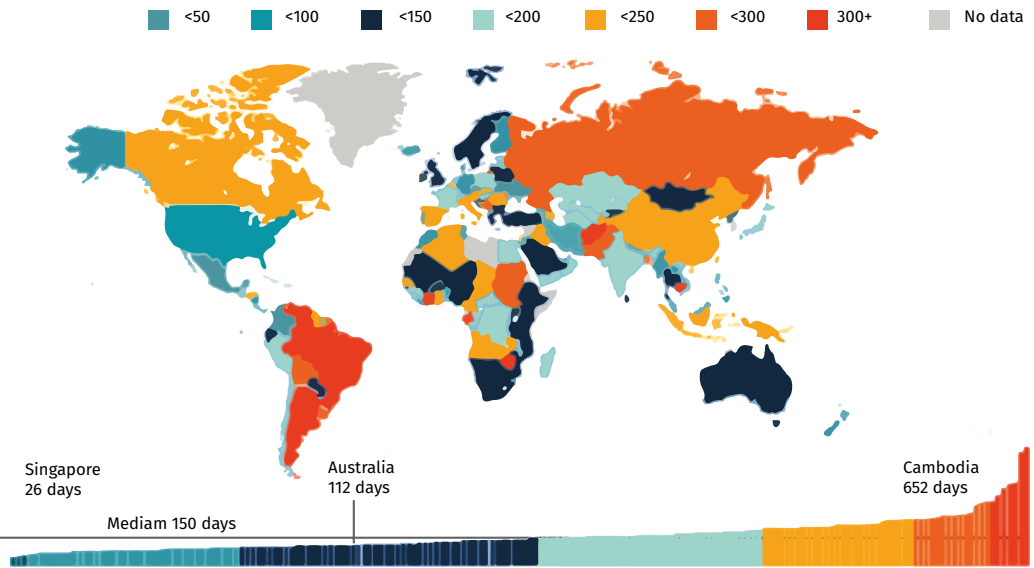
**Figure 17.** Projected vs. real curve of cumulative annual disbursements annually, 2008–2016



Source: DIA 2020 (Cavalo et al, 2020)

Permit and approval processes are key factors in delays, and in Latin America & Caribbean they take 25% longer than in countries of the Organization for Economic Cooperation and Development (OECD) (McKinsey, 2017; Figure 18). Of all developing regions, the Latin American and the Caribbean region has the world's poorest performance in this regard. The best performing country in the world is Singapore, where completion of all permit and approval procedures requires only 26 days. In Latin America and the Caribbean, the average is more than 181 days. Colombia has the least delays in the region (73 days). Between 2009 and 2011, Colombia succeeded in facilitating construction permits by improving electronic verification of pre-construction certificates, introducing regulations categorizing construction projects on the basis of risk, enabling option of electronic verification of various documents, adopting the rule that silence means consent, and incorporating a new unified form for obtaining building permits.

**Figure 18.** Days required to complete all permit and approval procedures by country



Source: McKinsey (2017) and World Bank.

Even without national maintenance data, the little evidence that does exist suggests the region is not investing enough in this area.

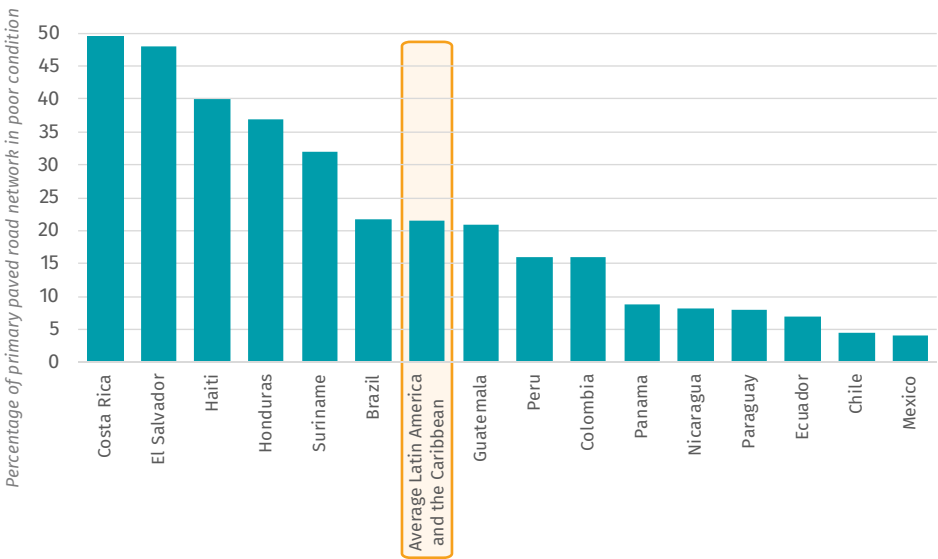
**Increase and improve planning for investment in maintenance**

The need to invest in maintenance is clear: maintenance helps keep the existing infrastructure working properly and prolongs its service life. Experts and those responsible for infrastructure public policy understand that infrastructure deterioration is not necessarily linear. Sparing maintenance costs causes faster deterioration of assets and accelerates the urgency for future maintenance. In the extreme case, inadequately maintained assets will have to be rehabilitated or even replaced. And what is obvious to public policy makers and experts is likewise evident to infrastructure users. While potholes damage vehicles and increase the likelihood of accidents, breaks in water pipes and low-reliability electrical networks undermine the quality of service. A poorly maintained structure may also force companies to invest in their own equipment to maintain continuity of service; for example, electricity generators that divert resources from their core businesses and thus reduce their competitiveness.

While it seems clear that countries systematically invest less than necessary in maintenance, it is not easy to substantiate this conclusion since there is scant information available on the subject. The problem is not unique to Latin America and the Caribbean. Data on maintenance is scarce in both developing and developed countries. A logical source of information on investment in both new and maintenance assets should be the national accounts of individual countries. However, countries use different methodologies, which complicates the identification and reporting of these costs and explains the difficulty of compiling maintenance costs data.

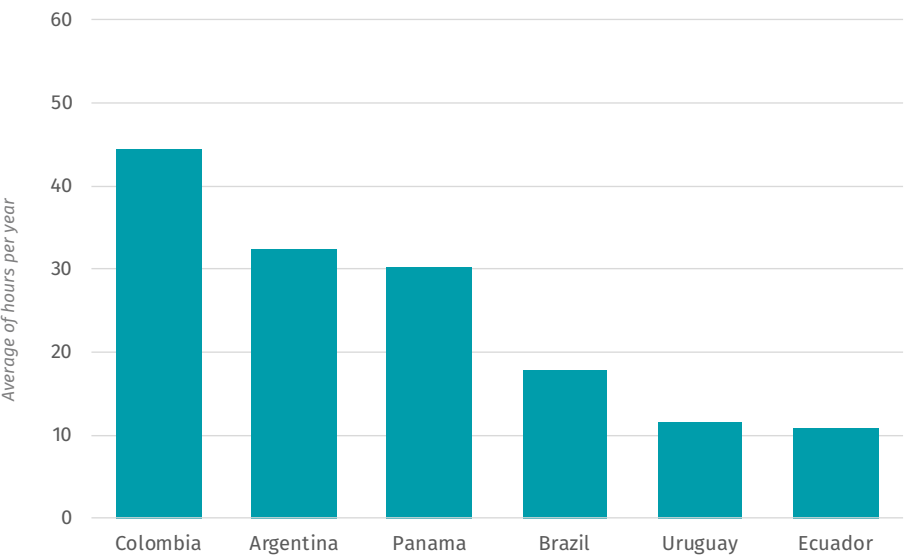
Although available evidence is scant and partial, it does show that maintenance is far from optimal. Much of the region's primary road network is in poor condition (Figure 19). Power outages vary widely between countries, suggesting that some have considerable room to improve maintenance (Figure 20). Data from a handful of countries shows that water losses – especially those of a technical nature – are also extremely common in the region. Improved maintenance in terms of good practices could bring them closer to reference countries; in the case of water, Singapore is the model, with only a 5% loss (Figure 21). In summary, even without national maintenance data, the little evidence that does exist suggests the region is not investing enough in this area.

**Figure 19.** Primary paved road network in poor condition



Source: Pastor (2019).

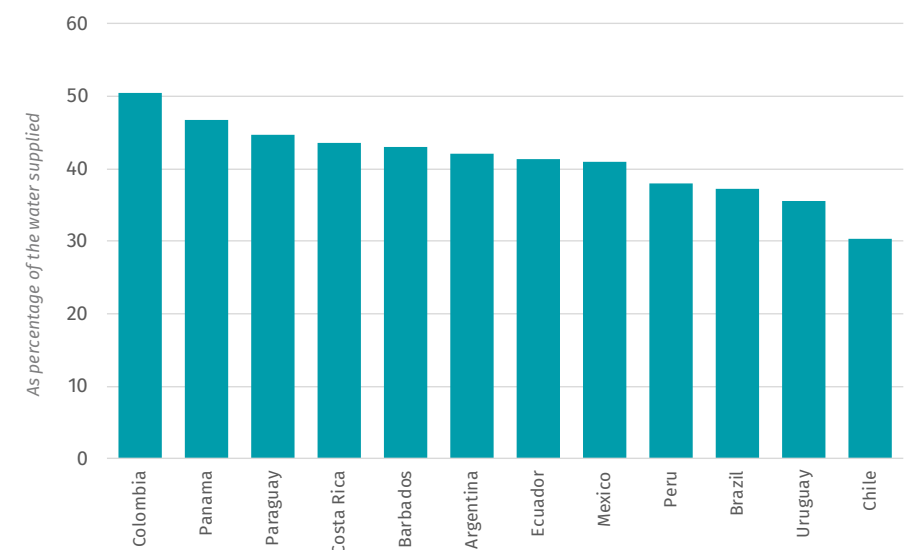
**Figure 20.** Duration of electric power outages, hours per year, 2015



Source: Sanin (2019).



**Figure 21.** Water losses in selected countries in Latin America



Source: Pastor (2019).

**The invisible enemy: increasing transparency, reducing corruption**

Corruption generates waste, scarcity and inflated prices, and creates bottlenecks in project management. The combined result of these effects is a reduction in quantity and quality of public goods and services, which can harm the citizens who depend on them. The extent of corruption in public contracting in the region is of particular concern. According to World Bank Business Surveys, Latin American & Caribbean companies pay twice as many bribes to public officials for contracts as their counterparts in OECD countries. In the Global Competitiveness Index 2017–2018, the region’s score was poorer than those of East Asia, Europe, North America, the Middle East, South Asia and sub-Saharan Africa in indicators on diversion of public funds, favoritism in decisions by public officials, and inefficiency in public spending.

There is much information at both global and regional levels to support the idea that infrastructure projects with public bidding are especially vulnerable to corruption. An estimated 10% to 25% of the value of public contracts is lost to corruption (Izquierdo et al., 2018). This information is consistent with the figures calculated on inefficiency in public spending on infrastructure.

The Latin American & Caribbean region has not remained idle in combating corruption. Most countries in the region have made progress on various fronts, including legislative and institutional reforms, civil society initiatives, and adoption of international standards on transparency and governance. Over the past two decades, many countries have improved their legal frameworks and institutional capacity to increase transparency and fight corruption (Casas-Zamora and Carter, 2017). They have also tried to raise their standards to international levels to promote integrity, especially in high-risk areas such as extractive industries, construction, and finance. Among the stakeholders establishing standards are the Extractive Industries Transparency Initiative (EITI), the Construction Sector Transparency Initiative (CosT), and the Financial Action Task Force (FATF).

Some countries in the region have also strengthened autonomous government audit organizations and expanded access to information. These legal mechanisms have provided a key resource for civil society organizations (CSOs) and investigative journalists, who perform a fundamental but often overlooked role in uncovering major episodes of corruption in the region (de Michele, 2017).

The improvements made to date, however, have not proportionally impacted the actual and perceived levels of corruption. Legal and institutional reforms are a necessary but insufficient condition for promoting integrity and combating corruption. The main challenge is to ensure the effectiveness of these mechanisms. The limited effectiveness of anti-corruption institutions is due to insufficient law enforcement, which in turn reflects lukewarm political commitment, limited financial and human resources, and inter-agency coordination challenges. Addressing the inefficiencies inherent in the fight against corruption will require persistence and measures taken by all sectors of the economy.

Beyond the necessary improvements to the legal framework, progress can be made in the fight against corruption with targeted interventions. New initiatives and solutions based on innovations in information and communications technologies (ICT) have great potential to increase transparency, oversight and efficiency in use of public resources in the region. Applications of digital technology include open data initiatives, use of big data and data mining to optimize management of public investment and use of social network platforms to encourage citizen participation in the public investment cycle. These new tools build on and complement the above-mentioned legal and institutional measures.

Open data initiatives, use of big data and data mining to optimize management of public investment and use of social network platforms to encourage citizen participation in the public investment cycle.

Data-analysis techniques are expanding the tools available for auditors and oversight bodies. Data mining enables public-sector auditors to systematically scrutinize large amounts of transactions and eventually identify risks of corruption in real time. Brazil's Public Spending Observatory, a unit of the Office of the Comptroller General, has developed data-mining tools that allow officials to audit USD 5 billion in public spending. In 2015 alone, the unit sounded the alarm in more than 7,500 cases, equivalent to contracts for USD 104 million (Moreno, 2017).

In 2016, IDB launched the regional InvestmentMap initiative, an online platform that allows users to monitor the physical and financial progress of public investment projects through data visualizations and geo-referenced maps. InvestmentMap was first used in Colombia in 2013 to monitor mining and hydrocarbon royalties paid to local governments. In 2018, platforms were inaugurated in Costa Rica, Paraguay, and Peru.

The first external evaluation of a similar but earlier platform, MapaRegalías, provided evidence of an 11% increase in the project completion rate. Furthermore, since the launch of MapaRegalías, the number of irregularities detected and referred to a control institution (mainly the attorney general) in Colombia increased from 57 in 2013 to more than 1,000 in 2016. InvestmentMap was developed to deepen and expand these results.

Sound legal frameworks remain key requirements for effective management of public investment. As the example of InvestmentMap demonstrated, proper legal provisions, budget transparency, and technology and incentives for citizens to use available information form a complete package. The reforms should be accompanied by effective regulations to prevent conflicts of interest, especially in public procurement, and to ensure cooperation between the bodies responsible for preventing, detecting and punishing fraud, misuse of public funds, and corruption.

**Addressing constraints on government capacities during post-COVID-19 recovery will require investing in the investment process today**

“Investing in the investment process” can have a high return in improving investment efficiency and is fundamental to building improved infrastructure in the future (“build back better”). The main problem with policies and actions adopted to improve the investment process is that there is still little known about their effectiveness. The region must put the issue of evaluation of impact on the agenda of public policies on infrastructure.

Despite these constraints, addressing an effective infrastructure investment process during the economic recovery phase will require starting today to establish the necessary institutional capacities, focused on policies that have consensus among experts in the infrastructure sector. These include the following: (i) develop and implement infrastructure plans that recognize the linkages and interdependencies of infrastructure services and generate a bank of projects that offer predictability to the construction industry and promote private participation; (ii) allocate sufficient pre-investment resources; i.e., prepare projects carefully to reduce the number of unforeseen contingencies, especially those leading to cost overruns; (iii) promote competition and innovation (for example, shifting from input-based selection criteria, old standards and lower price to quality-of-service selection in order to encourage adoption of new technologies); (iv) prioritize investment in maintenance, implementing improved contracts such as the region did on road rehabilitation and maintenance, in which it has proven experience and success, and change the paradigm from reactive to predictive maintenance, which is already possible given new technological advances; and (v) fight corruption in infrastructure, improving law enforcement, but also innovating with targeted technology solutions; for example, InvestmentMap – a geo-referenced platform of projects already implemented in Colombia, Peru and Costa Rica – enables citizens to identify how resources in their jurisdiction are spent, thus reducing opportunities for corruption.

## 4 Latin America and the Caribbean must invest in a green and digital future

The preceding sections show that investing more and better in infrastructure is critical to accelerating the post-COVID-19 economic recovery, generating jobs, improving income distribution, and integrating the region into the world. But maximizing the impact of infrastructure investment also requires identifying the sectors and types of investment with the greatest potential. In this sense, investing in the digitization of infrastructure services and in sustainable and environmentally friendly infrastructure are two key strategies for improving infrastructure building of the future, so the quantitative boost in investments is transformed into a qualitative leap in services provided to users and businesses and helps build the economies of the future.

### Infrastructure should be sustainable<sup>22</sup>

It is imperative that infrastructure be sustainable, meaning that projects be planned, designed, constructed, operated and dismantled in a way that ensures their economic, financial, social, institutional and environmental sustainability throughout project life cycle (IDB, 2018). Here we focus on the environmental aspects of sustainability. Environmentally sustainable infrastructure has three characteristics. First, its adverse effects on global climate should be minimal. Second, sustainable infrastructure should be resilient in the face of climate change events (including increasingly more frequent and intense storms and droughts) and a constantly changing regulatory and policy environment. And finally, it should have minimal effects on natural resources and local environments.

The reason behind this imperative is that decisions about amount, type and location of today's infrastructure investments will have impacts on climate, natural resources, and the environment for generations to come. Infrastructure tends to have a long lifespan and to create path dependencies and network effects. For example, investments in fossil-fuel power plants, which have an average service life of more than 40 years, are typically accompanied by investments in roads, railways, and oil or gas pipelines that also impact the climate, natural resources and the environment. These are long lasting and also have effects of dependent paths and networks. Therefore, investments in unsustainable infrastructure made today can adversely effect climate and the environment for decades.

<sup>22</sup> Parts of this section are taken from DIA 2020 (Cavallo et al., 2020), Chapters 6–8.

An increasingly popular type of infrastructure that tends to increase rather than compromise sustainability is natural infrastructure (also known as green infrastructure), which involves the use of natural or quasi-natural ecosystems to provide the same services as traditional or “gray” infrastructure (Browder et al. 2019). For example, in coastal areas, naturally occurring coral reefs or mangroves can be restored or protected to provide the same protection against storm surges and floods as levees, breakwaters, and bulkheads. In cities, green terraces and quasi-natural green spaces can contain storm water runoff, significantly reducing the burden on sewers. And in both urban and rural areas, natural forests and built wetlands can perform the same water purification functions as effluent treatment plants.

Under certain conditions, natural infrastructure can provide services as effectively, and in some cases as cost-efficiently, as traditional gray infrastructure. Natural infrastructure can also provide valuable services that traditional gray infrastructure cannot. For example, coral reefs, sea grass and mangroves not only help control floods, but they also help the nutrient cycle, filter water, provide a habitat for flora and fauna, and stimulate recreational and ecotourism activities. The Latin America and the Caribbean region is well positioned to take advantage of the natural infrastructure. Often regarded as a superpower of biodiversity, the LAC region is home to half of the world's remaining tropical forests, a quarter of mangroves, a fifth of coastal habitats and the second largest coral reef (Blackman et al., 2014; Bovarnick et al., 2010).

These two characteristics – ensuring that infrastructure is sustainable and utilizing natural infrastructure in addition to gray – have become hallmarks of the international organizations that are providing design of post-COVID-19 stimulus packages (Hammer and Hallegatte 2020; IMF 2020b; ONU 2020). Several countries have designed stimulus packages incorporating these principles, including China, Germany, and Korea (Vetter 2020; Chipman Koty 2020). How can infrastructure help to mitigate climate change, build resilience and reduce environmental and natural-resource degradation?

### Climate mitigation

To prevent the worsts effects of climate change – including sea level rise, increased disease outbreaks, intense frequent storms, water shortages, loss of biodiversity, and declining agricultural productivity – the world

The region accounts for 9% of the world's population but generates 12% of the world's overall CO<sub>2</sub>

will have to limit the increase in temperature to between 1.5 °C and 2 °C. That, in turn, will require zero carbon-dioxide (CO<sub>2</sub>) emissions by 2050 or 2070. For that purpose, the countries of Latin American and the Caribbean region have signed the Paris Accord, which involves voluntary commitments to reduce greenhouse gas (GHG) emissions. The decisions taken on infrastructure will significantly affect the likelihood that these commitments will be fulfilled.

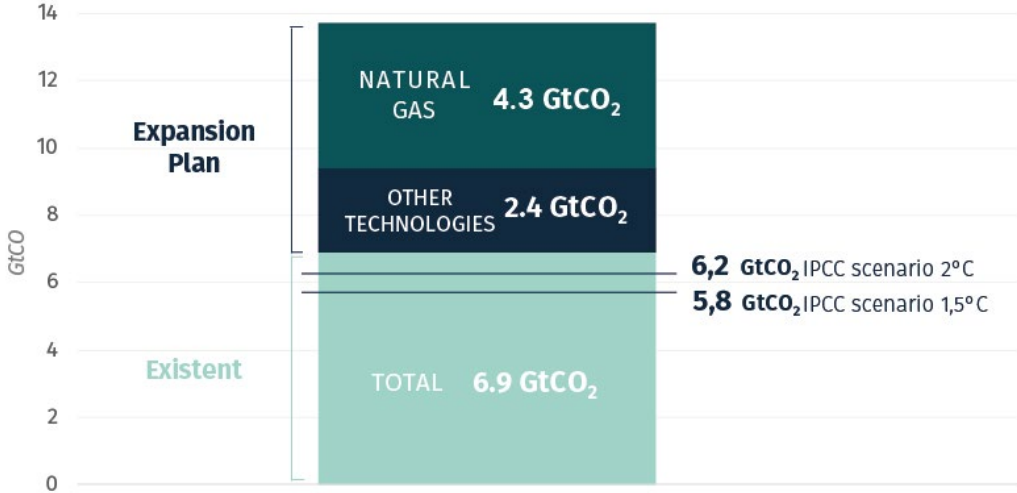
As is true for all regions of the world, achieving carbon neutrality in the coming decades will be a challenge for Latin America & Caribbean. The region accounts for 9% of the world's population but generates 12% of the world's overall CO<sub>2</sub> emissions. The two greatest sources of CO<sub>2</sub> (and other greenhouse gases) are power generation and food production. Use of fossil fuels for transport and electricity accounts for about 70% of total CO<sub>2</sub> emissions in the region. Between 1990 and 2014, these emissions increased 87%.

Can this trajectory be changed? Can adequate and reliable infrastructure services be provided in zero-carbon economy? The answer is yes, but achieving it requires significant progress in advancing the four pillars of decarbonization:

- Zero-carbon electricity generated by renewable sources and supplemented where it is not sufficient with other low-carbon sources.
- Mass electrification of economic activities with electric vehicles, boilers and heating systems for industrial and residential use. In situations where this is not possible, fossil fuels should be replaced by sustainably produced carbon-free fuels such as hydrogen and biofuels.
- Increased use of public transport and non-motorized transport, incorporated into mass public transport planning.
- Conservation and restoration of forests and other ecosystems with high atmospheric carbon absorption.

Several obstacles must be overcome to make the transition to zero-carbon emissions. The main one is to ensure that planning and business practices adopt technologies compatible with decarbonization. Figure 22 illustrates the magnitude of the challenge: the region's existing electricity plants already generate more CO<sub>2</sub> emissions than the maximum level compatible with climate targets. So the projected growth of generation capacity using natural gas is incompatible with the CO<sub>2</sub> emissions required to meet the net-zero emissions target.

**Figure 22.** Committed emissions from the region's electricity sector vs. emissions consistent with the temperature targets in the IPCC scenarios.



Source: González-Mahecha et al. (2019).

The good news is that providing carbon neutral energy and transport services by 2050 is technically possible. Moreover, doing so can bring economic benefits. The cost of renewable energy is falling rapidly. At three cents per kilowatt-hour (the value observed in energy tenders in several countries in the region in 2020), solar and wind power are already the cheapest way to generate energy. And if done correctly, the transition to a zero-carbon economy will create jobs and boost economic growth.

Price signals are a powerful tool for accelerating decarbonization. In practical terms, this basically means increasing the prices of fossil fuels. Hepburn et al. (2020) demonstrated the benefits of stimulus policies with an emphasis on sustainable interventions in fiscal stimulus packages following the 2008–2009 financial crisis. At the same time, the results of these “green” stimulus packages suggest that investments in more sustainable infrastructure also require important reforms in fossil fuel prices to achieve net-zero carbon emissions (Hammer and Hallegatte 2020). In Latin America and the Caribbean, reducing or eliminating subsidies, which are widespread and substantial, can significantly drive up the cost of fossil fuels. Since 2010, the region has subsidized fossil fuels with more than 1% of GDP per year. However, reducing



these subsidies could disproportionately affect the poor, so this should be managed carefully (Rentschler and Brazilian 2017; Skovgaard and van Asselt 2018). For example, this could be accomplished through tax transfers – redistributing resources used for subsidies through existing social protection programs (Schaffitzel et al., 2020). The drop in oil prices during the pandemic provides an opportunity to eliminate subsidies at a relatively low social and political cost. Failure to do so would mean that this drop in prices could delay the shift to renewable energies.

#### Resilience

Infrastructure must be resilient to both the direct effects of climate change (including sea level rise, severity and frequency of storms, droughts, and temperature rise) as well as to the policy and regulatory risks associated with climate change. Resilient pre-disaster investments reduce damage to infrastructure assets and minimize disruption of services, avoiding economic losses for individuals and businesses. There are many engineering options to increase resilience; for example, using earthquake-resistant construction materials, raising roads and railways, and increasing duplication in transmission networks so that service disruption is kept to a minimum in the event of a network segment being affected by a natural disaster. To remain resilient, structures must also be maintained properly.

Additional costs for resilient structures are estimated at 5% of the investment (Cavallo et al., 2020). Evidence shows that the higher cost of a building with more resilient infrastructure is often more than offset by the lower maintenance and repair costs of those assets over time.

Infrastructure design regulations should require exhaustive risk analysis from the start, at the design and planning stages of any new project. This can help ensure that important decisions with long-term downstream consequences can be made while all options are still feasible. Taking resilience into account from the start of the project is much more effective in time and costs than doing so later through modifications to previously approved engineering designs, when many features (such as project location) have already been determined, or even worse, to reconstruct or attempt to retrofit works after construction is completed. At the same time, even with the best effort, it is impossible to eliminate all risks. So governments should manage residual risk by promoting financial tools that distribute risk and finance reconstruction and contingency plans.

Resilient pre-disaster investments reduce damage to infrastructure assets and minimize disruption of services, avoiding economic losses for individuals and businesses.

Countries in the region can improve their risk management frameworks. Nearly two thirds of the countries in Latin America and the Caribbean have formal regulations that require disaster risk analysis prior to an investment, seismic resistance standards, a definition of critical infrastructure, and standardized technical requirements for critical infrastructure. However, less than one third of the countries in the region have formal regulations that establish risk transfer mechanisms, construction insurance, or service continuity plans. The water and sanitation sector is particularly critical.

Finally, infrastructure should be resilient to risks associated with changes in policies and regulations that address climate change and environmental degradation, such as risks of infrastructure investments becoming stranded assets. For example, an increase in price of coal can cause financial deficits for coal-fired power plants. And elimination of diesel subsidies can increase bus owners' risk of bankruptcy. These types of policy and regulatory risks should discourage investment in unsustainable infrastructure.

#### Limiting degradation of the local environment and natural resources

Infrastructure projects not only can have significant effects on global climate and resilience to climate change but they also can have more immediate effects (both negative and positive) on the environment and natural resources. Minimizing negative effects and reinforcing positive ones can yield enormous benefits for human health and natural resources.

One example of a negative impact is use of fossil fuels for electricity generation and transport. Use of fossil fuels for these purposes is the main cause of air pollution in most cities in Latin America and the Caribbean, where more than 80% of the population lives. At least 150 million people live in cities that do not meet WHO air quality standards, with air pollution causing 5% of premature deaths per year in the region and costing more than 2% of the GDP (World Bank and the Institute for Health Metrics, 2016). Investments in clean energy and transport infrastructure can directly increase human health benefits through improvements in environmental quality. These investments can even bring associated political benefits. There is early evidence suggesting that reduced air pollution during the confinement of the pandemic has increased public support for maintaining these improvements once the confinement eventually ends (CACC 2020).

Investment in sustainable infrastructure not only can prevent damages but can also bring about related environmental benefits. This is the case for investments in drinking water and proper sanitation to prevent environmental pollution. This is a significant problem in the region: approximately 25 million inhabitants in rural areas of Latin America and Caribbean are in contact with water polluted by cities (UNEP, 2016). The region should invest more than USD 33 billion to bring the proportion of treated waste water up to just under two thirds by 2030 (CAF, 2012). In addition, 35% of the region's population has no access to safe drinking water and 78% has no access to securely managed sanitation services (World Bank, 2019). Investments in adequate drinking water and sanitation infrastructure can clearly have important benefits for human health both directly and also through improvements in environmental quality.

Another example of environmental benefits associated with investments in adequate and sustainable infrastructure is provided by a recent study by Vilela et al. (2020) that analyzed planned road expansion plans in the Amazon. The study found that cancelling economically unjustified projects could prevent 1.1 million hectares of deforestation, preserving ecosystems critical to biodiversity. The authors also found that careful selection of a subgroup from the projects planned can obtain 77% of the economic benefits at 10% of the environmental and social cost.

Making infrastructure sustainable in all the ways presented in this section – limiting greenhouse gases, ensuring resilience to climate change and natural disasters, minimizing degradation of the local environment and natural resources – requires development of a portfolio of policies. A particularly important policy is to ensure that market price for fossil fuels and other goods and services are appropriate for creating incentives that encourage sustainable infrastructure. Other equally important policies include careful planning and institutional capacity building for the planning, financing and implementation of sustainable infrastructure (IADB 2018; Serebrisky et al., 2018). These topics will be addressed in Section 5.

### Digitize the infrastructure

Infrastructure investment is by its very nature a prospective exercise. We must build assets today that can provide quality services we will need in the years to come. In this sense, we live in challenging times: expected changes in provision of services will be transformational. Take

for example the provision of electricity. The organization of electricity markets has begun to change dramatically, especially in the distribution segment. Until recently, distribution was characterized by monopolistic companies and passive consumers who demand electricity at the prices offered to them. From now on, however, the consumer will have an increasingly important role in generating his or her own electricity, becoming a consumer and producer at the same time (which has led to use of the term *prosumer*). Electricity companies, which will no longer be monopolies, will have to change their business models in order to survive.

The changes are driven by two simultaneous and mutually reinforcing trends: decentralization in electricity generation and digitization. Decentralized energy production in households and industries involves entry of a large number of producers into the energy market, made possible by advances in technology and dropping costs. Digitization in turn will enable consumers to exchange electricity on the market, either with the distribution company, or increasingly, with other consumers. But digitization's impact will be much broader. Growing digitization allows distribution companies to use tools (such as machine learning) to optimize use of the power grid, reducing maintenance and investment costs. Digitization also enables implementation of demand response mechanisms for consumers and cost reduction through smart metering and application of the "Internet of Things" (IoT). For example, consumers may schedule use of household appliances or the charging of electric vehicles for the times of day when prices are lower or when there is more electricity on the grid (which will increasingly stabilize as dynamic prices are set).

In the transport sector, the most disruptive change will be automation, and the impact of further automation will largely depend on the digitization of services. Urban mobility began to experience a process of decentralization with the emergence of transport network companies (Uber and Cabify are the most well known in the region), which in practice has involved the entry of new service providers. Along with the development of electric vehicles, automation is expected to lead transport network companies to offer autonomous, connected, electric and shared (ACES) mobility services.<sup>23</sup> Mass transport (subways, metro trains, buses) and logistics services will increasingly be automated, opening up possibilities for significant increases in the sector's productivity.

23 ACES: Autonomous, connected, electric, shared [for vehicles].

Technological change can contribute to changing the paradigm under which water & sanitation services are organized and operated. More water is now being extracted than is necessary due to inefficient processes, and only a small fraction of wastewater is being treated. Technology can contribute to integrated water management; for example, by measuring and regulating the volume of water used by each major user (agriculture, industry and households); reducing costs for waste water treatment and expanding options for reuse.

Technological disruption will also impact infrastructure construction and maintenance. Digital tools, drones and satellite-based data can optimize planning, engineering designs, land acquisition and resettlement. Emerging technologies can reduce construction costs by 10% to 50% (Cavallo et al., 2020). Augmented and virtual reality, for example, can facilitate design and construction. Eventually, types of infrastructure to be built will evolve with new technologies. In addition, investing in predictive maintenance, along with or complementing corrective maintenance, will generate additional cost savings. This will be possible through analysis of large amounts of data, which will help identify and forecast maintenance needs and optimize their scheduling.

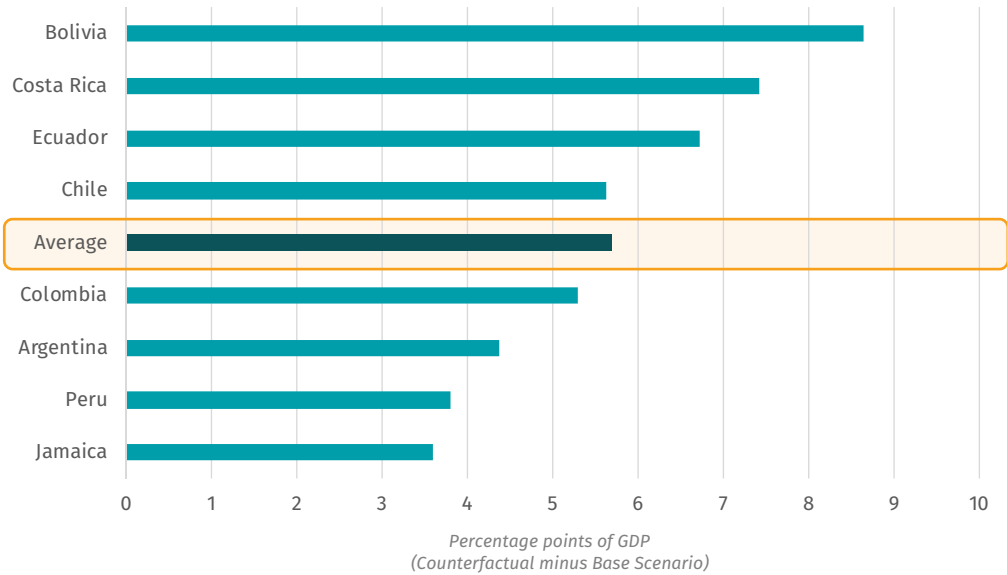
In a widely digital world with well-regulated digitization, consumers will pay less for better services that are consumed only when needed. Recurring power outages will be eliminated; it will be possible to reach each household with quality water; transportation to jobs will take less time and be more comfortable and safe. The good news is that the same benefits at the individual level can translate into more prosperous and equitable economies.

Cavallo et al. (2020) present simulations showing that digitization of services can boost economic growth. A 5% increase in efficiency (due to increased productive efficiency) would lead to a USD 200 billion increase in GDP (6% increase). The assumption of a 5% efficiency increase is reasonable taking into account the impact that digitization can have on reducing loss, improving energy efficiency and automating processes. Digitization of services, then, could provide a domestic source of growth for a region that is vulnerable to fluctuations due to external factors.

Given the above, digitization has the capacity to improve the infrastructure services' environmental performance: producing more efficient energy means better use of resources and accelerates the shift away from less green-friendly sources. Better integration and less waste of water and wider use of public transport are developments with positive downstream consequences for the environment.

In addition, digitization can be a source of inclusive growth: the simulations suggested that incomes in all households would increase, especially incomes in the poorest households, thus helping attain greater distributive equity (see Figures 23 and 24). Digitization would help bring down service production costs and thus the price paid for them. As lower-income households spend more of their income on services than richer households, they effect will be relatively greater on them.

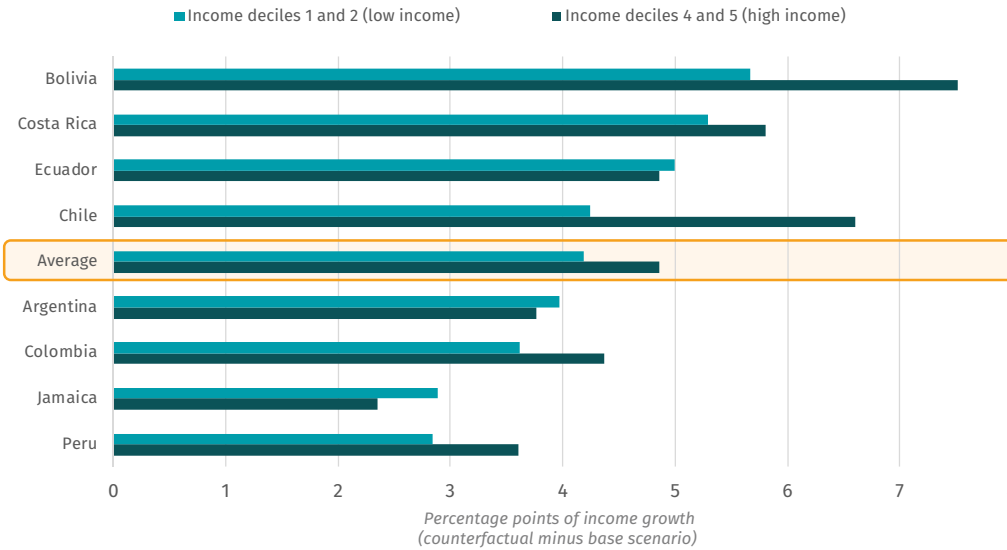
Figure 23. Impact on GDP of digitization of services



**Note:** The figure shows the cumulative change, in percentage points of GDP, from the counterfactual scenario (i.e., greater efficiency) minus the benchmark (i.e., growth with no change in digitization) over 10 years.

**Source:** DIA 2020 (Cavallo et al., 2020)

Figure 24. Impact of digitization of services on household income



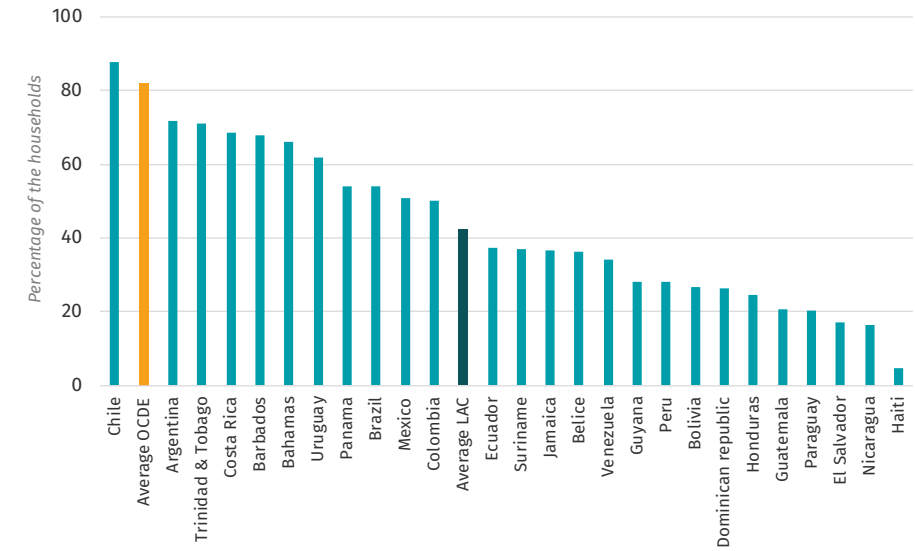
**Note:** The figure shows the cumulative change, in percentage points of real income, of counterfactual growth rates (i.e., greater efficiency) minus the benchmark (i.e., no change in digitalization) over 10 years.

**Source:** DIA 2020 (Cavallo et al., 2020)

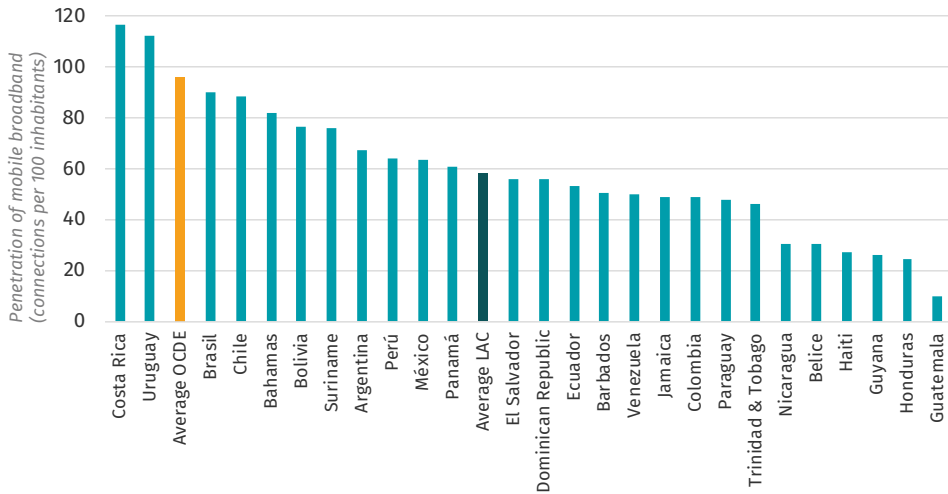
To benefit from technological advances in water, sanitation, energy and transport services, the region will need to develop its digital connectivity structure. Access indicators show that many countries are lagging behind in this area. Figure 25 shows that only two fifths of households have access to the Internet at home, and only two thirds of the population has access to mobile broadband.

**Figure 25.** Access to fixed and mobile communications technologies, Latin America and OECD, 2018

Households with Internet access (as percentage of total households)



Penetration of mobile broadband (connections per 100 inhabitants)

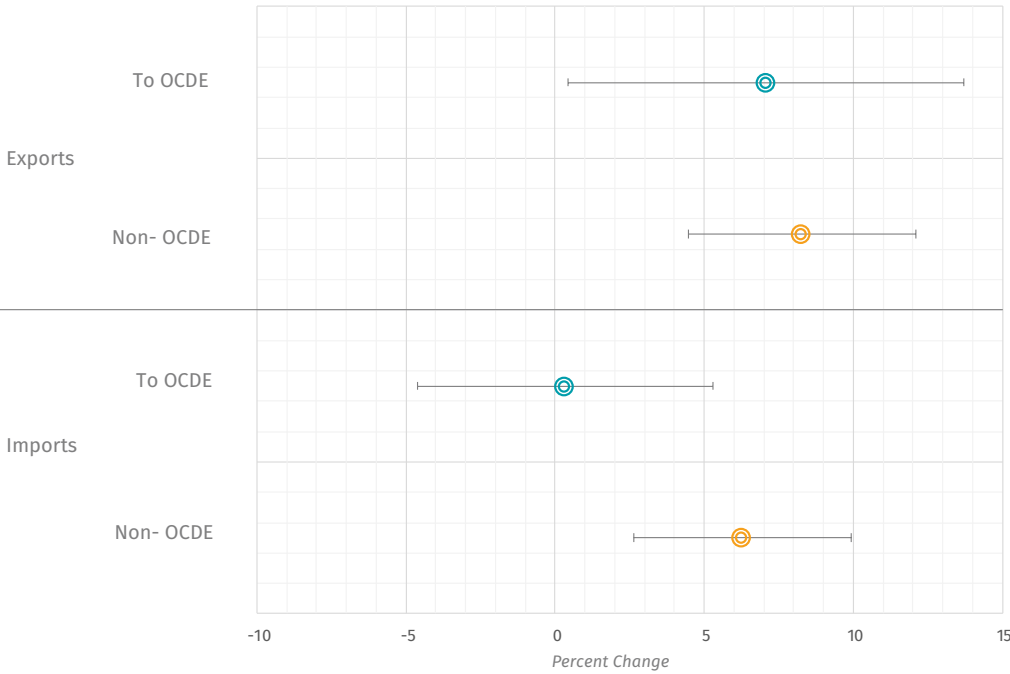


**Note:** Both figures based on most recent data available (2018).

**Source:** UIT (2018).

Commercial integration provides a concrete example of how digital infrastructure investment can enhance growth in the region. Currently, search and information costs, estimated between 6% and 13% of trade value (Volpe 2010), continue to severely limit exporters in the region, especially given the options created by the digital revolution and e-commerce. Empirical evidence consistently suggests that the Internet has boost international trade, which is directly associated with connectivity structure. For example, Estevadeordal et al. (2019) studied data on bilateral trade flows in 200 countries and the year in which each country connected to submarine fiber-optic cable. The conclusion: within the first 12 months or such connectivity, a developing country's exportation to other developing countries rises by 7.1% and to developed countries by 8.3% (see Figure 26).

**Figure 26.** The effect on international trade of the deployment of fiber optic cables



**Note:** A regression analysis of bilateral trade flows between more than 200 countries over the period 1990-2017 is performed on an dummy variable equal to 1 if the exporter or importer is connected to at least one submarine cable and on the logarithm of the number of Internet users. All regressions include controls for: fixed peer country effects (to control for factors that do not vary over time, such as distance, sharing a border, having the same language, etc.) and free trade agreements. The regressions that assess the effect of exports (imports) include fixed year-importing (exporting) country effects and control for their GDP. The sample is divided to take into account the various origins and destinations (OECD and non-OECD). For each variable, the point corresponds to the point estimate and the horizontal line to the 95% confidence interval. The standard errors are grouped by country pairs for inference purposes.

**Source:** Estevadeordal, Rodríguez Chatruc and Volpe Martincus (2019) based on data from COMTRADE, Telegeography, CEPII and the World Development Indicators.



The ideal scenario would have to be extremely dynamic supply and demand capable of acquiring and using digital services. On the supply side, countries need to adopt policies that help develop the communications infrastructure needed to achieve universal coverage, and also to promote a competitive and dynamic market for digital services. Countries in the region should create and implement a digital agenda. This includes developing a national broadband plan that facilitates open access to the infrastructure and promotes competition in segments where feasible. On the demand side, this plan should be accompanied by a properly targeted subsidy policy to achieve universal access and promote use of affordable communication services for the entire population. Finally, training should be provided so that users can take advantage of the opportunities offered by technology.

## 5 Getting down to work: how to sequence post-COVID-19 infrastructure investments

As we have seen so far, maximizing the impact of infrastructure investment on economic activity, income distribution, foreign trade and employment requires more and better investment and a focus on green infrastructure and digitization. In addition, it is necessary to invest at the right time to increase its effectiveness. Investing at the right time has two purposes: to achieve a greater multiplier effect of the investment on demand and to adjust to fiscal constraints. These benefits are particularly important in the context of developing countries with limited fiscal space.

### The importance of sequencing infrastructure investment

The region is in a much weaker fiscal position to respond to this crisis than it was at the time of the financial crisis of 2008–2009. The numbers are compelling. In 2008, the region's average fiscal balance was -0.4% of GDP, while in 2019 it was -3%. Public debt rose from 40% of GDP in 2008 to 62% in 2019. In 2009, the region was able to respond to the crisis with an average fiscal expansion of 3% of GDP – measured as the change in primary deficit between 2008 and 2009. However, at that time there was much heterogeneity and the capacity to respond depended largely on initial debt levels. Chile, for example, with a public debt of less than 5% of GDP, was able to respond with a fiscal expansion of more than 8% of GDP; while Jamaica, with a debt of almost 130% of GDP, was unable to expand spending and even had to reduce it. Given current debt levels, and taking into account the relationship between debt level and fiscal expansion observed during the 2008–2009 crisis, the response capacity today would be, on average, about half: 1.5% of GDP (IDB, 2020a).

If infrastructure investment is to play a relevant role in the response to the COVID-19 crisis, as this note argues it should, it is essential that investment be made on time and in a sequence appropriate to each country's context and needs. The urgency to reactivate economic activity is particularly challenging: investment cycles in infrastructure projects, from pre-investment to the start of construction works, can normally take several years. Therefore, in order to achieve the desired dynamic effect on demand in the short term, priority should be given to investment in projects with rapid execution and high impact on job creation and expansion of services, without, of course, sacrificing adequate planning and quality of the investment to ensure that the new infrastructure built is productive and sustainable. To this end, it is advisable to prioritize labor-intensive projects of low technical complexity with a high degree of advancement on the procurement process. Examples of such investments, of rapid deployment and easy standardization (commonly known in English as *shovel ready* projects) include:

- Maintenance activities of critical infrastructure works, which would not only quickly create jobs but could also help to maintain the quality of the services provided;
- Adaptation of urban works to guarantee their resilience and operability under conditions of social distancing; and
- Other specific investments needed to improve or provide continuity to provision of public services.

Ideally, and as needed, these investments should be accompanied by the procurement of technological equipment to promote digitization of some processes as well as inputs for the implementation of and constant adaptation to safety, health and hygiene protocols.

Despite the focus on short-term recovery during this phase, it will be crucial at the same time to prepare the ground for the viability of investments needed to promote longer-term economic and employment stability. This implies pursuing priority projects to increase the amount of infrastructure and its associated services, in particular to serve vulnerable and excluded populations and to generate new areas of economic dynamism (i.e., through development of new strategic value chains). Among other alternatives, projects should be properly planned and prepared to include:

- Infrastructure needed to expand coverage of basic services critical to competitiveness and productive development, including provision of water, sanitation, energy and waste management services;
- Strategic infrastructure for regional connectivity, such as ports of entry and integration corridors; and
- Infrastructure to develop strategic value chains, such as industrial parks, laboratories, and logistics centers.

### Infrastructure investment planning: an old pending task

As mentioned in Section 3, building better infrastructure will also require increasing the quality of the investment. This implies accompanying investments with reforms in policies, regulations and institutional frameworks needed to transform infrastructure services, not only to face the new post-emergency reality presented by COVID-19, but also to meet the challenges of environmental, financial, social, and institutional sustainability.

Proper sequencing of infrastructure projects requires establishment of adequate planning processes, based on prioritization criteria that

Establish clear prioritization and sequencing of infrastructure investment projects in order to execute them in an orderly and efficient manner requires the formulation of national infrastructure plans.

maximize socioeconomic impacts and improve efficiency throughout the project cycle. Several countries have embarked on reform agendas linked to the establishment of new institutions. For example, Australia, Canada and the United Kingdom have created specialized infrastructure centers, known as “infrastructure agencies” (Ibodies). Latin American and Caribbean countries could follow this example and establish similar institutions. Chile’s Infrastructure Policy Council is the only institution in the region that shares some of the design features of infrastructure agencies in the countries mentioned here.

Although I-bodies generally have different functions that are adapted to each institutional context, they all offer these common benefits: (i) they provide greater strategic coherence to the government’s infrastructure policy; (ii) they reduce political risk; (iii) they provide greater certainty to the market and investors; and (iv) they increase public confidence in infrastructure provision. Many I-bodies produce lists with independent assessments of infrastructure projects, based on audits or assessments of infrastructure needs and performance. While I-bodies are at an early stage of institutional development and it is too early to measure their impact, establishing specialized institutions represents a promising possible path for Latin American and Caribbean countries to choose the right projects and carry them out in the right way.

Beyond institutional solutions, the need to establish clear prioritization and sequencing of infrastructure investment projects in order to execute them in an orderly and efficient manner requires the formulation of national infrastructure plans. With support from the IDB, some countries in the region have followed this path (Peru in 2019 and the Dominican Republic in 2020) but, unfortunately, they are exceptions rather than the rule.

What are the components of an effective national infrastructure plan? While the economic, institutional and cultural features of each country influence the scope of these plans, several aspects are common.

First, national infrastructure plans are a tool for planning infrastructure investment covering periods of time longer than political cycles; this characteristic aims to diminish interference from different governments, which, in the region’s experience, have been characterized by promoting new plans of their own rather than giving continuity to pre-existing ones. The concept of national infrastructure plans is to be able to organize priorities, to the extent possible, based on technical analyses. Greater predictability also helps to facilitate involvement of the private sector in infrastructure development.

Second, infrastructure plans are built on the basis of a macroeconomic and sectoral diagnosis that allows for the establishment of realistic objectives, increasing transparency in decision-making.

Third, infrastructure plans aim to prioritize investments in order to exploit the synergies of investment projects. For example, in the case of Peru’s National Infrastructure Plan, one criterion of prioritization was associated with the development of logistics corridors; that is, based on implementation of a set of multisector works evaluated as a whole, rather than on an individual basis. Another example of the latter point is the consideration regarding the development of multiple-use dams (provision of drinking water, energy, recreation) in the case of the Dominican Republic.

In short, the ultimate goal of national investment plans is to provide countries with a framework they can use to develop projects in an orderly manner and with foresight, avoiding unnecessary bottlenecks in infrastructure investment, allowing investment in project planning with satisfactory time frames, and maintaining consistent levels of capital spending over time.

Finally, as noted in Section 4, one aspect that merits particular attention is the need for careful planning to ensure that infrastructure is environmentally as well as socially and financially sustainable (Seribrisky et al., 2018; Nassiry et al., 2016). Sustainability should be integrated into projects and project preparation facilities from the early stages of design; doing so can reduce the need for substantial modifications that delay projects and increase costs during later stages. For example, portfolio screening tools can be used to help ensure that infrastructure is resistant to the predicted impacts of climate change. And planning is needed to help ensure that greenhouse gas emissions and environmental impacts are minimized during construction and preparation. Careful planning is also needed to align infrastructure development with national climate mitigation, environment, biodiversity and disaster risk management objectives and strategies.

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## 6 Paying the bill

One of the main challenges in making the increased infrastructure investment necessary to drive the post-COVID-19 economic recovery is determining who will pay for it. The answer to this question requires, as a preliminary step, distinguishing between financing and funding, terms that are often used, mistakenly and indistinctly.

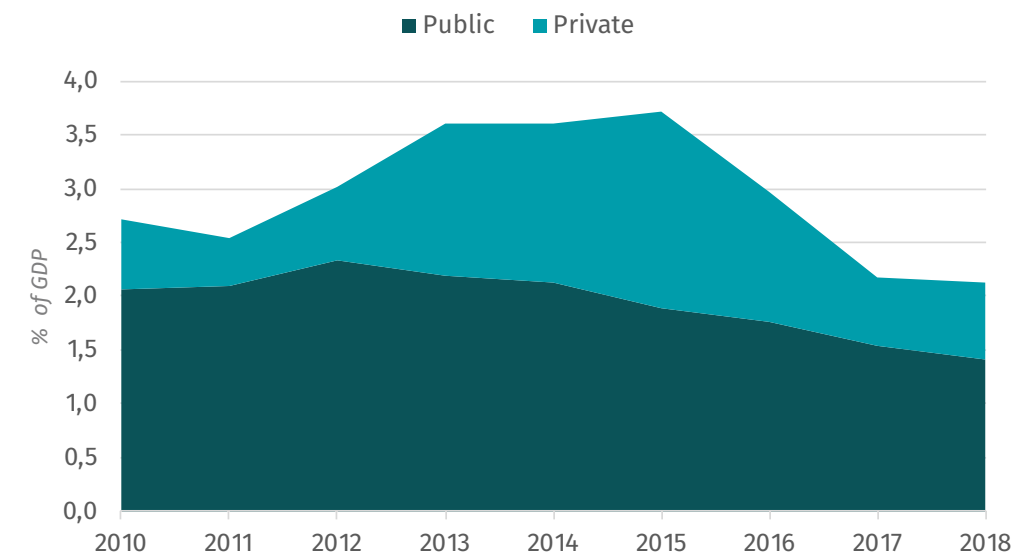
By financing we usually mean who contributes the capital. Typically, infrastructure projects require large investments upfront, while revenues from those investments are received only several years later. Revenue can come from a variety of sources, which determines how the project is funded. Revenue can come from users (consumers), who fund projects through the fees they pay for the use of a highway or for consumption of electricity, water, or sewage services. Revenue can also come in part (or in full) from public transfers in the form of direct subsidies for every kilometer of road built, every kilowatt of electricity produced or every liter of water supplied. Users can make the corresponding payments on the bills, and then there can be subsidies, whether they are targeted at households by income level, or at businesses. Therefore, in these cases the funding would be shared between the users and the government. Even so, if part of the funds comes from public sources, this implies funding through taxes since governments must eventually find a way to pay their obligations. The revenue is then used to pay the financiers a return on the capital they invested plus interest or dividends, depending on the type of financing obtained. In this sense, it is important for the financiers to know where the funding will come from, since this will largely determine the risks they will have to assume.

### Private participation to boost investment in infrastructure

Traditionally, most infrastructure investment in Latin America and the Caribbean has been public, surpassing private investment in almost all countries in the region. However, public investment fell sharply from historically high levels of 4% of GDP in the late 1980s to just over 2% since the 2000s. The drop in public investment in the region can be explained by two simultaneous policy decisions. First, fiscal space was reduced as a result of the adoption, in the 1990s, of macroeconomic policies aimed at reducing public spending. Second, policymakers believed that opening up infrastructure services to private participation would offset the reduction in public investment in infrastructure (Fay and Morrison, 2007), which in practice did not occur. Although private investment has played a

prominent role in some countries of the region, it averages no more than 0.5% of GDP. As Figure 27 shows, private investment has fluctuated widely and public investment has shown a decreasing trend.

**Figure 27.** Public and private investment in infrastructure in Latin America and the Caribbean, 2010–2018



Source: Infralatam, IJ Global and the PPI database of the World Bank.

In a context of very limited fiscal space resulting from the COVID-19 pandemic, attracting private investment is critical for infrastructure to drive economic growth. Private participation in infrastructure comprises different modalities, from privatization to performance management contracts. In many cases a private company provides the service without requiring government subsidies, while for other services the government provides transfers. The term public-private partnership (PPP) usually encompasses all governance arrangements that regulate private participation in infrastructure. PPPs do not turn bad projects into good projects; but there are circumstances in which PPPs can improve the quality of services or their efficiency through cost reduction.<sup>24</sup> From a public welfare point of view, PPPs are appropriate when improvements in performance exceed the increase in contracting and financing costs.

<sup>24</sup> World Bank (2013), *Value-for-Money Analysis, Practices and Challenges: How Governments Choose When to Use PPP to Deliver Public Infrastructure and Services*.



PPPs can improve service delivery through a variety of mechanisms, including (i) clear efficiency profits, through better planning, development and maintenance of assets; (ii) better alignment of incentives; (iii) better risk management throughout the project life cycle; and (iv) mobilization of additional financing. In terms of efficiency, PPPs can improve project selection by filtering out white elephants, and well-focused private sector management teams can improve project planning and implementation. The use of tools such as cost-benefit analysis in the contracting process can optimize decision-making. Performance-based contracts can align the incentives of private and public actors, resulting in better maintenance and improved quality of service delivery. Contracts that allow the builder of a project to take charge of its operation (and maintenance) improve incentives to ensure that construction is on schedule and of good quality at the same time. In addition, PPPs can serve as a tool to improve risk management (identification, allocation and mitigation).

The existing evidence for the region reveals that PPPs have improved results. For example, studies suggest that private participation has increased the efficiency and productivity of ports, reducing transport costs and increasing trade and competitiveness. And the costs of road rehabilitation and maintenance per PPP are 25-30% lower than those of traditional contracting.<sup>25</sup> Much more evidence is needed to measure the impact of PPPs, but the evidence that exists shows that when PPPs are properly structured and supervised they achieve both lower costs and improved quality.

Since 2010, many countries in Latin America and the Caribbean have strengthened their frameworks for creating PPPs. In 2009, only one country in the region had the institutions required by international standards. Ten years later, 16 countries had created specific bodies to implement PPPs, provide technical support and monitor private participation in infrastructure.<sup>26</sup> Resorting to private financing for infrastructure does not translate into automatic benefits and does not mean that governments should have less capacity. It could be argued that identifying good projects for private financing, conducting a bidding process, selecting and negotiating contracts and monitoring private sector actors are

<sup>25</sup> See Suárez-Alemán, Astesiano and Ponce de León (2020a) about airports; Suárez-Alemán, Astesiano and Ponce de León (2020b) about ports; and Pérez and Pereira (2020) about highways.

<sup>26</sup> See Cavallo and Powell (2019), Appendix F online, available at: <https://flagships.iadb.org/es/MacroReport2019/Construir-oportunidades-para-crecer-en-un-mundo-desafiante>.

actions that require a sophisticated set of skills. The region has made great strides and there is considerably more potential to increase private financing of infrastructure by further developing the institutions needed for PPPs.

### Considerations for boosting private investment in the context of COVID-19

This section briefly describes the main emerging trends generated by COVID-19 that will impact the capacity to attract private investment in infrastructure. It also proposes the use of instruments and highlights the catalytic role of multilateral agencies.

#### Risk allocation

The basic pillar for private investment to generate positive impacts is the correct allocation of risk. COVID-19 does not alter this premise and will force the strengthening of efforts to identify, measure and mitigate the risks generated by the pandemic.

The structuring of PPP agreements is likely to be affected by the impact of two trends that affect their financial sustainability. On the one hand, the increase in country risk will increase the cost of credit available to investors. On the other, the deterioration of public accounts will increase the uncertainty of fiscal contributions when they are needed in the projects. The credibility of governments to honor their obligations and eventually the use of guarantee instruments that can be granted by the MDBs will be critical.

The pandemic will generate new risks of a magnitude as yet unknown. The demand for public services has been reduced in many cases by amounts never seen before. This is the case for airports and public urban transport. And the uncertainty does not only extend to the recovery of demand to pre-COVID-19 levels; it is very likely that both the structure and the level of demand have changed permanently due to changes in habits (for example, lower volumes of business passengers due to greater use of remote work). The allocation of PPPs using instruments such as the Lower Net Present Value of Revenues (Engel et al., 1997), which is frequently used in Chile, may be an alternative for reducing the higher demand risks.

*The basic pillar for private investment to generate positive impacts is the correct allocation of risk.*

### How and where to boost private investment in the short term?

One avenue to attract private investment in a context of greater risk is *asset recycling*. Originally developed and promoted in Australia, asset recycling makes it possible to achieve two objectives: to attract private capital to investment alternatives with lower risks and to generate fiscal resources that can help finance new infrastructure. Attracting private investment to “brown” infrastructure, which involves assets in operation (as opposed to “green” infrastructure that requires construction), allows the involvement of the private sector in projects that, because they are already developed and have a less risky profile (the demand is known and there are no construction risks, among others), increasing potential investors interested in participating in the infrastructure.

Asset recycling also allows the public sector to monetize underutilized assets and simultaneously save costs associated with asset management, thereby increasing the ability to fund new projects. An asset recycling strategy can be implemented quickly but will depend on the political will to guarantee funding, preferably through user charges, which can be a difficult proposition in recessionary environments, which reduce users’ disposable income, making it difficult to pay for services.

In Section 3, the need to increase and improve plan investment in maintenance was discussed and in Section 5 it was pointed out that maintenance activities can be activated quickly to channel resources with significant potential for job creation and improved quality of services. The potential for attracting private capital to rehabilitation and maintenance projects is wide and is an area in which the Latin American and Caribbean region has proven experience. The region has pioneered the adoption of rehabilitation and maintenance contracts (CREMA) to improve the condition of the road network. CREMAs are widely used in Argentina, Brazil, Chile and Uruguay, among other countries in the region, but could be used much more. Other services, such as public lighting, also provide great opportunities for attracting private investment in the short term, although their implementation is often hampered by the lesser capacity of subnational levels of government, which are in charge of these services.

### The need for a well-prepared bank of projects

Lack of adequate project preparation is often mentioned as the main reason for renegotiation or cancellation of PPP projects. Pre-investment is often under-resourced due to its high cost, often in the range of 3-5% of total investment. Very few pre-investment funds have had continuity and scale. The limited evidence on their impacts shows that their impact on resource mobilization is very large (Fioravanti et al., 2019). Given the need to be selective in the context of a fiscal crisis such as that generated by COVID-19, it would be desirable for the countries of the region to create pre-investment funds.

### Multilateral development banking as a catalyst for private investment

What role can the IDB and other MDBs play in this process? Ketterer and Powell (2018) argue that MDBs can have a comparative advantage by acting as agents particularly well prepared to mitigate risks related to execution of public sector contracts, regulatory risks or expropriation risks. Empirically, Broccolini et al. (2020) note that MDBs attract private investors. Specifically, this work documents that the number of loans, the size of private capital flows, the number of creditors per loan, and the average maturity of loans increase in the years following the presence of syndicated loans with MDB participation. Focusing specifically on infrastructure, they note that when MDBs participate in syndicated loans, the average maturity of loans in the country-sector increases by 0.8 years in the short term and, over a 3-year period, they increase to 2.6 years. This work reveals that MDBs can play a relevant role in increasing financing for infrastructure works.

## 7 Infrastructure investment should be part of post-COVID-19 stimulus plans in Latin America and the Caribbean

The current health crisis linked to the COVID-19 pandemic has exposed the governments of Latin America and the Caribbean to difficult trade-offs between actions required to control the spread of the disease and those needed to sustain the social and economic activity of individuals and businesses. The economic crisis resulting from the need to restrict citizen mobility will also present difficult policy choices. Perhaps the most evident and obvious will be the need to balance policies to foster economic recovery with limited fiscal space. In this sense, the selection of efficient policy instruments will play a major role in the effectiveness of governments in tackling the various challenges associated with the crisis.

This note discussed the merits of investing in infrastructure to simultaneously address many of the challenges facing the region's governments during the recovery phase. Infrastructure investment has the potential to increase demand for goods and services, increasing economic activity and creating jobs in the short term. To this end, it is necessary to focus on investment in shovel-ready projects that enable rapid implementation while improving the services received by citizens and businesses.

Additionally, investment in infrastructure has the potential to generate sustainable growth through increases in productivity and increased integration and foreign trade, thus being a key component of a better building effort. Investing in environmentally friendly and digital infrastructure maximizes the benefits that can be achieved economically in the medium term, while simultaneously helping to meet the emissions commitments that the countries of the region have made. Enhancing sustainable economic growth in the medium term is also crucial to address the processes of fiscal consolidation that will undoubtedly be necessary.

While this note invites the public sector to boost investment in infrastructure, the size of the challenges ahead requires finding possible alternatives for the private sector to play a role in financing and funding infrastructure projects. Exploiting the potential of public-private partnerships will expand the scope of possible actions and, at the same time, free up scarce public resources to address other equally important social needs such as supporting unprotected groups affected by the pandemic. Finally, investment in infrastructure has the potential to contribute to more equitable income distribution at a time when social tensions will be maximized.

In conclusion, this note argues that infrastructure investment has a prominent role in the region's economic recovery plans. **Investing more and better in infrastructure will be necessary and cannot be postponed. Making this possible is a challenge for all of us.**

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