



Wired

Digital Connectivity for Inclusion and Growth

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Opportunities for All

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OVERVIEW

Wiring Latin America and the Caribbean for Growth and Inclusion

Latin America and the Caribbean (LAC) continues to competently manage challenges of weak global demand, higher debt, uncertainty surrounding the war in Ukraine, and the ongoing although diminishing inflationary pressures affecting many regions of the world. Overall, well-grounded macro policy responses—unimaginable for the region a generation ago—have led not only to an increased resilience to shocks, but to a superior inflation record, sounder financial sectors, and relative calmness in global markets. Employment has largely recovered, and poverty and inequality are moving toward pre-2019 levels. Forecasts for the region have been steadily upgraded over the last six months.

Yet overall, the global environment, although improving, will remain adverse, while debt service will remain formidable and budgets tight. Further, the anemic growth prospects for LAC are not collateral damage from the pandemic but reflect long-standing structural issues. Addressing them requires a social consensus that is increasingly elusive as wages lag and household income remains depressed, particularly for the middle class, and citizens manifest dissatisfaction with government.

Chapter 1 of this report lays out the recent social and macroeconomic evolution of the region and the near-term challenges it faces. The three fundamental constraints it describes—low growth, limited fiscal space, and social discontent—reinforce one another. Without higher growth, household welfare will lag; limited fiscal space curtails investments that could promote growth and address social needs; both contribute to undermining the social consensus that is necessary to enact reforms in any sphere. Chapter 2 explores how these three interrelated constraints can be eased by increasing digital connectivity, combined with necessary complementary investments, and systems for experimentation and evaluation.

Chapter 1: Continued Resilience, Sluggish Wage Growth, Low Dynamism, Weak Social Consensus

Enhanced buffers and lower foreign-currency-denominated debt, as well as enhanced banking surveillance, ensured that the COVID-19 crisis was contained relative to previous crises. While LAC has shown less dynamism than any other region of the world, it has now fully recovered lost GDP. Total employment has recovered, while poverty and income inequality are returning to pre-pandemic levels.

Yet, the region is buffeted by adverse headwinds. Delayed progress on inflation in the Group of Seven (G7) will likely lead to sluggish growth there over the medium term; China's growth juggernaut has stumbled. While forecasts for growth in the United States and euro area, China, and Japan have been adjusted upward since the April 2023 projections, they are still well below those of 2022. Commodity prices have softened, while global interest rates remain high. Despite these factors, and with the arrival of El Niño expected to limit agricultural production or cause general disruption in several countries, LAC forecasts of 2023 growth have been slightly upgraded from their low levels in May 2023 to 2.0 percent in September 2023, and 2.3 percent in 2024.

On the fiscal front, government spending remains high, although it varies across countries. Transitory transfers to vulnerable individuals and businesses during the pandemic are receding—albeit incompletely, while in many countries, other spending has not fallen or has increased. This and the continued burdensome debt service arising from high

interest rates continue to constrain fiscal space and limit progress on debt reduction: debt to GDP fell to 64 percent of GDP from 67 percent a year ago, but remains well above the 2019 level of 57 percent.

On the monetary front, independent central banks implemented swift and aggressive interest rate hikes early on, often between six months and a year before most advanced countries. Inflation is now receding, Brazil and Chile are now beginning to cut rates, and others may follow. Regional inflation, excluding Argentina and the República Bolivariana de Venezuela, stands at 4.4 percent, compared to 6.4 percent in Organisation for Economic Co-operation and Development (OECD) member-countries and 8.6 percent in Eastern Europe. In most LAC countries, inflationary expectations remain anchored and central bank targets are expected to be achieved in 2024. The successful fight against inflation partially reflects external factors: fuel and food prices have fallen from their high levels in the immediate aftermath of the Russian invasion of Ukraine; but core inflation, which subtracts out these costs, remains more persistent.

On the financial front, there is significant consumer indebtedness and some rise in nonperforming consumer loans in Brazil and Chile and microenterprise loans in Ecuador. This may partly reflect sharply higher interest rates; hence, the early inflation responders may serve as bellwethers for countries that raised policy rates later. However, this debt service shock is taking place against a backdrop of an almost doubling of consumer credit as a percentage of GDP in many countries over the last 20 years, which may have contributed to consumption being a major driver of the recovery, but which also injects a new source of risk to the system that needs to be monitored. Despite this evolution, there are only modest movements in overall levels of nonperforming loans, banking sectors appear relatively sound in the region and international markets remain calm, with even some decrease in spreads.

Despite solid macroeconomic management in the region, prospects for growth remain low. They are not wholly a reflection of global conditions or collateral damage from the pandemic; they also reflect long unaddressed structural issues. Regional growth remains constrained by low capital accumulation and productivity growth. Despite increases in foreign direct investment in Argentina and Brazil in the past year, there is little evidence in recent years of the region taking advantage of the realignment of global value chains. Over the past five years even Mexico has seen only minor increases in inflows of foreign direct investment (FDI) despite its obvious proximity to the United States. The Spring 2023 edition of the *Latin America and Caribbean Economic Review* (LACER) discussed how, despite the fact that wages are now competitive with China and other destinations, other structural factors in LAC—such as taxes, the cost of capital, the weak education level of the workforce, poor infrastructure policy, and social instability—all reduce the attractiveness of the region as a nearshoring destination.

Addressing these structural concerns, as well as undertaking necessary fiscal reforms, is made difficult by the fact that the conditions for social consensus are proving elusive. Jamaica stands out as having developed effective mechanisms to achieve transparency and consensus on truly heroic debt reduction and budget discipline.

Chapter 2: Wiring Latin America and the Caribbean for Growth and Inclusion—The Necessary Big Push

LAC will continue to face the mutually reinforcing triple challenges of low growth, limited fiscal space, and citizen dissatisfaction. Expanding digital connectivity offers a possibility to make progress on all three fronts. Some examples illustrate the potential. Most of the region's high-growth unicorns are operating on digital platforms. e-government programs have slashed tax compliance costs, reduced the time and cost of obtaining government-issued identification, and sped up and decreased the cost of procurement. Digital connectivity has made service provision in areas such as education and health more effective, efficient, and resilient to shocks, for instance, by allowing students with digital connections to continue studying during the COVID-19 pandemic. In many ways the pandemic has accelerated the

digitalization of the economy. The ensuing changes in consumption habits and ways in which services are delivered seem to be permanent. e-commerce and e-finance have grown dramatically and show no signs of retreat.

But the full potential of wiring the region for growth and inclusion remains untapped. LAC has already made significant progress installing the necessary hardware—the cables, towers, and interchanges necessary for basic digital communication. Although broadband coverage in Haiti and most of Central America is well below 50 percent, Brazil, Chile, Dominica, and St. Lucia are more than three-quarters covered. Three critical challenges, however, remain.

First, hard-to-reach locations still lack even basic coverage and quality remains low, particularly in the less profitable segments of the market (rural and peri-urban areas with low population density, low socioeconomic levels, or challenging geography) where private providers are less keen to invest. Although only 7 percent of the population lacks physical infrastructure, 55 percent of households across LAC cite low quality of internet provision as a major obstacle to internet use. While new satellite technologies make it more feasible to reach less dense areas, a variety of policy experiments, such as shared infrastructure arrangements, have also been effective in expanding coverage. They all share the characteristics of being well planned, with careful diagnostics of bottlenecks and optimal deployment of resources, aided by fluid cooperation and coordination between central and federal government agencies and other actors, including local governments, and between the public and private sectors.

Second, the region faces a set of challenges related to decreasing the “usage gap” of existing infrastructure: actual access is much lower than the physical infrastructure could support. About 38 percent of the population (240 million people) lives in an area with coverage but chooses not to access the internet. Roughly 50 percent cite cost, which on average is especially high in the Caribbean and Central America but is more generally prohibitive for lower-income families. The World Bank’s LAC Digital Economy Country Diagnostics reports calculate that for the bottom quintile of families in El Salvador, Ecuador, and Jamaica, fixed broadband fees account for nearly 25 percent of monthly income, compared to well under 5 percent for the top quintile. But problems of information, lack of content in local languages, and even lack of interest (reported by 20 percent of households) curtail use. Together, these factors keep many families unconnected, leaving a channel that could promote inclusion, strengthen resilience, and build social cohesion underexploited.

Third, as with any other infrastructure “hardware,” critical investments in “software” are necessary complements. Critical software includes digital and traditional human capital skills and managerial capabilities, availability of financing, efficient government protocols and capabilities, and a supportive regulatory structure. Broadband, alone, is not a silver bullet.

All three challenges are important to address if LAC is to maximize the social benefit of digital connectivity, but also to ensure that such connectivity does not exacerbate spatial, educational, or gender inequalities. A tragic example is the dispersion of educational losses during the pandemic where, on average students lost a year and half of schooling—translating into 10 percent lifetime earnings foregone—but these losses were concentrated in poorer families with less access to connectivity and tablets. As a result, income gaps are likely to widen across the next generation. Regions that lack connectivity and complementary factors will slip further behind the richer ones that already have them. Women in rural areas are 37 percentage points less connected than men and, given their fewer digital skills, women will participate less in the high-paying job market than men who have those skills. Cell phone ownership among indigenous people is half that of non-indigenous people, and both they and Afro-descendants lag in internet access and computer ownership. The digital divide reinforces prior forms of exclusion precisely because access to technologies is becoming a key aspect of social capital in increasingly globalized Latin American societies. Hence, the region needs to make an additional big push—investing in physical infrastructure as well as in a range of digital and traditional human capital and other complementary assets to fully realize the potential of digital connectivity.

Finally, successfully introducing any new technology into society requires an iterative process of experimentation and evaluation to establish what works and what must be abandoned. The developing world has seen its share of digital

promises unfulfilled, most notably in education. Hence an active knowledge agenda is an essential accompaniment to government intervention (and any subsequent scaling up).

Digital Opportunities to Promote Growth and Reduce Poverty and Marginalization

By now, the value that digital technologies can create in terms of productivity, growth, and diversification is well established. These technologies reduce transaction costs, improve matching between producers and consumers, enhance information flows, and increase competition. The internet itself has facilitated trade in digital services, enabling new forms of cross-border collaboration and creating new market opportunities, and potentially raising LAC's low share of service trade. The internet also serves as critical infrastructure for coordinating global value chains and thus creating nearshoring opportunities. Digital connectivity also can facilitate the creation of carbon markets and other green practices.

For individual firms, connectivity enhances information about supplier markets and can lower production costs. It also can advance modern agriculture and integrate lagging rural areas more into the modern economy by forging or strengthening agricultural value chains, linking to markets, and extending advisory services, including in low-emission and climate-smart farming practices, to hard-to-reach areas. Digital platforms in fintech and e-commerce have both led to greater access to financial services and goods—particularly for micro, small, and medium enterprises (MSMEs)—while stimulating new industries. In particular, they have provided the soil for some of the most encouraging green shoots in an otherwise bleak regional growth story. The number of unicorns—companies backed by venture capital (VC) with market valuations exceeding \$US 1 billion in revenues—more than quadrupled from 4 in 2018 to 18 in 2021 and most are built on digital platforms.

However, to fully exploit the opportunities and to ensure that connectivity does not exacerbate existing inequalities, accompanying complementary investments in skills, finance, and regulatory systems are critical. e-commerce in distant locales has grown most in areas with high education levels. Local business accelerators that support programs for entrepreneurs that train, coach, and sometimes fund start-ups and other support institutions are critical elements of ecosystems that foster and promote high-growth company clusters. As is the case with all digital connectivity, information and communications technology (ICT) infrastructure cannot be a substitute for excellence in agricultural research, active connectivity with external centers, and well-trained extension specialists. World Bank surveys of technology adoption show that not only is there great variation across firms in the adoption of technology, but within firms, often traditional practices coexist with modern digital-based practices, reflecting lagging managerial practices. The dependence of LAC unicorns on foreign venture capital and their low share in regional GDP highlights the need for risk finance. Women are less likely to use smartphones and connect digitally, partly reflecting shortfalls in digital skills, and are underrepresented both as investors and founders in the region. Fintech, in particular, presents new risks, ranging from traditional questions of supervision and portfolio soundness to issues of cybersecurity and data privacy. In sum, the digital connectivity agenda needs to be conceived as a package of investments to ensure inclusion and maximum growth impact.

GovTech to Increase Fiscal Space and Promote Higher-Quality Provision of Government Services

The adoption of digital tools can make governments more responsive to their constituencies by easing government transactions with citizens, improving the efficiency and quality of service provision, and promoting inclusivity. Reducing transaction costs associated with government procedures not only makes the government more accessible in general but particularly benefits more remote and disadvantaged segments of society that have difficulty accessing services.

Further, employing digital networks and tools can help reduce the large share of GDP—as much as 4 percent—lost in inefficiencies in public expenditures and spending leakages (Spring 2023 LACER); such “savings” could be redirected to

growth-related or social investments. Most LAC countries have implemented e-procurement systems at the national level that generate savings through automation and standardization of processes; facilitation of instant exchange between suppliers and buyers; and improved transparency, traceability, accessibility, and accountability of the public procurement system. Digital solutions for public financial management support subnational governments where capabilities are often weaker. Digitalizing tax collection can raise government revenues by reducing the estimated 6 percent of GDP lost in evasion. The emergence of digital technologies along with big data analytics and the emergence of artificial intelligence (AI) algorithms have significantly increased the value of intelligent data-rich fiscal ecosystems. The forthcoming World Bank *Handbook of Government Analytics* offers a range of techniques for analyzing new data to improve public institutions.

Better Service Provision to Citizens. The costs of interaction with governments are high in LAC; half of administrative procedures require two or more trips to government offices and long wait times. They are also a source of corruption; one-third of Latin Americans paid a bribe to access a transactional public service. Digital provision of public services is cheaper and faster to deliver, can extend the reach of government, and by reducing interactions between government officials and citizens, decreases opportunities for bribes and corruption. For example, online renewal of government identification (ID) cards is less costly than traditional manual procedures and particularly benefits those from rural areas or other hard-to-reach groups. Biometric authentication technologies lead to savings and better targeting of aid disbursement programs and are popular with beneficiaries. Lower registration transaction costs may be associated with higher registration rates, especially among microenterprises, reducing informality.

More generally, digital connectivity also can be viewed by governments as a new space for experimentation, innovation, and learning in service delivery models in a wide range of areas—including health, education, agricultural extension programs, technology extension programs in manufacturing, entrepreneurship programs, and social assistance. Learning from these experiments clearly requires establishing systems for defining goals and metrics and robust evaluation of what did and did not work.

Improving Health Care Delivery. Digital technologies increase the quality and efficiency of health care and can extend it to previously underserved communities. The COVID-19 pandemic helped expose long-standing weaknesses in many health systems of LAC countries: large differences in the quality of care among different geographical areas; lack of meaningful access for many marginalized and isolated communities; outdated, redundant, and inefficient bureaucratic procedures; and fragmented systems. Digital connectivity has been shown to facilitate preventative care and early detection of disease and raise awareness of the population around unhealthy behaviors. Telemedicine and electronic health records allow patients to save time and money in visits, particularly in rural areas, and can increase compliance with medicine protocols through low-cost interventions. Telementoring programs can greatly reduce the quality gap in primary attention centers or community clinics in isolated or marginalized communities, training frontline health care professionals in the highest-quality and state-of-the-art protocols to deal with difficult or infrequent conditions.

Here again, complementary investments are required beyond connectivity: necessary physical infrastructure for consultations, devices that function well, and enough data centers to store information securely and reliably; and well-trained health care providers familiar with these technologies and platforms. A favorable enabling environment is also needed in the form of strong policies and regulatory frameworks in cybersecurity and data privacy protections.

Improving Education. Similarly, digital technologies offer potential for improving both the quality and accessibility of educational services, particularly in low-income urban, peri-urban, and rural communities. Remote communities often face daunting challenges, including a lack of resources (notably, textbooks and other teaching materials) and lack of training and feedback for teachers related to their isolation from peers. But connectivity more generally can support teachers by providing access to educational content and offering prompts and tips on how to utilize this content. The increased availability of very low-cost video cameras to record instruction offers opportunities for reflection and constructive feedback for teachers who may have received little training on pedagogy. Successful programs in these areas are generally managed by independent agencies with strong political support across the

political spectrum; have a secure long-term financing stream that ensures stability as they plan and implement their roadmaps; and attract talented workforce with strong technological back-up to manage devices and connectivity. The monitoring of internal processes and careful evaluation, especially of service delivery targets and academic achievement, is also key. Digital early warning systems can also flag students who are likely to drop out. Innovation in learning technologies such as adaptive learning algorithms can deliver personalized learning support to students and help them recover from pandemic-induced learning losses.

The COVID-19 crisis also revealed how connectivity could enhance resilience in the face of shocks by taking the educational system online, although with very uneven effects across society that need to be addressed going forward. And—to continue the underlying theme of this chapter—exploiting the possibilities of digital connectivity will require training for teachers and education professionals, not only in digital skills and foundational pedagogical skills, but also in the managerial capability of school administrators. The rushed deployment during the pandemic revealed shortfalls across these areas.

Finally, arriving at a successful introduction of digital connectivity and technologies that raises the quality of education in LAC requires a policy framework of experimentation, learning, monitoring, and evaluation. Simply dropping hardware in classrooms does not work.

Developing Complementary Skills

As stressed throughout chapter 2, growth-promoting and inclusive use of digital connectivity will require a range of complementary investments in education, finance, and regulatory frameworks. There is a particular need for investments in skills related to digital technologies, the absence of which leads to a lack of familiarity or interest in the potential benefits. Studies from Europe suggest that an increase of 1 percent in basic digital skills is associated with a 2.5 percent increase in labor productivity, and an increase of 1 percent in advanced digital skills is associated with a 3.7 percent increase in labor productivity, thus supporting higher wages. The region as a whole is lagging the average of OECD countries in basic, intermediate, and advanced digital skills with only 28 percent of the population having the most basic skills, compared to 64 percent in the OECD countries.

Developing digital skills requires a long-term strategy with sustained political and financial commitments, and coordination between different national ministries as well as subnational governments, in partnership with private service providers, the private sector, and community leaders and local nongovernmental organizations (NGOs). Digital skills need to be embedded in educational curricula at all levels of the formal educational systems. However, governments can go further and promote usage and digital skill trainings in libraries, government buildings, community centers, and social or neighborhood associations, and by offering trainings and skills development in the free connectivity zones in rural areas.

Of particular concern is the gap seen in digital skills among women and other marginalized populations, such as indigenous and Afro-descendant peoples. Women have a lower likelihood of owning a smartphone and men are more than four times more likely to have advanced digital skills than women. Improving digital literacy among indigenous and Afro peoples, who often live in more distant areas, remains important to ensure these divides do not worsen. Among indigenous and Afro-descendants there are gaps not only in access to internet services, but in access to computers and cellphones, which in turn implies they lack the necessary digital skills to thrive in the emerging labor market.

In sum, it is important to see digital infrastructure as one element of a multidimensional push that includes various types of human capital accumulation if it is not to exacerbate existing geographical, income, racial, or gender disparities. Digital hardware is not a silver bullet; it needs to be accompanied by programs to ensure skills across divides. However, the potential to make progress on the triple problem of low growth, limited fiscal space, and declining faith in government is substantial.

Growth Outlook for the Region

Real GDP Growth Rates

	2020	2021	2022	2023e	2024f	2025f
Argentina	-9.9	10.7	5.0	-2.5	2.8	3.3
Bahamas	-23.5	17.0	14.4	4.3	1.9	1.6
Barbados	-12.7	-0.8	11.3	4.6	4.0	3.0
Belize	-13.4	15.2	12.7	4.9	3.5	3.3
Bolivia	-8.7	6.1	3.5	1.9	1.5	1.5
Brazil	-3.3	5.0	2.9	2.6	1.3	2.2
Chile	-6.2	11.7	2.4	-0.4	1.8	2.3
Colombia	-7.3	11.0	7.3	1.5	2.1	3.1
Costa Rica	-4.3	7.8	4.3	4.2	3.3	3.5
Dominica	-16.6	6.9	5.9	4.9	4.6	4.0
Dominican Republic	-6.7	12.3	4.9	3.1	4.6	5.0
Ecuador	-7.8	4.2	3.0	1.3	1.9	2.2
El Salvador	-7.9	11.2	2.6	2.8	2.3	2.3
Grenada	-13.8	4.7	6.4	3.9	3.8	3.5
Guatemala	-1.8	8.0	4.1	3.4	3.5	3.5
Guyana	43.5	20.1	63.4	29.0	38.2	15.2
Haiti	-3.3	-1.8	-1.7	-2.5	1.3	2.2
Honduras	-9.0	12.5	4.0	3.2	3.0	3.4
Jamaica	-9.9	4.6	5.2	2.3	2.0	1.4
Mexico	-8.7	5.8	3.9	3.2	2.5	2.0
Nicaragua	-1.8	10.4	3.8	3.1	3.2	3.5
Panama	-17.7	15.8	10.8	6.3	6.4	6.5
Paraguay	-0.8	4.0	0.1	4.8	4.0	4.0
Peru	-10.9	13.4	2.7	0.8	2.3	2.3
St. Lucia	-24.4	12.2	15.9	3.6	2.9	2.3
St. Vincent and the Grenadines	-3.7	0.8	4.9	6.0	4.8	3.7
Suriname	-16.0	-2.4	2.4	2.0	2.6	3.0
Uruguay	-6.3	5.3	4.9	1.5	3.3	2.6

Source: World Bank staff calculations.

Note: The cut-off date for the data is September 22, 2023. "e" stands for estimate; "f" for forecast.



CHAPTER 1

Continued Resilience, Sluggish Wage Growth, Low Dynamism

Latin America and the Caribbean (LAC) continues to face the same challenges of economic recovery following the pandemic, persistent higher debt, and the inflationary pressures arising from a variety of sources affecting many regions of the world. As discussed in the April 2023 *Latin America and the Caribbean Economic Review* (LACER) (World Bank 2023a), overall, well-grounded policy responses unimaginable for the region a generation ago have led not only to an increased resilience to shocks but to an inflation-fighting record superior to that of the Organisation for Economic Co-operation and Development (OECD). Enhanced buffers and lower foreign-currency-denominated debt, as well as enhanced banking surveillance, ensured that the COVID-19 crisis was of the same order of magnitude as elsewhere, and the region has now recovered lost income. On the fiscal front, governments implemented active fiscal policies early in the pandemic, such as transitory transfers to vulnerable individuals and businesses, which are now receding, albeit incompletely. On the monetary front, independent central banks implemented swift and aggressive interest rate hikes early on, often between six months and one year before most advanced countries, and maintained anchored inflation expectations. There is light at the end of this tunnel, too, as inflation is receding, some countries in the region are cutting rates, and others may follow. Therefore, forecasts for the global economy and the region have been slightly upgraded over the last several months.

Still, the region continues to face challenges, some of them long-standing, and the global environment will remain adverse overall. High global interest rates exacerbate service on the increased debt contracted during the crisis and governments struggle with fiscal space. Delayed progress on inflation in the Group of Seven (G7) will likely lead to sluggish growth over the medium term; China's growth juggernaut has stumbled; and commodity prices have softened. However, the anemic growth prospects for LAC are not collateral damage from the pandemic but reflect long unaddressed structural issues. Addressing these issues against the backdrop of adverse global economic conditions requires a social consensus that needs to improve as citizens report dissatisfaction with government performance and elected officials do not retain popular support. Household income losses from the pandemic have not been fully recovered, especially for the middle class, and the social fabric remains stretched.

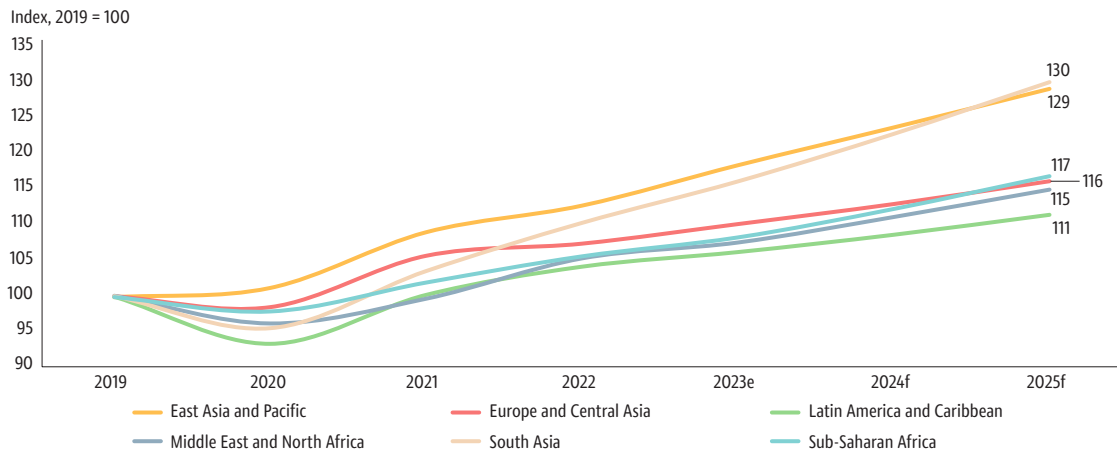
Economic Performance: External Headwinds and Internal Adjustment

Although LAC's gross domestic product (GDP) is now firmly above its pre-pandemic level, going forward, LAC is expected to experience more anemic growth than all other regions (figure 1.1). While GDP is 11 percent above pre-pandemic (2019) levels in LAC, it is 30 percent higher in East and South Asia and 15 percent higher in war-battered Eastern Europe.

While GDP in countries from South and Central America bounced back rapidly and surpassed pre-pandemic levels, they are still in the process of converging to their pre-pandemic trend (figure 1.2, panels a and b). Caribbean economies experienced a different cycle (figure 1.2, panel c). Initially, they suffered a larger and more persistent shock due to the high weight of tourism and remittances in their economies, and some initial lag in their vaccination processes. As these variables began to normalize, these economies started growing back vigorously and are expected to continue closing the gap with respect to their pre-pandemic trend.

Figure 1.1. LAC Countries Are Underperforming Global Growth

Real GDP levels by region

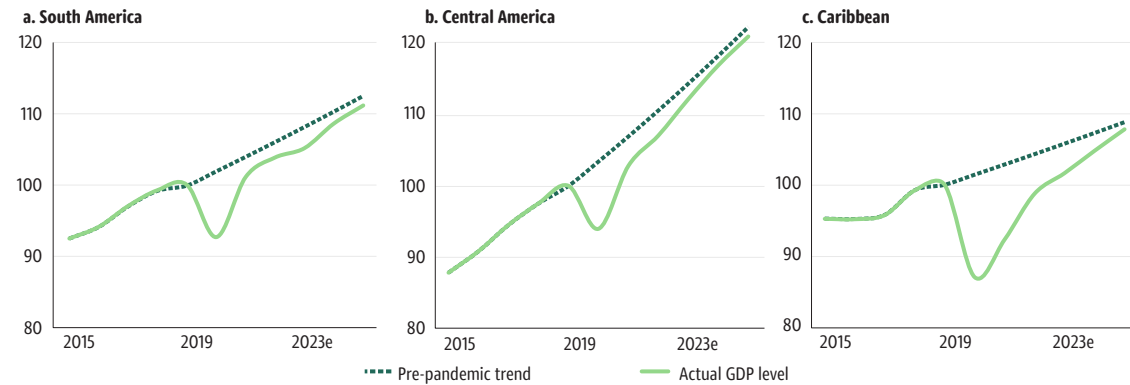


Source: World Bank Macroeconomics, Trade, and Investment Global Practice–Latin America.

Note: The index values are based on projections (as of September 22, 2023). e = estimate; f = forecast; GDP = gross domestic product.

Figure 1.2. LAC Countries Are Catching Up with Pre-pandemic Trends in GDP Growth

Gross domestic product (Index, 2019 = 100)



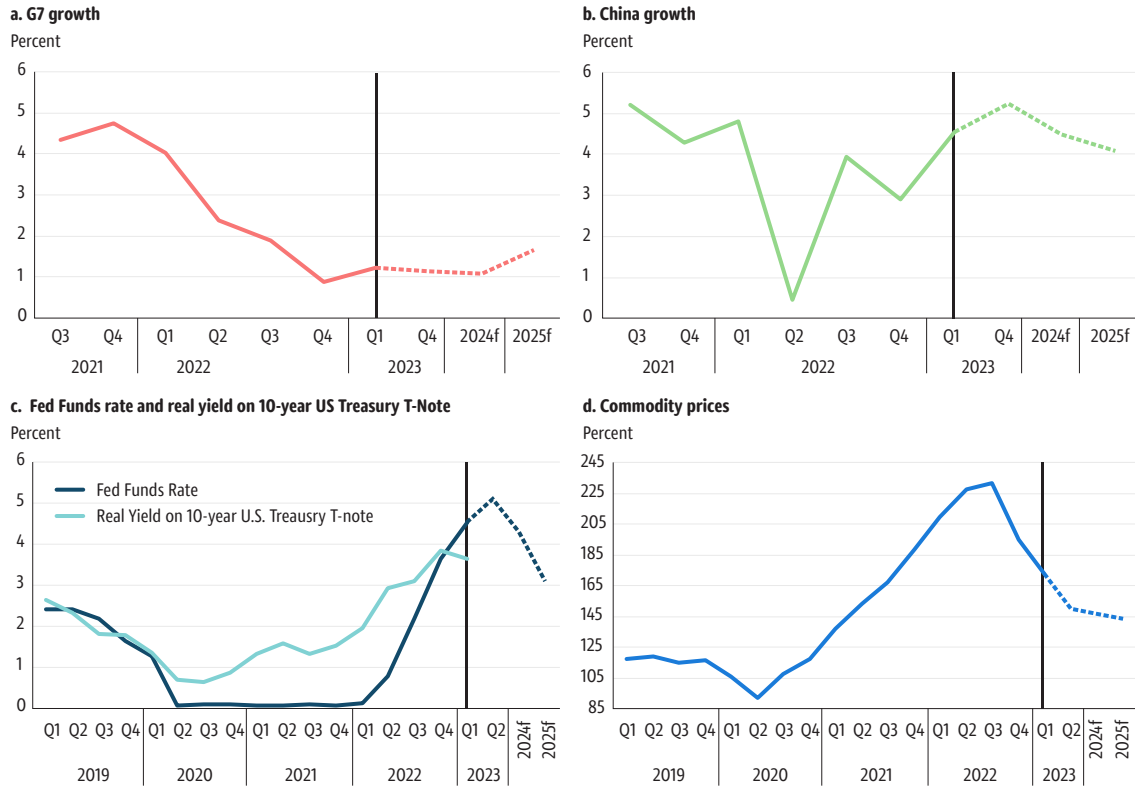
Sources: National authorities; Haver Analytics; *Global Economic Prospects* (World Bank).

Note: The pre-pandemic trend was calculated using the average growth rates over 2015–19. The index values are based on projections (as of September 22, 2023). e = estimate.

Looking ahead, the expected deterioration of the world economy in 2023 is expected to lead to LAC underperformance relative to other emerging markets through four principal channels. (figure 1.3). On the one hand, concerns persist about the economic performance of the main trading partners in the G7 (figure 1.3, panel a), and the increasingly uncertain prospects for China (figure 1.3, panel b) (see box 1.1). Despite recent good news on inflation, the sharply higher interest rates in the advanced countries have not yet begun to decline (figure 1.3, panel c). On the other hand, despite some recent decreases, commodity prices are currently moderately high by historical standards providing a boost to exports (figure 1.3, panel d), but are soft relative to recent highs and may soften more if China stumbles.

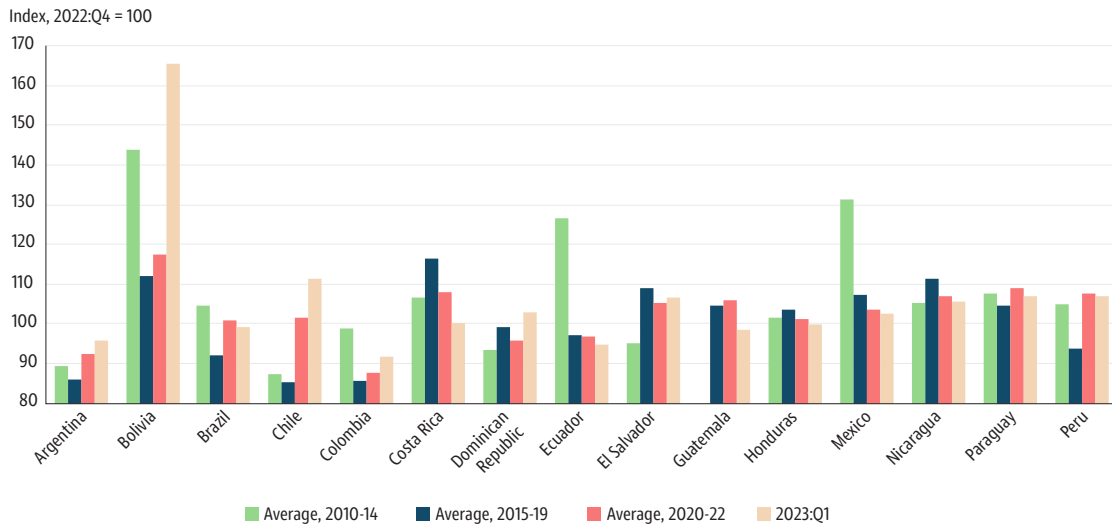
These trends, of course, affect distinct parts of the region differently depending on their trade basket. Argentina, Brazil, Chile, Colombia and Peru face more favorable terms of trade compared to the situation before 2020, while some other countries, including Costa Rica, and Guatemala, do not. Some countries can expect dynamism of similar magnitudes (for example, Argentina and Peru) or even improve (Brazil) compared to that observed in the last commodity super cycle; others, while still benefiting from the current cycle, should not expect such a significant boost (for example, Chile) (figure 1.4). Furthermore, the Caribbean dependence on food and fuel imports will be affected adversely by any further rises that might arise, such as from the Russian invasion of Ukraine.

Figure 1.3. LAC Countries Face Strong External Headwinds



Sources: For panel a, Organisation for Economic Co-operation and Development (OECD) database (OECD 2023a) and International Monetary Fund (IMF) World Economic Outlook (WEO) database (IMF 2023a); for panel b, Haver Analytics and IMF WEO database (IMF 2023a); for panel c, FRED, Federal Reserve Bank of St. Louis; for panel d, World Bank Commodity Prices (Pink Sheets) (World Bank 2023b) and IMF WEO database (IMF 2023a).
Note: f = forecast; G7 = Group of Seven.

Figure 1.4. Terms of Trade Improvements Have Added Dynamism to the External Sector for Some LAC Countries



Source: Haver Analytics.

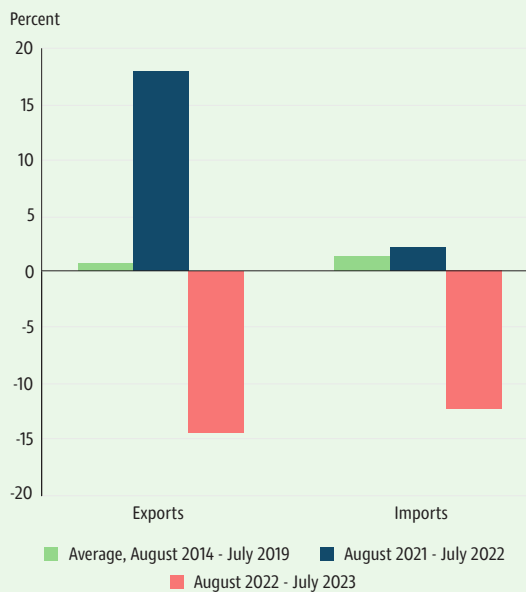
Box 1.1. Uncertain Giant: How Much Will China Contribute to LAC's Growth?

A major concern for Latin America and the Caribbean (LAC) is the economic performance of China—a major trading partner and a key driver of commodity prices. When lockdowns and other extraordinary pandemic measures were announced to come to an end, the economy of the Asian giant was expected to bounce back and provide a major boost to global growth, especially considering the anemic growth rates anticipated for advanced economies. However, recent developments have cast a mantle of doubt over the state of the Chinese economy (figure B1.1.1). Relevant economic indicators such as retail sales, industrial production, and international trade have disappointed analysts, and are situated significantly below their pre-pandemic levels.

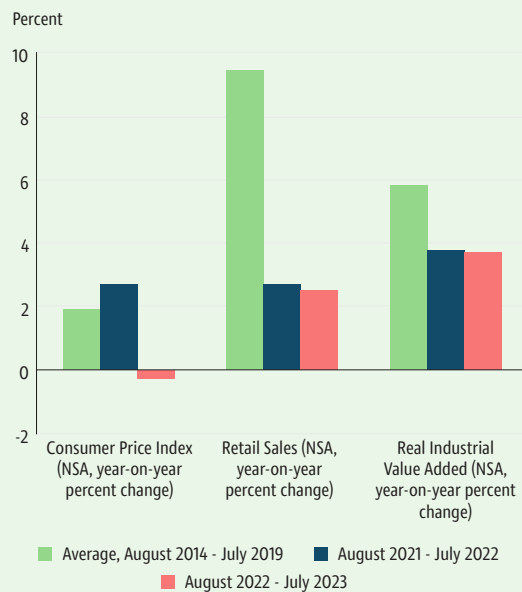
Figure B1.1.1. China's Economy is Faltering

a. Chinese global exports and imports

Not seasonally adjusted, year-on-year percent change



b. China: Consumer Price Index, retail sales, and real industrial value added



Sources: Haver Analytics; World Bank staff calculations.

Sources: Haver Analytics; World Bank staff calculations.
 Note: NSA = not seasonally adjusted.

In 2000, the Chinese market accounted for less than 2 percent of LAC total trade, but by 2022 that number had climbed to 17 percent (figure B1.1.2). Depressed demand from China will therefore affect trade dynamics in LAC countries, particularly in those countries relying on exporting commodities. Besides a lower demand for exports, a lower global demand for commodities will decrease their price, leading to more fragile current accounts and devaluation pressures. As several of those commodity companies are state-owned, fiscal revenues will also decrease, posing a threat to fiscal sustainability, which is already vulnerable in LAC.

China's economic slowdown could also decrease its investment and lending in the region. China's foreign direct investment (FDI) to LAC amounts to 9 percent of the region's total FDI (Dussel Peters 2023). Moreover, several Latin American countries have been receiving resources from China to develop infrastructure, often funded through loans from Chinese banks. As some of these funds can be redirected from overseas to the domestic economy, LAC countries would need to find other sources to complete those projects.

Continued on next page

Box 1.1. Uncertain Giant: How Much Will China Contribute to LAC's Growth? (continuation)

Figure B1.1.2. China's Growing Influence in Latin America Is Partly Reflected in Trade

Percent share of trading partner in LAC total trade



Source: World Integrated Trade Solution.

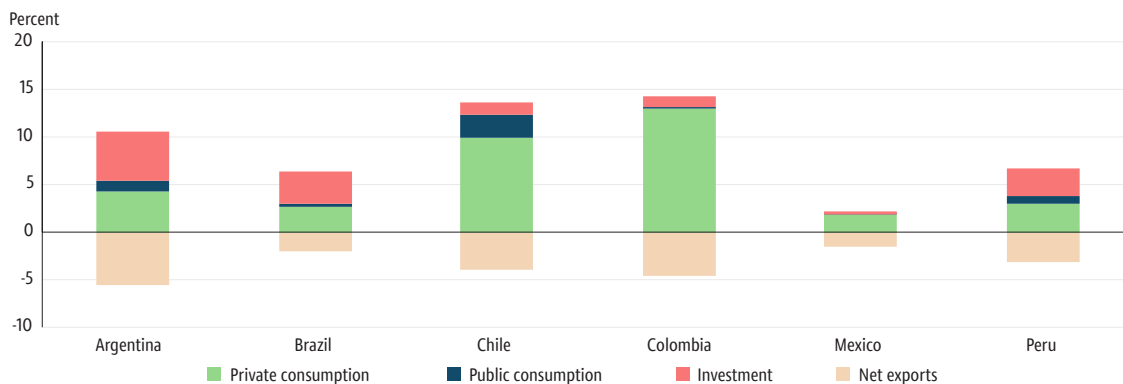
Note: EU = European Union; LAC = Latin America and the Caribbean; UK = United Kingdom.

But there are also opportunities. Latin American countries could collectively fill the gap that China is leaving. Intraregional investment would help them to diversify their economic structure and move away from their overreliance on commodities. Increasing the integration within the region would lead to the development of regional value chains and the strengthening of economic ties among neighboring countries. Integration with distant countries that either are looking to diversify away from China in favor of a more neutral region or just want to expand their markets would also be beneficial for Latin America dynamics. A well-managed process of diversification, sustained on innovation, along with greater integration, could foster long-term growth in the region and reduce its vulnerability.

As shown in figure 1.5, the recovery in LAC has been driven by consumption, especially private consumption. During the pandemic, households were not able to spend during the confinements and non-poor households saved an important fraction of their income. After confinements were eased and the economy rebounded, households have spent these savings, supporting greater private demand.

Figure 1.5. Recovery Has Been Driven by Consumption

Growth components

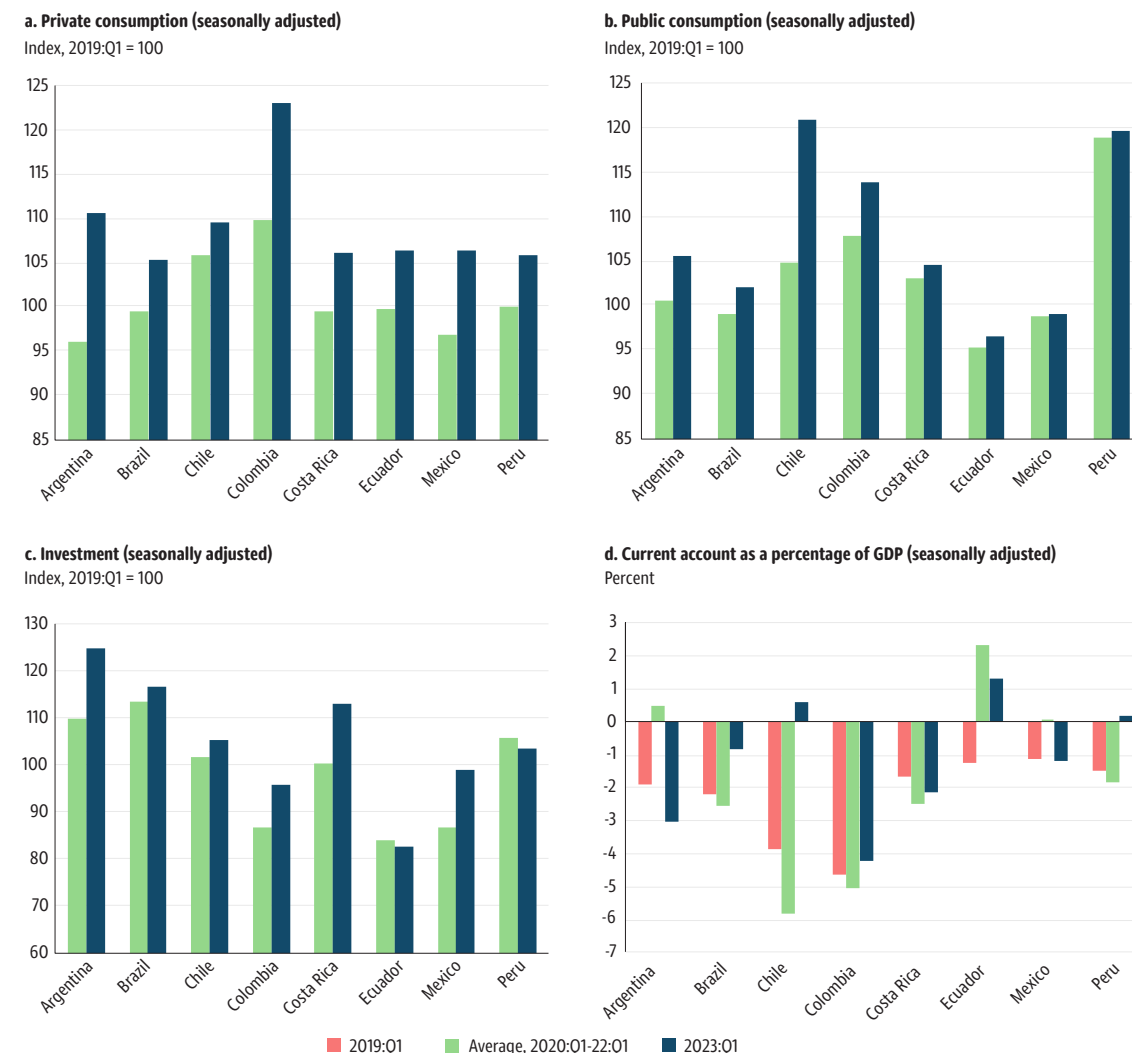


Sources: Macro Poverty Outlook (World Bank); World Bank staff calculations.

Note: The periods compared are the fourth quarter of 2019 and the fourth quarter of 2022.

The strength of private and public consumption continued during the first quarter of 2023 (figure 1.6, panels a and b). However, given the increase in interest rates to ease inflation pressures, consumption is expected to slow down during the rest of the year. On the other hand, investment has not recovered to pre-pandemic levels in several countries, although it has improved with respect to the pandemic years (figure 1.6, panel c). As a consequence, the strong demand in countries with a floating exchange rate has led to an increase in their current account deficit, that is now starting to adjust in 2023 (figure 1.6, panel d).

Figure 1.6. Internal Demand Is Strong

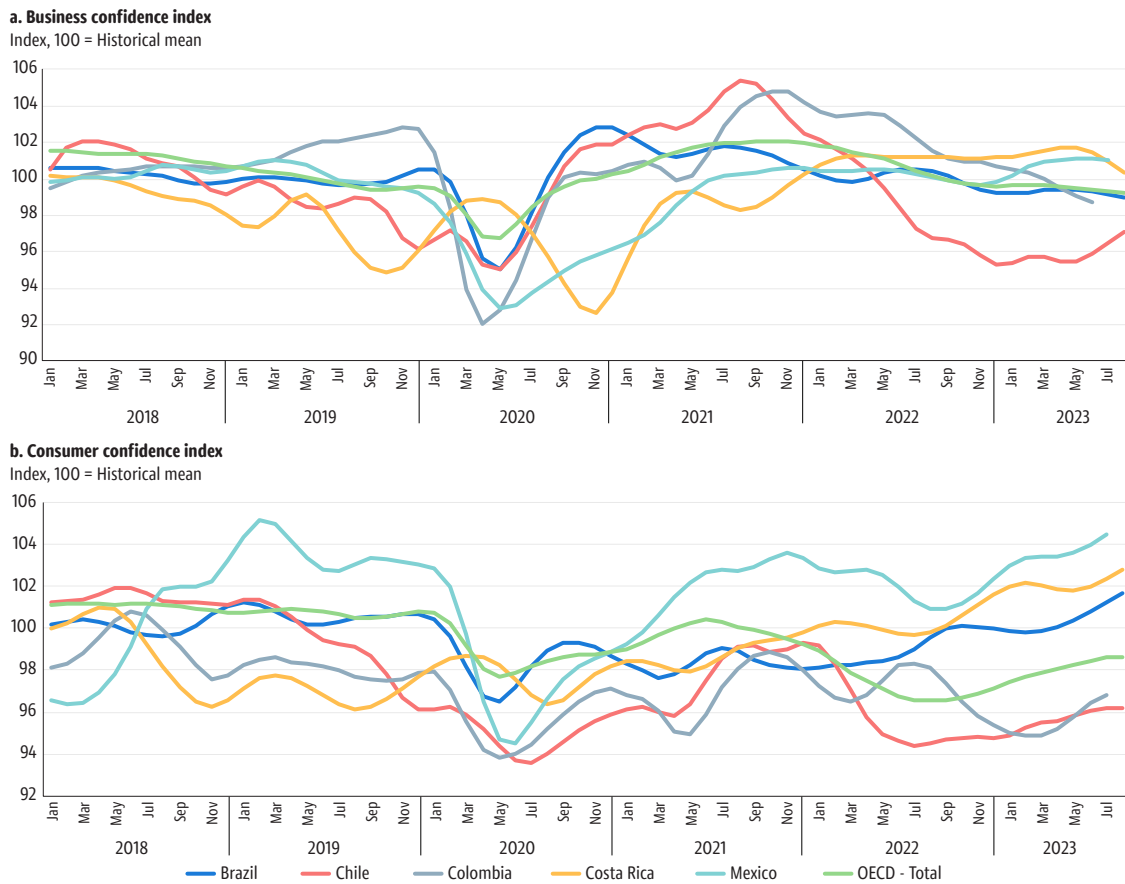


Sources: *Macro Poverty Outlook* (World Bank); World Bank staff calculations.

While near its historical average, business confidence is down from its 2021 peak, perhaps reflecting the low 2023 growth prospects (figure 1.7, panel a). Trends in consumer confidence vary greatly by country, remaining strong in Brazil, Costa Rica, and Mexico but falling sharply in Chile and Colombia (figure 1.7, panel b). These indicators, in addition to increased borrowing costs and concerns about the world economy, point to a moderation of consumption and continued subdued investment for Chile and Colombia.

In light of these trends, consensus growth forecasts for LAC have been progressively upgraded, as in the rest of the world (figure 1.8). This said, the region has proved more resilient, with lower forecast volatility, than North America, Eastern Europe, and Western Europe.

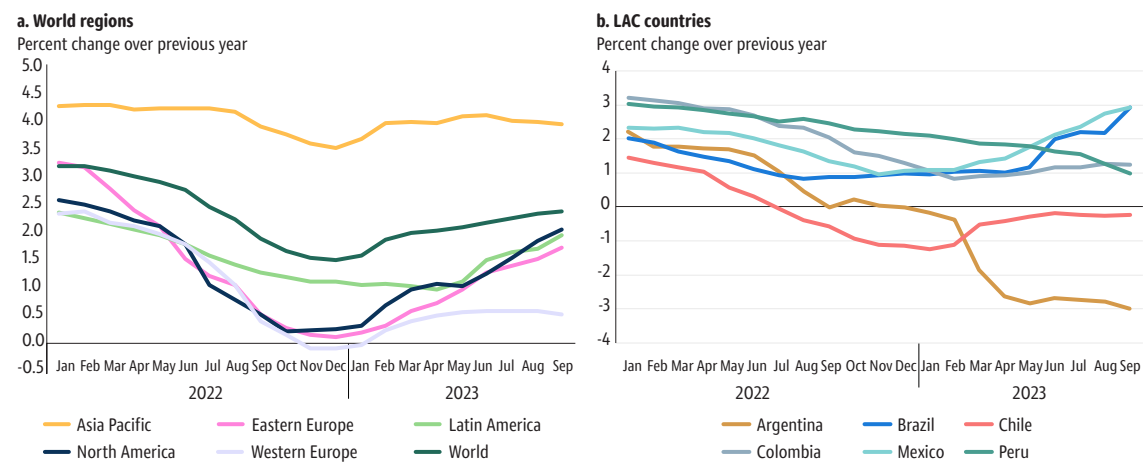
Figure 1.7. Business Confidence Has Recovered to Historical Levels



Source: OECD 2023b, 2023c.
Note: OECD = Organization for Economic Co-operation and Development.

Figure 1.8. LAC Growth Expectations Are Rising After A Year Long Decline

GDP consensus forecasts for 2023



Source: Consensus Economics.
Note: GDP = gross domestic product; LAC = Latin America and the Caribbean.

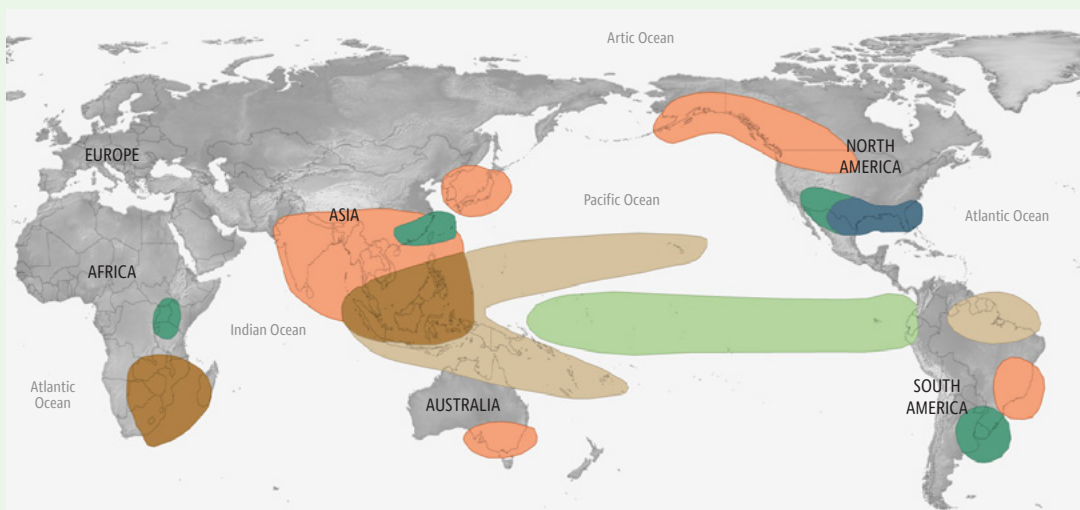
One factor that is increasing growth uncertainty is El Niño. LAC is particularly exposed to the extreme weather conditions that El Niño could bring because the region is dependent on agricultural exports and is already vulnerable to rising temperatures. Box 1.2 discusses some possible outcomes and strategies to cope with disruptions.

Box 1.2. El Niño: Economic Consequences in Latin America and the Caribbean

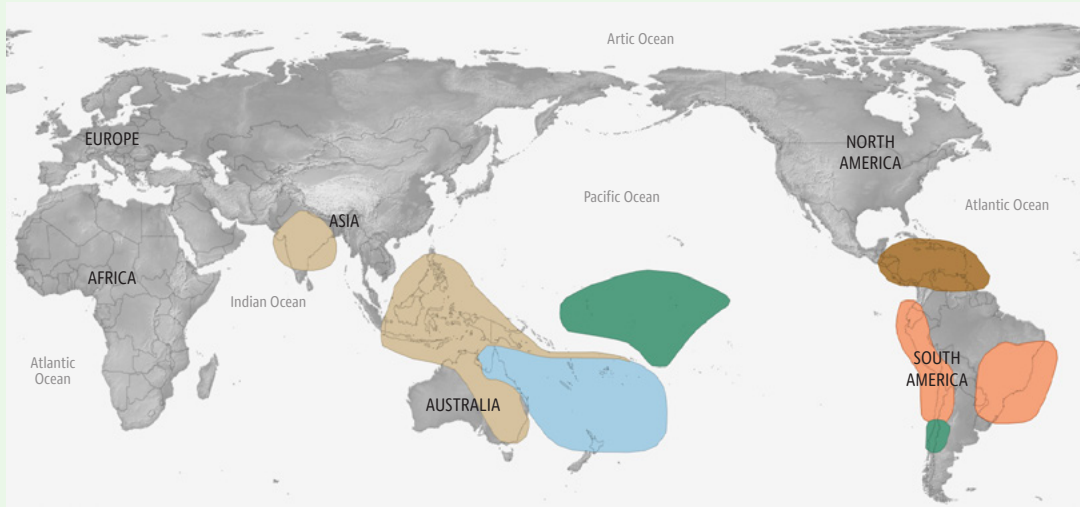
El Niño, a climate pattern that consists of the unusual warming of surface water in the Pacific Ocean, is underway and is likely to provoke a surge in global temperatures and disruptive weather and climate patterns (map B1.2.1). El Niño's effect is uneven across Latin America and the Caribbean (LAC). Usually, the El Niño phenomenon brings rain and storms to southeastern South America between December and February, and warmer and drier conditions to northeastern South America during this period. Between June and August, El Niño brings warmer and drier conditions to the Caribbean and Central America, warm temperatures to the east and west coastal countries in South America, but wetter weather in central-Chile.

Map B1.2.1. Global Climatological Effects of El Niño

December-February



June-August



■ Cool ■ Wet ■ Cool and dry ■ Cool and wet ■ Warm ■ Dry ■ Warm and dry ■ Warm and wet

Source: National Atmospheric and Oceanic Administrations (NOAA); Climate Prediction Center (2023).

Continued on next page

Box 1.2. El Niño: Economic Consequences in Latin America and the Caribbean (continued)

Among the effects that El Niño can have in LAC, Smith and Ubilava (2017) estimate a 0.8 percentage point decrease in growth for countries located in tropical and humid areas, and a 0.7 percentage point decrease for countries in temperate and arid areas. According to Corficolombiana, a Colombian financial services company, the El Niño phenomenon coincides with price increases ranging from 1 to 5 percentage points in Bolivia, Colombia, and Ecuador. Also, El Niño events have global repercussions on other countries which can then, through trade channels and global prices, affect LAC countries even if they are not hit by weather shocks.

Some countries in LAC are already starting to observe several El Niño-like conditions. A historic drought in Panama is forcing the Panama Canal Authority to reduce the weight and the number of vessels crossing the canal, affecting exports from LAC countries and global trade. According to the Central Bank of Peru, primary activities such as agriculture and fishing as well as associated processing activities have already been affected by El Niño, leading to a drop of the Fishery Production Index of 68.93 percent (year-on-year) in June. Ahead of El Niño event and its drier-than-usual conditions, Colombia has boosted its imports of liquefied natural gas (LNG) to conserve its hydroelectric operations. As of August, the country had already imported 60 percent more LNG than last year and had more than tripled its 2021 levels. In Chile, heavy rainfall associated with El Niño prompted the government to declare a state of catastrophe in August in four regions: O'Higgins, Maule, Ñuble, and Bío-Bío (World Bank, 2023c).

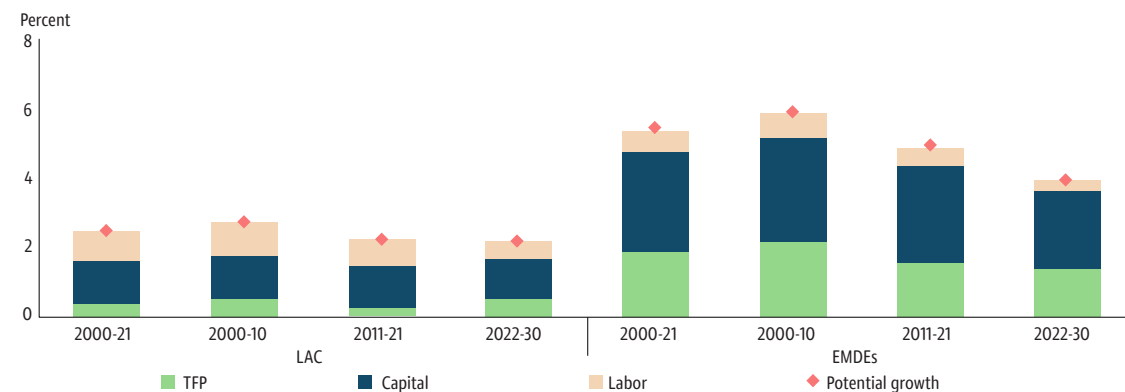
According to the World Meteorological Organization (WMO 2023), there is a 90 percent probability of this phenomenon continuing during the second half of 2023, and it is expected to be at least of moderate strength. Governments should implement a range of measures to address the challenges El Niño poses effectively. These include utilizing predictive tools to anticipate weather patterns, enabling better allocation of resources for water infrastructure enhancements, and reinforcing vulnerable structures. Moreover, authorities should also focus on building resilience through long-term strategies, balancing short-term recovery and sustainable preparation for future El Niño occurrences.

Prospects for Growth Remain Low

Despite overall solid macroeconomic management in the region, the relatively anemic growth levels point to the need to reenergize growth as the principal policy goal going forward, as stressed in the past several *Latin America and the Caribbean Economic Reviews*. The low forecasts going forward of roughly 2.5 percent are insufficient to reduce poverty and social tensions. Of greater concern is that these growth rates are not collateral damage of the pandemic but are very similar to the growth rates of the decade of the 2010s when LAC was growing at about 2.2 percent, while the world was growing at 3.1 percent.

Figure 1.9 shows that LAC’s performance compared to other emerging market and developing economies (EMDEs) is due both to low rates of capital investment and productivity (total factor productivity, TFP). It is possible that an increase in the cost of capital—due to increases in interest rates, uncertainty, and tax reforms that have increased taxation on entrepreneurial activity—have pushed firms to substitute capital for labor. In turn, low capital and TFP may have decreased labor productivity, explaining why the region is experiencing more employment, lower wages, and stagnant growth.

Figure 1.9. Low Rates of Capital Investment and Productivity are Impeding Growth in LAC Compared to Emerging Market and Developing Economies



Source: Kose and Ohnsorge 2023.

Note: EMDEs = emerging market and developing economies; LAC = Latin America and the Caribbean; TFP = total-factor productivity.

Is There Light at the End of the Tunnel for Inflation?

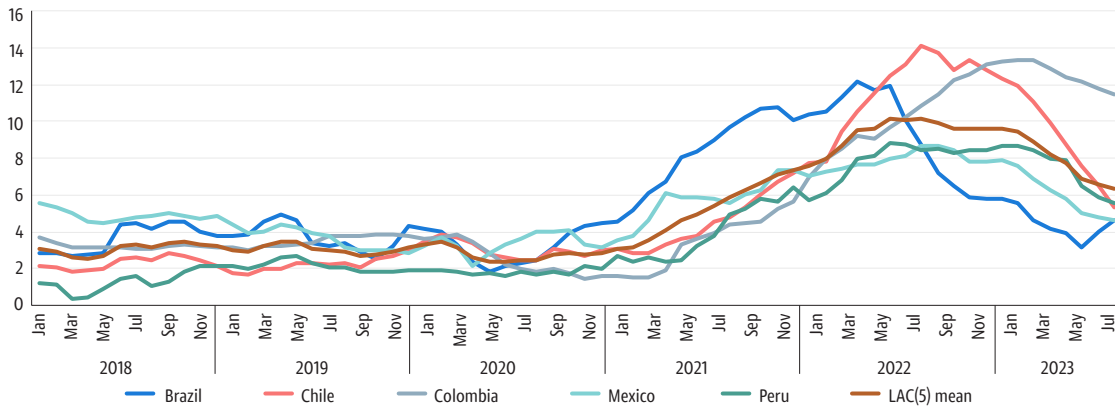
LAC has been a leading region in its ability to combat the surge in inflation that began in early 2021. Increased inflation emerged because of disruptions in global supply chains, the large expansionary monetary policies implemented during the pandemic by most LAC countries, and the spike in international commodity prices (especially in food and energy items) resulting from the Russian invasion of Ukraine. These pressures raised headline inflation from about 2.6 percent in late 2020 to about 9.5 percent in mid-July 2022. Since then, headline inflation has diminished steadily due to swift increases in monetary policy rates implemented by most central banks as well as the decrease in the prices of food and energy products (figure 1.10, panel a)—a mixture of good policy and luck. Core inflation has been more persistent, suggesting that the adjustment is not yet complete, but also has shown signs of moderation in the past few months (figure 1.10, panel b).

External Inflationary Pressures Are Receding. On the good luck side, global food and energy prices have decreased significantly since their peak after the Russian invasion of Ukraine. Despite continuing threats to grain exports in the Black Sea, global grain prices and futures remain stable. Although these prices are still high by historical standards, putting pressure particularly on the budgets of poorer households, their fall from 2022 peaks has contributed to the moderation of headline inflation (figure 1.11).

Figure 1.10. Headline and Core Inflation Are Abating

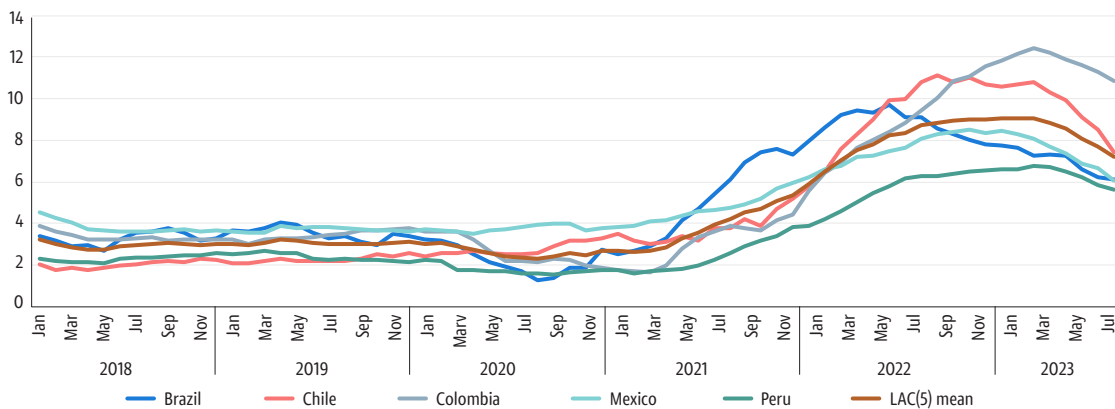
a. Annual headline inflation

Percent change, year-on-year



b. Annual core inflation

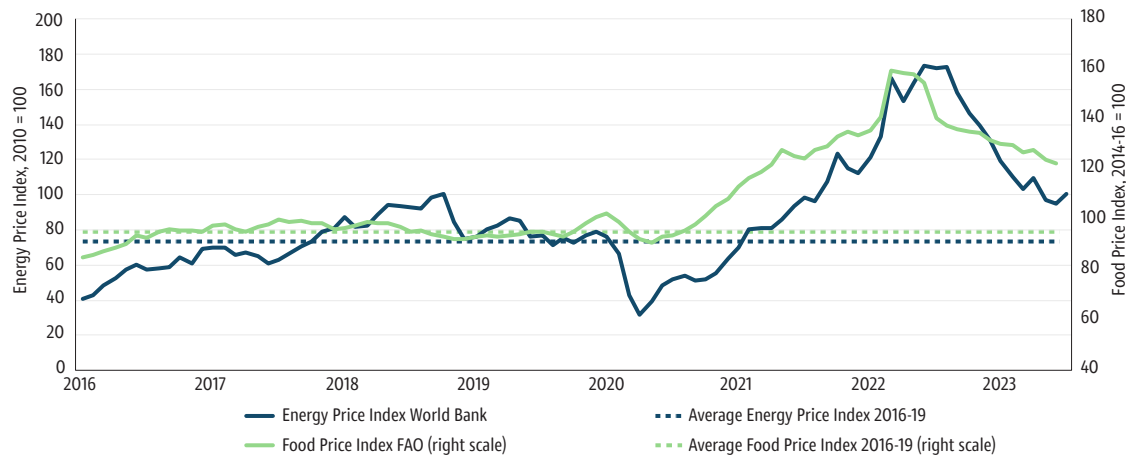
Percent change, year-on-year



Sources: Macro Poverty Outlook, World Bank; for Chile, Banco Central de Chile, IPC sin volátiles.
Note: LAC = Latin America and the Caribbean.

Figure 1.11. Energy and Food Prices Are High but Have Fallen from Their 2022 Peaks

Energy Price Index (World Bank); Food Price Index (FAO)

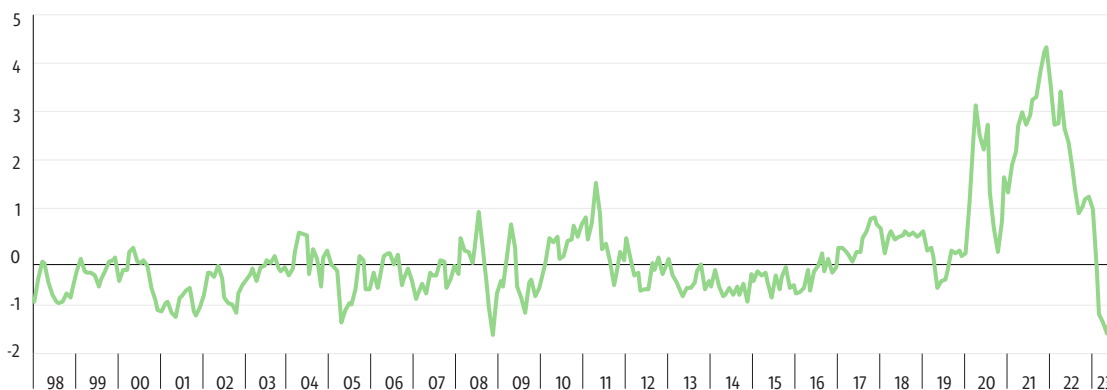


Sources: Energy Price Index, c); Food Price Index, Food and Agriculture Organization (FAO 2023).

In addition, pressures stemming from global supply chain disruptions have continued to decline, reaching historical low levels (figure 1.12). This gradual “normalization” in logistics around the world has also contributed to the reduction of inflation associated with tradable goods.

Figure 1.12. Supply Chain Disruptions Have Declined

Global Supply Chain Pressure Index (standard deviations from average value)



Source: Federal Reserve Bank of New York.

Note: Positive values represent how many standard deviations the index is above the average, implying that supply chains are under pressure. Negative values are shown when supply chains are functioning well and experiencing limited disruptions or pressure. In its normal state, the Global Supply Chain Pressure Index is expected to be below zero.

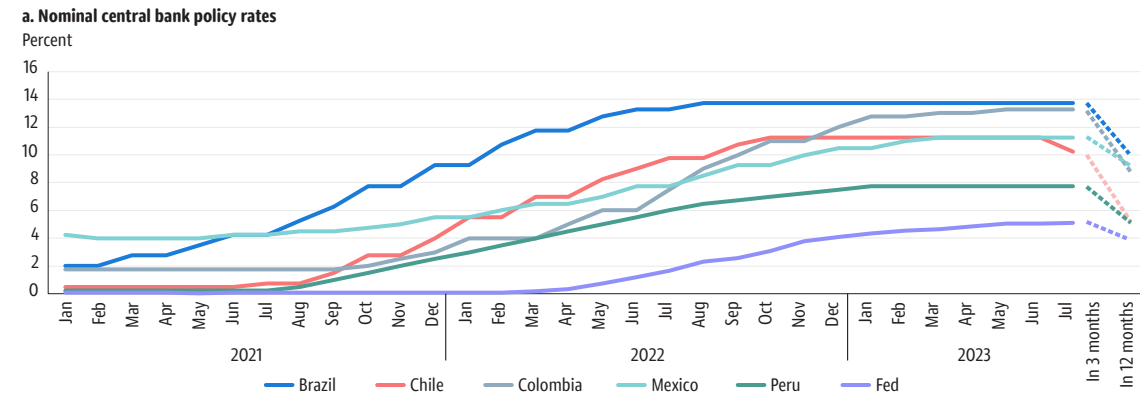
Swift and Early Rate Hikes Are Paying Off: In Defense of Central Bank Independence. Central banks in LAC reacted vigorously by increasing interest rates earlier and far more aggressively than their counterparts in advanced economies. As shown in figure 1.13, during this tightening process, central banks increased nominal and real interest rates by a considerable margin above the rates in the United States. Probably the poster child of this swift and early monetary policy response was Brazil. Monetary authorities increased the official lending rate (the overnight lending rate, or SELIC, Special System of Clearance and Custody rate) from 2 percent in February 2021 to 13.75 percent in June 2022. This response predated the US Federal Reserve tightening by one year and was only possible due to the competency and independence of the central bank. As is often the case, it did not occur without resistance from the executive branch. The determined initial reaction across most central banks in LAC allowed them to anchor inflation expectations faster and, consequently, stop the rate hikes sooner than in most advanced countries, which are just now reaching the end of the tightening cycle.

Most central banks in LAC are expected to start interest rate cut cycles promptly once inflation reduction is consolidated (Brazil and Chile have already begun), which will provide some economic stimulus. This phenomenon of increasing rates to deal with inflation first and cutting rates later to help cope with a sluggish economic environment is not novel and has been possible due to increasing countercyclical monetary policy in LAC countries and the phenomenon of the policy cycle within a business cycle (the so-called “cycle within the cycle”) identified by Rojas, Vegh, and Vuletin (forthcoming). While inflation is projected to remain above the target range at the end of 2023, it is expected to return to the target range during 2024 for most countries in LAC (figure 1.14).

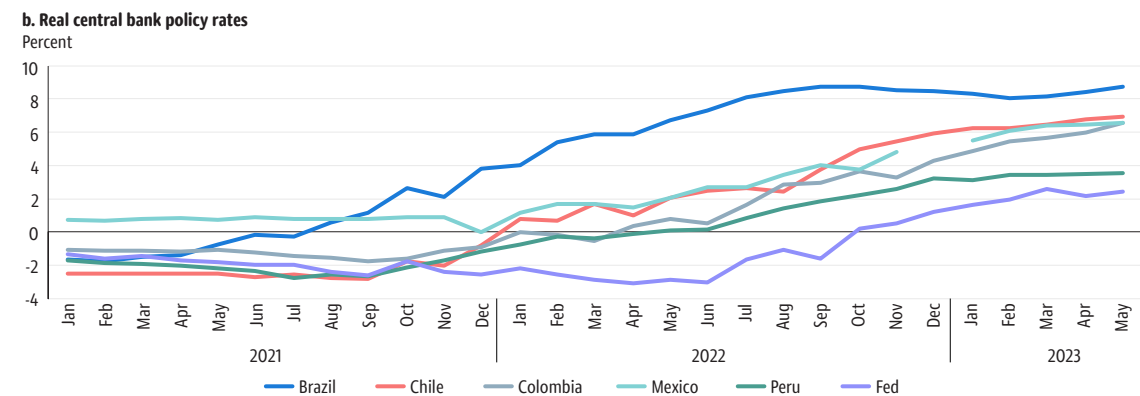
This said, three points merit mention. First, even though policy rates are expected to decrease soon, they are not expected to return to the levels that prevailed before the Russian invasion of Ukraine at least until the end of 2024, due to the persistence of core inflation and the relatively high interest rates in advanced economies. Chile is an exception.

Second, policy rates in advanced economies are expected to either continue increasing or stay at their current levels for longer, which will limit the ability of LAC monetary authorities to reduce interest rates if they wish to avoid capital outflows.

Figure 1.13. Monetary Policy Has Tightened

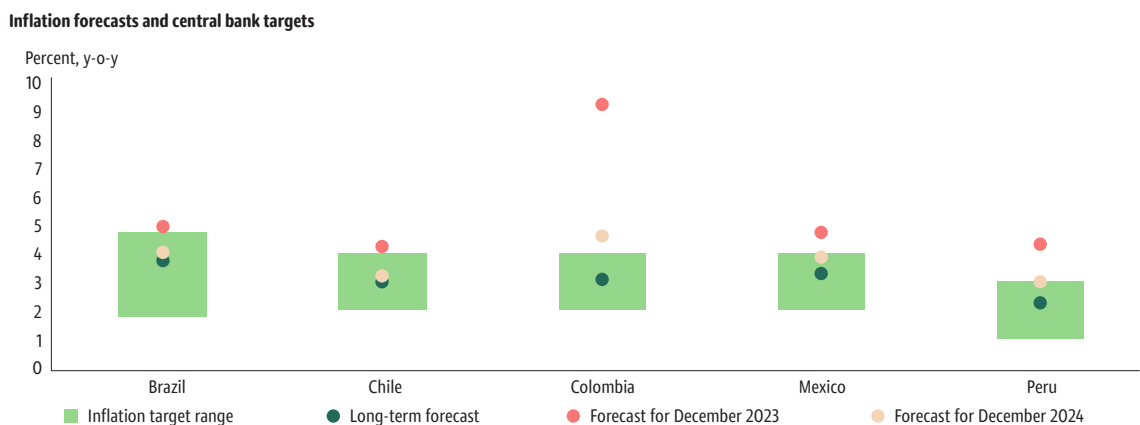


Sources: *Macro Poverty Outlook*, World Bank; Consensus Economics.
Note: Fed = US Federal Reserve.



Sources: *Macro Poverty Outlook*, World Bank; central banks databases.
Note: Fed = US Federal Reserve.

Figure 1.14. Inflation Expectations Are Anchored



Source: Consensus Economics.
Note: The survey date was September 2023. y-o-y = year-on-year.

Third, after a long period of negative real interest rates, most countries around the world are now moving to a more “normal” scenario of positive real interest rates—with LAC monetary authorities being among the early adopters. This is probably healthy from a long-term perspective but marks the end of a period of truly free money that will have an impact on investment globally.

Banking Sectors Remain Sound, although Consumers Are Experiencing Some Stress

Data on non-performing loans (NPLs) suggest that the financial sector in LAC remains broadly sound with some concern in select consumer segments (table 1.1). Brazil, whose consumer debt surpassed 50 percent of family income, is now experiencing a NPL ratio on household credit card twice as high as the one it had in January 2020. Chile's NPL ratio for non-bank credit cards has also significantly increased with respect 2022, but it is not far from the levels it showed before the pandemic. These were the first to raise their interest rates to control inflation pressures, and higher servicing costs may be causing stress on households' finances. Hence, some vigilance is in order to follow the lagged effects in these countries, and the impact as interest rates fall, to offer insight as to what we may see emerging in other countries. Ecuador's rise in NPLs in the micro credit may be capturing similar effects although the rise appears to predate the increase in policy rates in June 2022.

Table 1.1. LAC's Banking Sector is Healthy

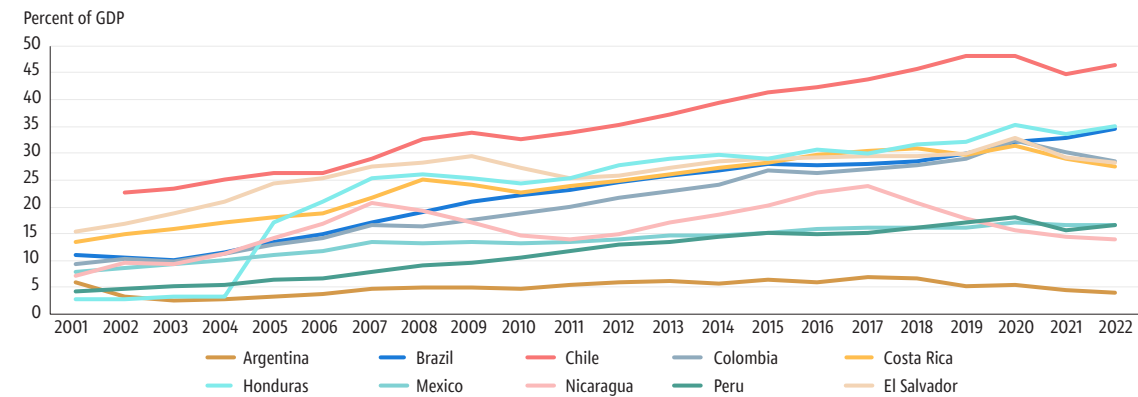
Banking sector non-performing loan (NPL) ratios (percent)

Country	Segment	Date					Latest	
		Jan-20	Jan-21	Jan-22	Jan-23	Latest		
Argentina	Headline NPL	7.9	5.7	4.7	3.4	3.2		
	Commercial sector	10.9	5.5	3.7	2.1	2.0		
	Industrial sector	13.3	11.6	8.2	6.6	6.5		
Brazil	Headline NPL	3.0	2.2	2.5	3.2	3.6		
	Household NPL	3.6	2.9	3.2	4.0	4.2		
	Household credit card	5.0	5.4	6.1	8.6	10.3		
Chile	Headline NPL	2.1	1.5	1.3	1.8	1.9		
	Consumption	2.4	1.4	1.2	2.7	2.8		
	Bank credit cards	4.7	4.3	2.4	4.3	4.4		
	Non-bank credit cards	11.1	15.5	8.1	11.5	13.4		
Colombia	Headline NPL	4.5	5.0	4.2	4.0	4.6		
	Consumption	7.0	7.6	6.8	6.1	7.3		
	Microcredit	7.0	7.6	6.8	6.1	6.6		
Ecuador	Headline NPL	3.4	3.8	3.8	4.5	4.7		
	Consumption	4.9	4.3	3.3	4.6	4.8		
	Microcredit	7.0	8.4	9.8	11.4	11.5		
Mexico	Headline NPL	2.3	2.8	2.7	2.2	2.3		
	Consumption	4.6	6.0	3.3	3.2	3.3		
	Credit cards	5.1	8.1	2.6	2.9	3.2		

Source: IMF Financial Soundness Indicators (FSIs) (IMF 2023b).

It is also the case that Chile and Brazil have the highest share of household debt to GDP levels in the region, 46.5 percent and 34.6 respectively. While well below the rates of the US (74.4 percent) or Canada (102.4 percent), these levels have been rising, as they have throughout the region, doubling over the last two decades (Figure 1.15). Increased household borrowing may partly contribute to the importance of consumption spending as a driver of the post pandemic recoveries, but clearly will not contribute to long run growth in the same way investment spending would.

Figure 1.15. Household Debt, Loans and Debt Securities

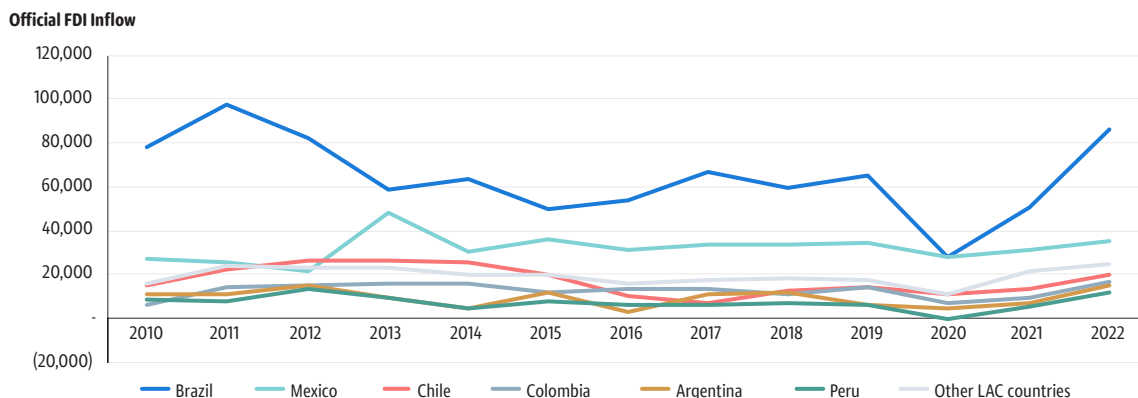


Source: Global Debt Database (IMF, 2023c).

FDI Has Increased, but Has Not Gained Momentum

Despite rises in foreign direct investment (FDI) over the last year, there is little evidence that the region is taking advantage of the realignment of global value chains. For most countries, FDI has, in general, been at similar levels to the pre-pandemic trend (figure 1.16). Even in Mexico, with its natural proximity to the US market, the increase has been only minor. As discussed in the April 2023 *Latin America and the Caribbean Economic Review, The Promise of Integration* (World Bank 2023a), this turn of events is somewhat paradoxical, given the overall successful management of the macro economy and the fact that wages are now competitive with China and other destinations. However, other structural factors—such as taxes, the cost of capital, the weak education level of the workforce, poor infrastructure policy, and social instability—all reduce the attractiveness of the region as a nearshoring destination. In fact, Figure 1.17 shows that, contrary to LAC, the FDI inflow for the East Asia and Pacific region (EAP) shows an increasing trend: in 2011 it had the same level of inflows at LAC, now it is 50% higher.

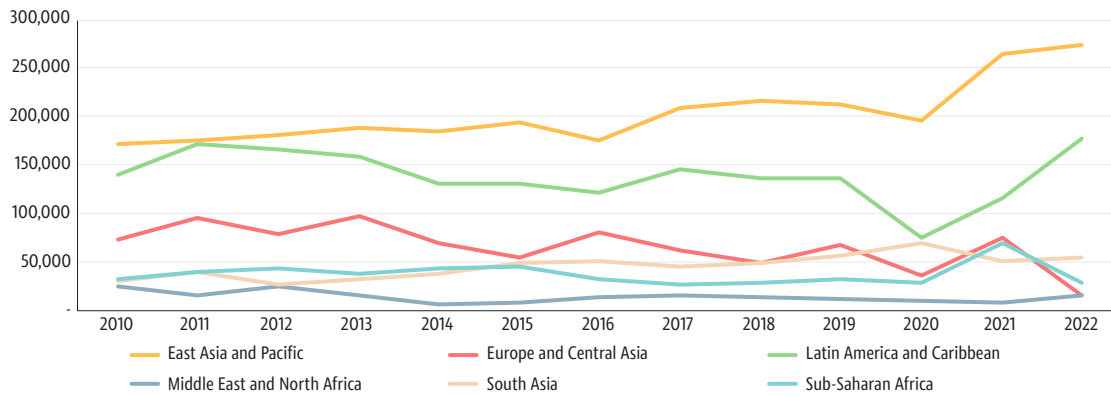
Figure 1.16. FDI inflows in LAC's top 6 FDI recipients (official FDI and greenfield FDI announcements, million USD)



Source: Author's calculation using UNCTAD FDI database.

Figure 1.17: Inflow of FDI by region – developing economies (WB classification)

US dollars at current prices in millions

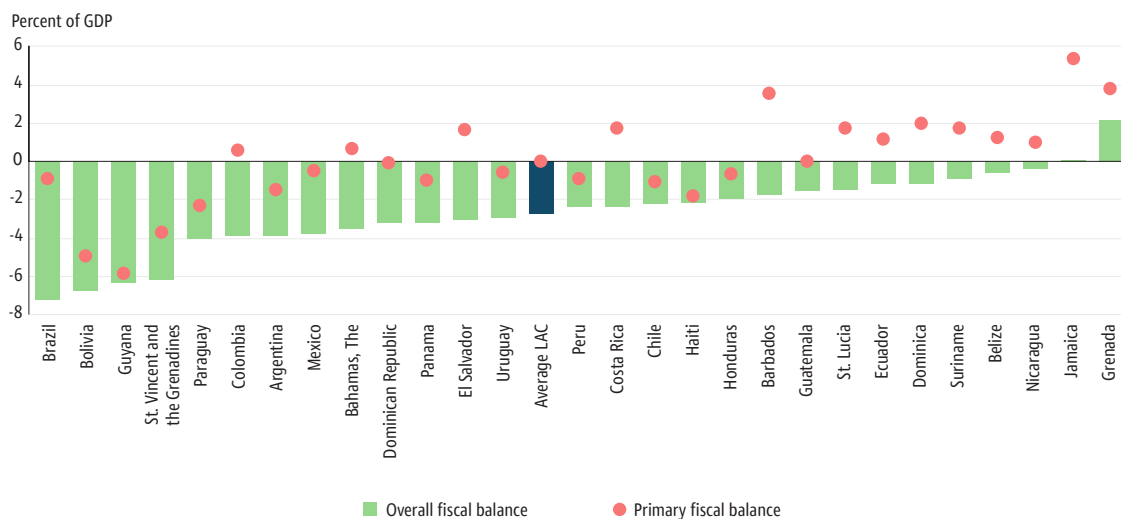


Source: Author's calculation using UNCTAD FDI database.

Fiscal Consolidation Remains Challenging

LAC countries are running fiscal deficits on average of 2.7 percent of GDP (figure 1.18). This is a consequence of cyclical factors such as the persistent public expenditure associated with the pandemic and the anemic growth of some countries, as well as structural factors such as taxing capacity, permanent government spending, and interest payments on public debt.

Figure 1.18. LAC Countries Are Running Significant Deficits



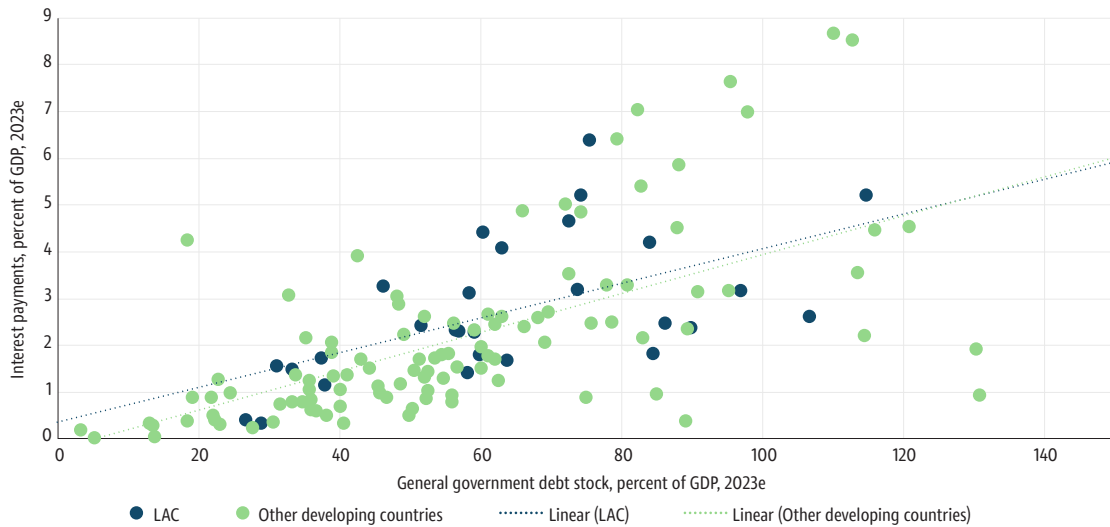
Source: World Bank Macroeconomics, Trade, and Investment Global Practice–Latin America.

Note: Values are based on projections (as of September 22, 2023). GDP = gross domestic product; LAC = Latin America and the Caribbean.

This situation requires the governments of the region to take energetic measures to ensure the sustainability of public finances over the long term. As shown in figure 1.19, high public debt as a percentage of GDP is not exclusively a LAC phenomenon. Previous *Latin America and the Caribbean Economic Reviews* have discussed at length the challenge of identifying more fiscal space. Further, in line with the decrease in international spreads, with the exception of some

outliers, service burdens are not statistically significantly higher than predicted by debt levels. However, the increased debt levels call for even more active measures considering that governments in LAC have, on average, low revenues by international standards and they pay a large fraction of their revenues as interest on their debt. The most extreme case is Brazil, with interest payments accounting for almost 7 percent of GDP.

Figure 1.19. Interest Rate Payments in LAC Countries are in Line with their Debt Level

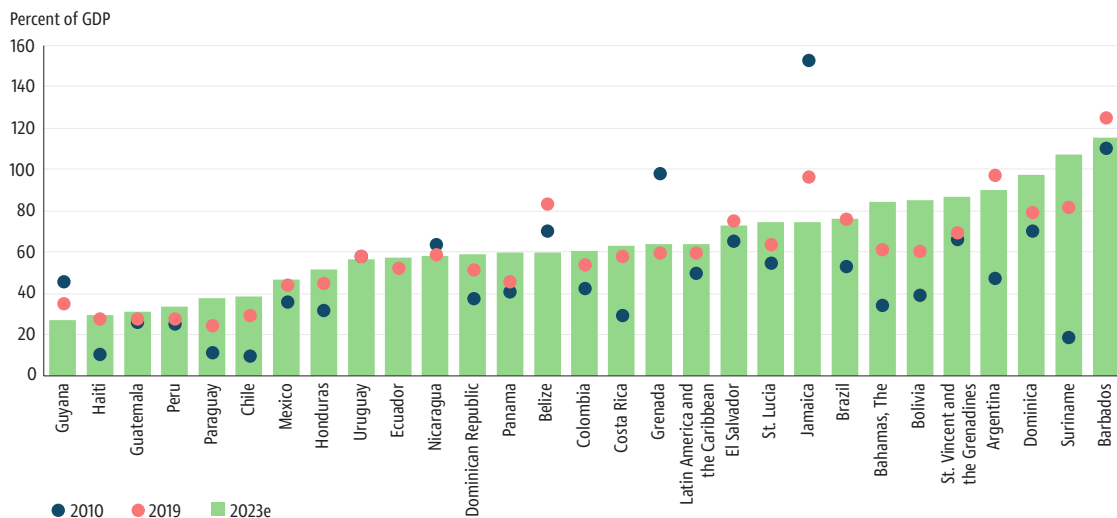


Source: World Bank Macroeconomics, Trade, and Investment Global Practice–Latin America.
Note: Values are based on projections (as of September 22, 2023). GDP = gross domestic product; LAC = Latin America and the Caribbean; e = estimate.

Debt was increasing even before the pandemic, but its burden accelerated after the policy response during the pandemic. While most countries have been aiming at fiscal consolidation, only a handful of them have successfully decreased their stock of debt, as can be seen in figure 1.20. Although most have improved their primary balance, debt service has been increasing given inflation and the trends on the global economy.

Figure 1.20. The Stock of General Government Debt is High

General government debt stock



Source: World Bank Macroeconomics, Trade, and Investment Global Practice–Latin America.
Note: Values are based on projections (as of September 22, 2023). e = estimate; GDP = gross domestic product.

Jobs Have Recovered, Although Wages and Household Income Have Not

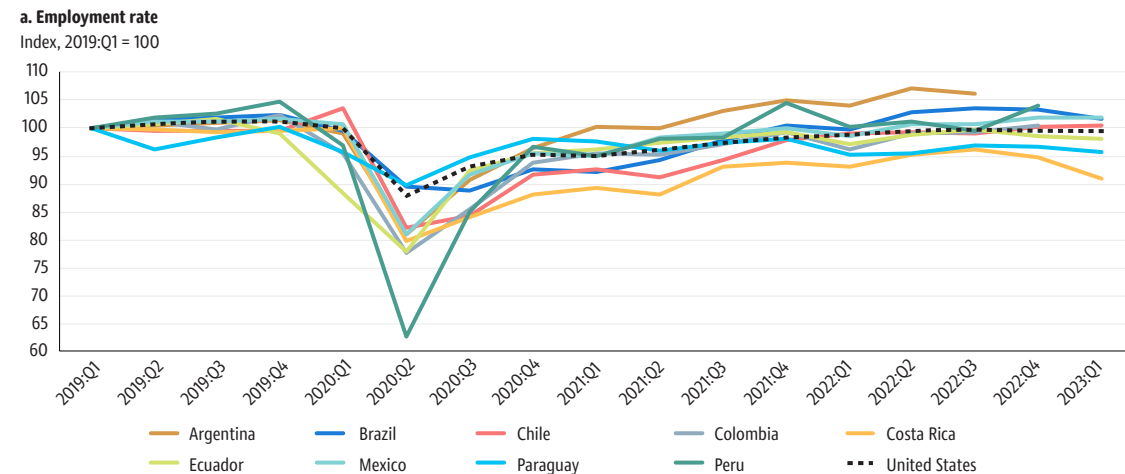
Strong Employment Recovery, but Depressed and Stagnant Real Wages.

Family incomes have still not fully recovered. The particular tendencies are driven by a combination of a job market that has evolved unevenly across levels of education, reduced social transfers and increasing inflows of remittances.

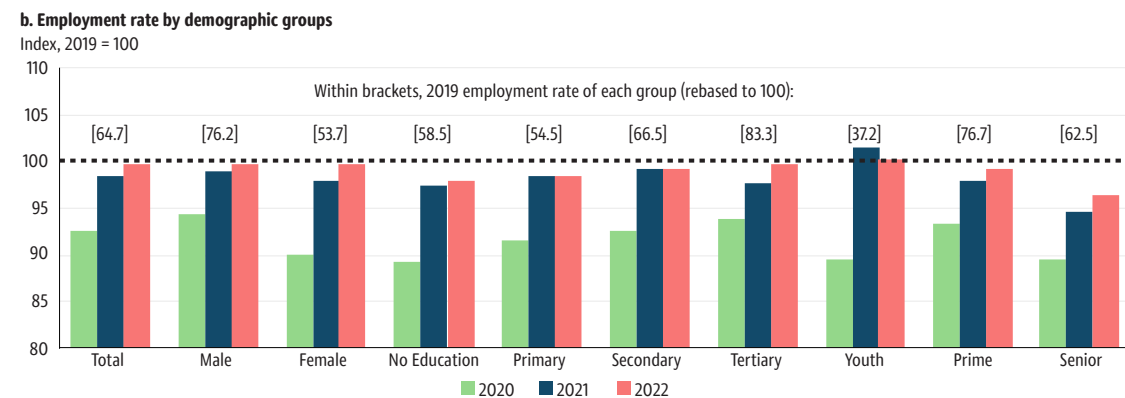
The Good News: Strong Employment Recovery

Employment recovered quickly after the pandemic. Employment rates are generally back to their 2019 levels throughout LAC (figure 1.21, panel a). A look at categories of workers (figure 1.21, panel b) shows that women, who suffered a disproportionate reduction in 2020, have now fully recovered their losses. Workers with lower education still lag the most in recovery, although as discussed later in this section, this may be related to the behavior of wages. Young workers have more than recovered, while the most senior workers still lag by 4 percentage points from 2019 levels. What is not clear is whether despite the lower coverage of pensions, older workers have opted to exit the labor market for early retirement, as has been occurring in the United States, or whether they have been marginalized by pandemic-related market restructuring.

Figure 1.21. Employment Rates Have Recovered



Source: ILOSTAT (International Labour Organization labour statistics).
Note: Employment rate is total employment divided by working-age population.



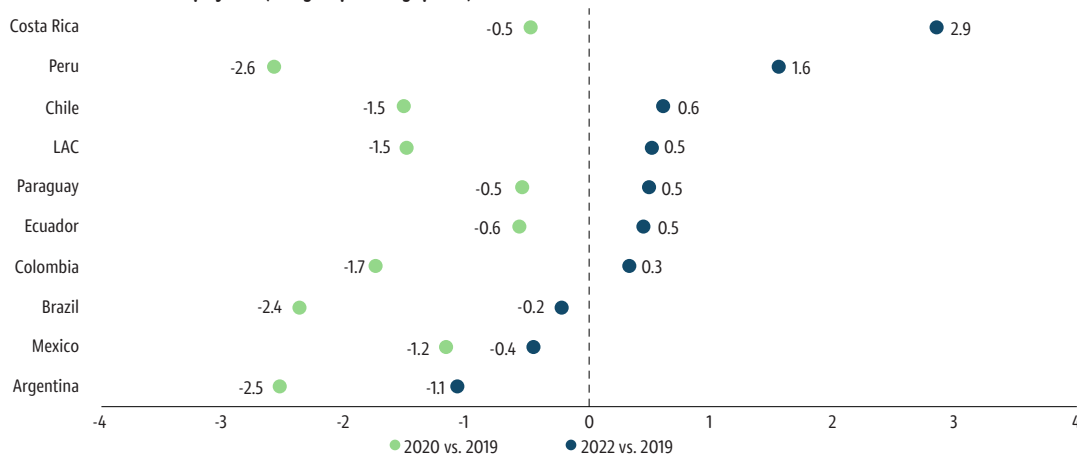
Source: World Bank Poverty and Equity Global Practice.
Note: Figures based on LAC's simple/unweighted average of nine countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, and Peru.

Formal jobs in the private sector have recovered well, although the region’s largest economies have continued to foster the creation of public sector jobs (figure 1.22, panel a). A previous shift within formal employment from stable positions in medium and large firms to more precarious roles in smaller enterprises—examined in the regional study, *From Infection to Inflation: Global Crises Hit Hard Poor and Vulnerable Households in Latin America and the Caribbean* (Olivieri et al. 2023)—appears to have reversed, as the share of employment in larger firms has returned, on average, to its 2019 levels (figure 1.22, panel b).

Meanwhile, informality has remained relatively stable since 2019 (figure 1.23). Across demographic groups, some increase may be observed among older workers since 2020. While it is normally the case that entry into informal self-employment rises with age (Perry et al. 2007), this may suggest some inability to find formal sector employment after the pandemic.

Figure 1.22. Private Employment Has Regained the Ground Lost during the Pandemic

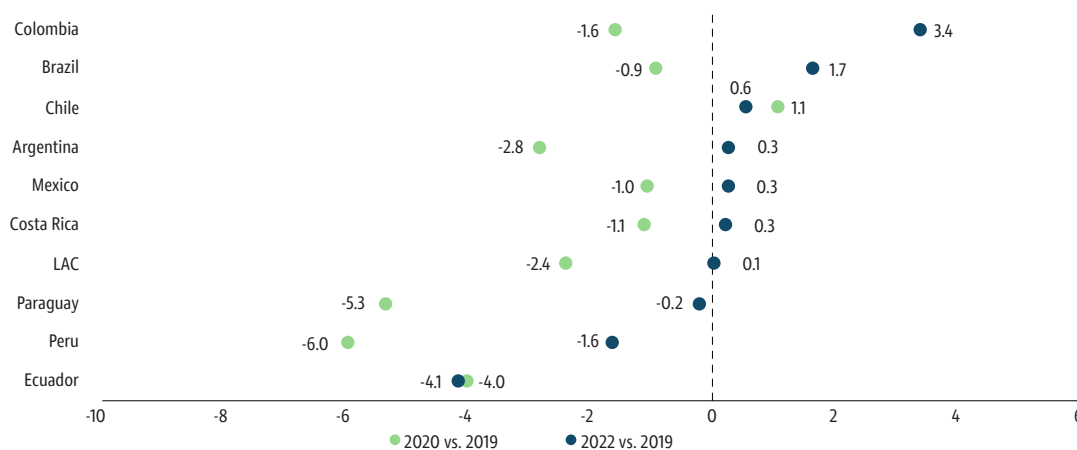
a. Private sector share in total employment (change in percentage points)



Source: ILOSTAT (International Labour Organization labour statistics).

Note: LAC = Latin America and the Caribbean. LAC figure is the simple/unweighted average of nine countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, and Peru.

b. Share of private sector employees in medium and large firms (change in percentage points in the share of employees working in medium and large firms)

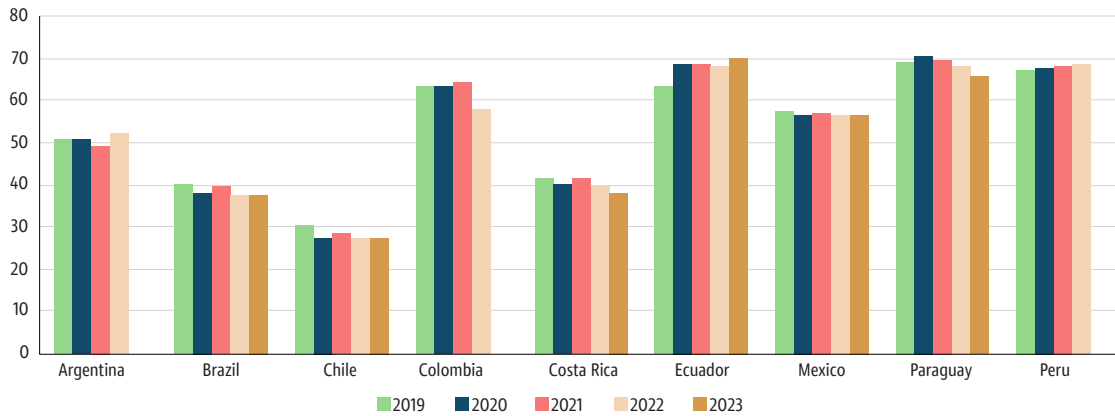


Sources: World Bank Poverty and Equity Global Practice.

Note: LAC = Latin America and the Caribbean. LAC figure is the simple/unweighted average of nine countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, and Peru. In this exercise, firms with five or less workers are defined as “small” firms, while those with more than five workers are defined as “medium and large.”

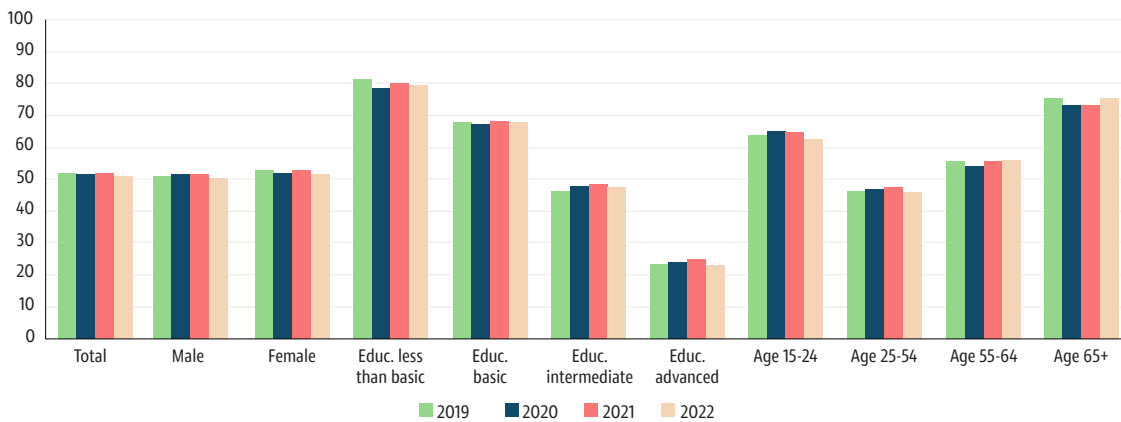
Figure 1.23. Informal Employment Has Decreased or Remained Stable

a. As share of total employment



Source: ILOSTAT (International Labour Organization labour statistics).

b. As share of total employment, by demographic groups



Source: ILOSTAT (International Labour Organization labour statistics).

Note: Educ. = education. Figures based on LAC's simple/unweighted average of nine countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, and Peru.

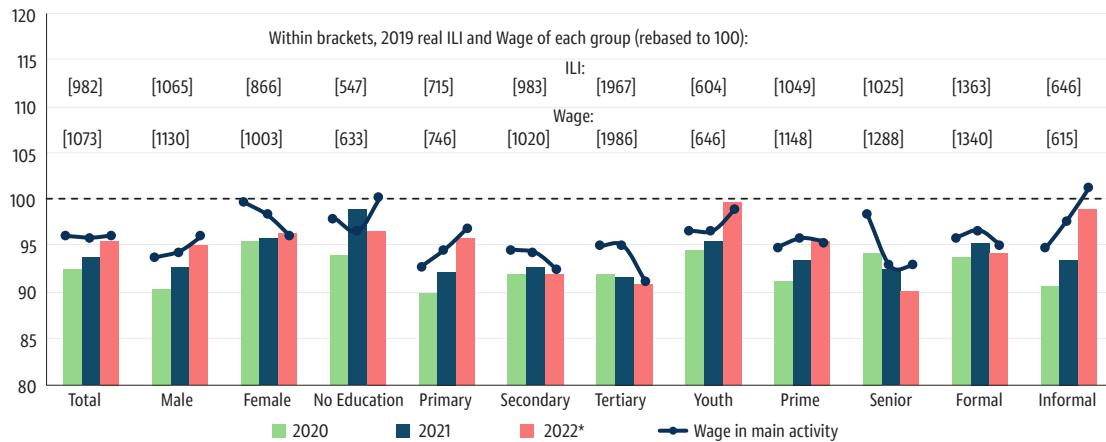
The Not-So-Good News: Stagnant Wages

The promising outlook in terms of employment may be related to inflation. While employment is increasing, real wages and Individual Labor Income (which includes both wages and income from self-employment) are declining in the face of inflation: both measures remain nearly 5 percentage points lower than in 2019 (figure 1.24). This has permitted the labor market to adjust through prices (wages and earned income), rather than quantities (number of people employed). The underlying patterns in earnings are consistent with the employment patterns discussed. Job recovery has been least for those with the least education, consistent with this group of workers having the greatest recovery of wages and ILI of any education group. As panel b of figure 1.23 shows, most workers in this group (70 percent to 80 percent) work in the informal sector. This group may have done relatively well due to the ability of the self-employed to adjust prices (wages and income) quickly; formal wages, in contrast, have remained imperfectly indexed to inflation. Female wages continue to fall, perhaps consistent with the rapid job recovery of female workers.

Earnings of young workers have more than recovered, while those of older workers remain depressed, despite parallel movements in employment. This pattern suggests a potential structural decline in demand for older workers emerging from the pandemic.

Figure 1.24. Real Individual Labor Income and Wages Have Stagnated since 2019

Real individual labor income and real wages, by demographic groups (Index, 2019 = 100)



Source: World Bank Poverty and Equity Global Practice.

Note: Colored bars display the evolution of the real Individual Labor Income (wage income plus self-employment income) since 2019; black lines with circles track the real wage in main activity. Both measures are displayed as an index (2019 = 100). Values within brackets at the top of the figure are displayed in 2017 PPP dollars. For 2020 and 2021, figures are based on LAC's simple/unweighted average of 12 countries: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Panama, Paraguay, Peru, and Uruguay. For 2022*, the regional average is based on available data for 4 countries: Costa Rica, Ecuador, El Salvador, and Paraguay. ILI = individual labor income; LAC = Latin America and Caribbean; PPP = purchasing power parity.

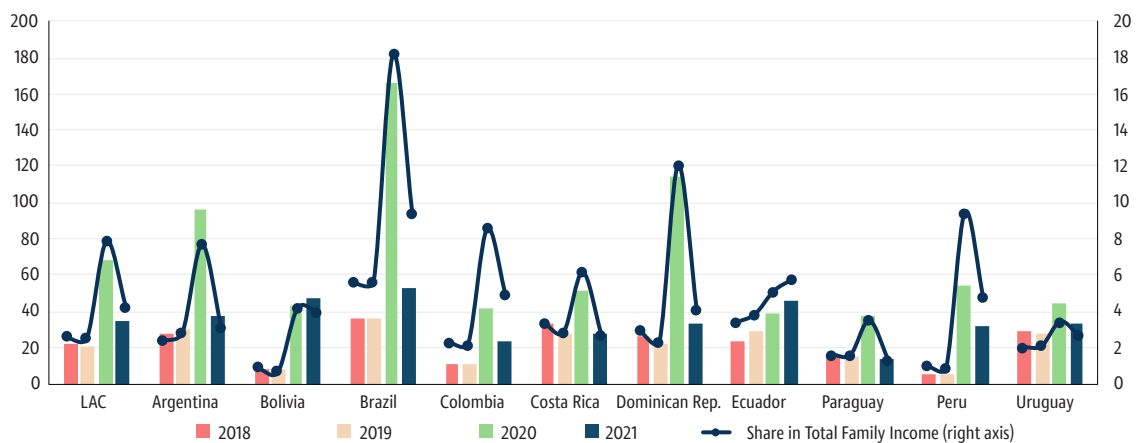
Social Transfers Have Declined, Remittances Remain Strong

Social Transfers Have Receded Following the Pandemic

The component of income that kept families afloat during the pandemic was the large state social transfers to the poor. These transfers surged in 2020 from an average of 2 percent to almost 8 percent of family income: rates for Brazil, the Dominican Republic, and Peru were much higher at 18 percent, 12 percent, and 10 percent, respectively (figure 1.25). These transfers have tapered back to an average of 4 percent, roughly double their 2019 rate.

Figure 1.25. The Average Public Transfer Amount per Household and Average Share of Public Transfers in Total Family Income Are Declining

2017 PPP dollars (left scale); percent (right scale)



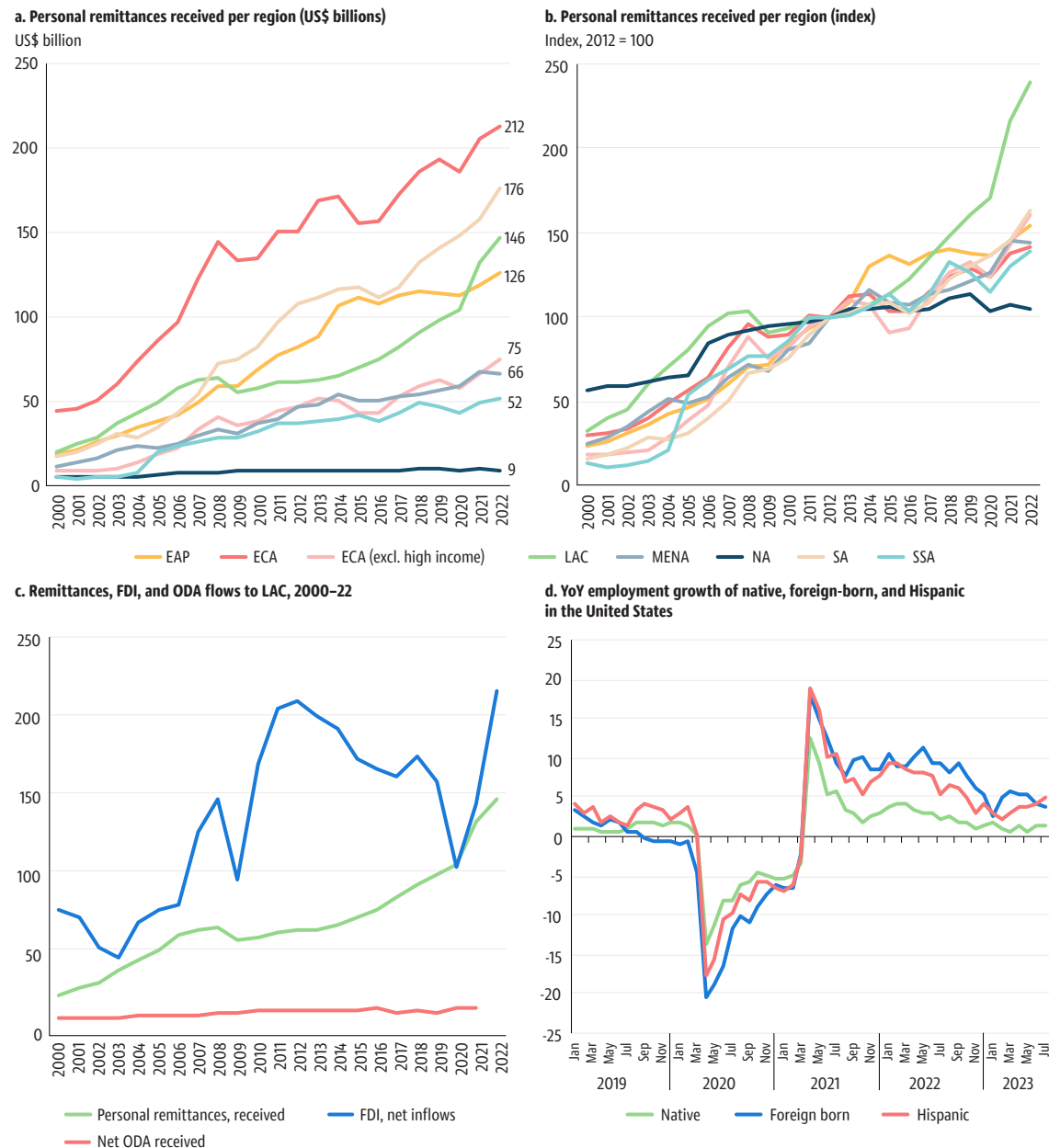
Source: World Bank Poverty and Equity Global Practice.

Note: LAC is a simple/unweighted average of 10 countries: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Paraguay, Peru, and Uruguay. LAC = Latin America and Caribbean; PPP = purchasing power parity.

Remittances Offer an Additional Lifeline to the Very Poor, Particularly in Central America and the Caribbean

Flows to families from workers abroad have continued to surge since 2000, particularly to the Caribbean, Mexico, and Central America. LAC registered US\$ 146 billion in remittance inflows in 2022 and was among the top remittance recipients around the world, surpassed only by South Asia among emerging markets (figure 1.26, panel a). LAC was also the region with the fastest growing remittance inflows during the last 10 years (figure 1.26, panel b). These flows have become a key financial resource for countries in LAC, comparable in magnitude to foreign direct investment (FDI) (figure 1.26, panel c). A likely driver of the uptick over the last two years has been the recovery of foreign employment in the United States since January 2020 (figure 1.26, panel d).

Figure 1.26. Remittances to LAC Have Surged

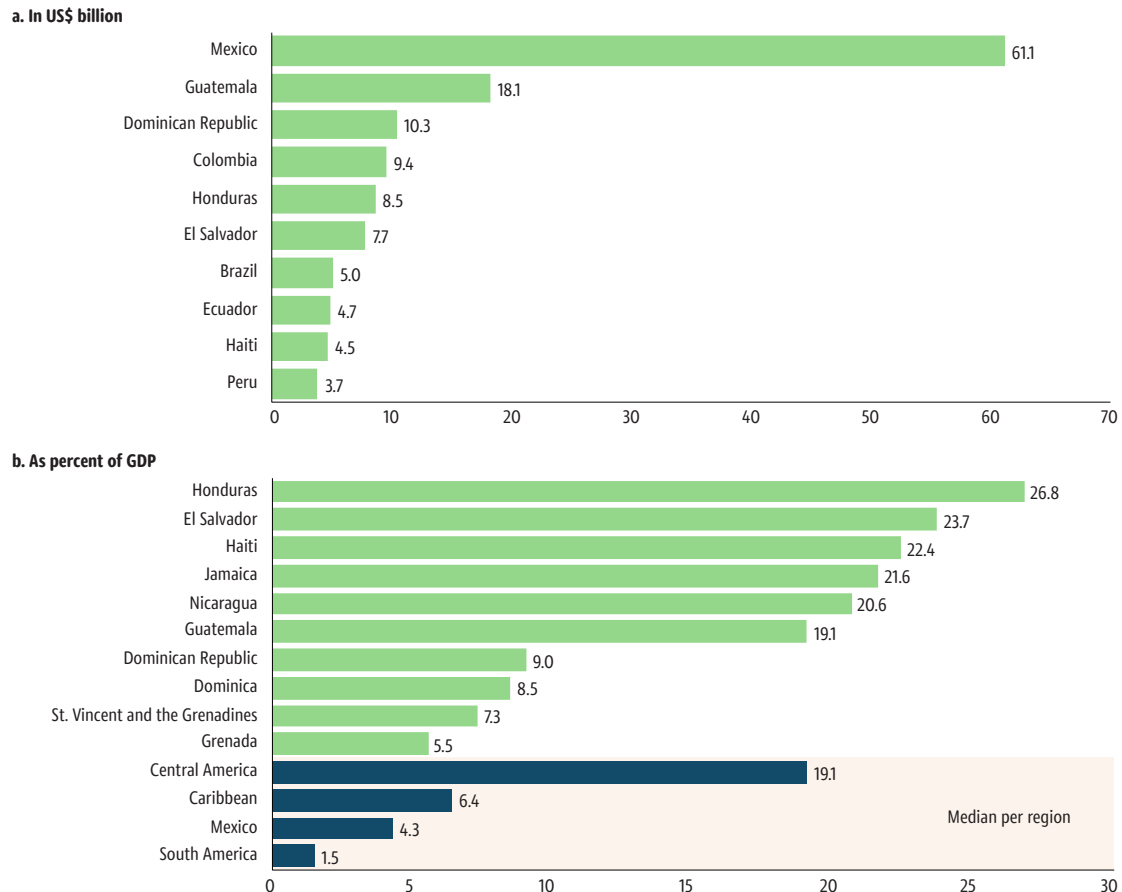


Source: U.S. Bureau of Labor Statistics; World Development Indicators (World Bank).

Note: In panels a and b, regions are as follows: EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and Caribbean; MENA = Middle East and North Africa; NA = North America; SA = South Asia; SSA = Sub-Saharan Africa. In panel c, FDI = foreign direct investment; LAC = Latin America and Caribbean; ODA = official development assistance. In panel d, YoY = year-on-year.

Mexico was the highest remittance recipient in LAC, receiving US\$61.1 billion (or 41.9 percent of the region's total) (figure 1.27, panel a). Mexico is the world's second-largest recipient of remittances after India, followed by Central America (US\$38.9 billion), South America (US\$ 26.9 billion), and the Caribbean (US\$19.0 billion). More striking is that the median share of remittances as a percent of GDP is 19.1 percent in Central America and 6.4 percent in the Caribbean, with the share at or about 20 percent of GDP in Honduras, El Salvador, Haiti, Jamaica, Nicaragua, and Guatemala (figure 1.27, panel b).

Figure 1.27. Remittances by LAC Country (Top 10 Recipients, 2022)



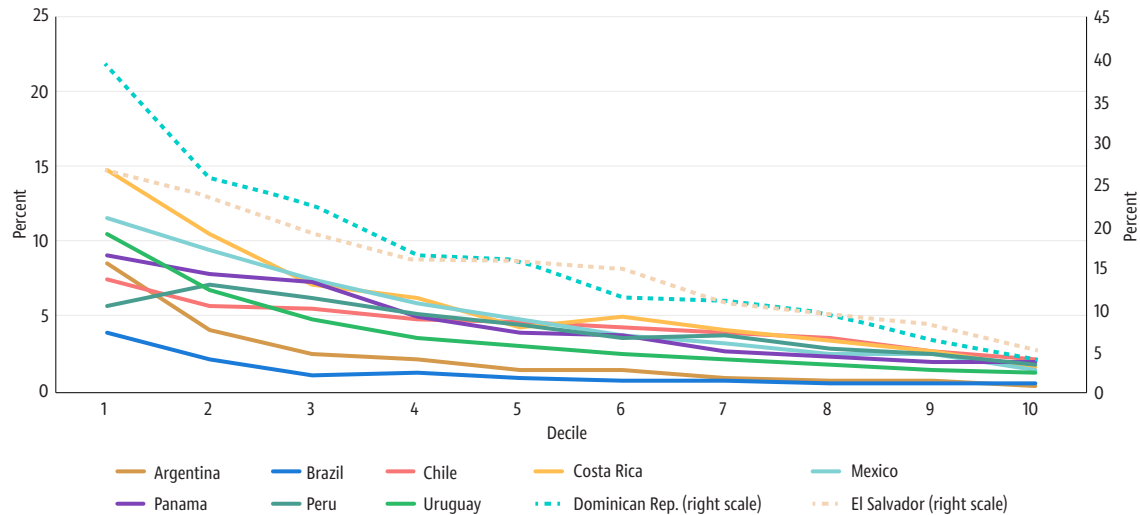
Source: World Development Indicators (World Bank).

Note: Calculations based on 29 Latin American and Caribbean countries for which data are available.

This huge participation in national income has both advantages and disadvantages. On the one hand, remittances are an important component for the income of poor households: the share of remittances in total household income is larger for lower deciles in the income distribution (figure 1.28), accounting for around 10 percent of the incomes of the poor in several LAC countries and rising to 25 percent in El Salvador and 40 percent in the Dominican Republic. On the other hand, these flows can be volatile, especially during global shocks that affect both sending and recipient countries. For comparison, the entire mining sector of Chile accounts for 10 percent of GDP, perhaps stifling competition in other sectors. The share of remittances in many countries is more than twice as large, raising questions about the competitiveness of other sectors.

Figure 1.28. The Average Share of Remittances in Total Household Income is Highest in the Lowest-Income Households

Average share of remittances in total household income, per decile of the income distribution, 2021.



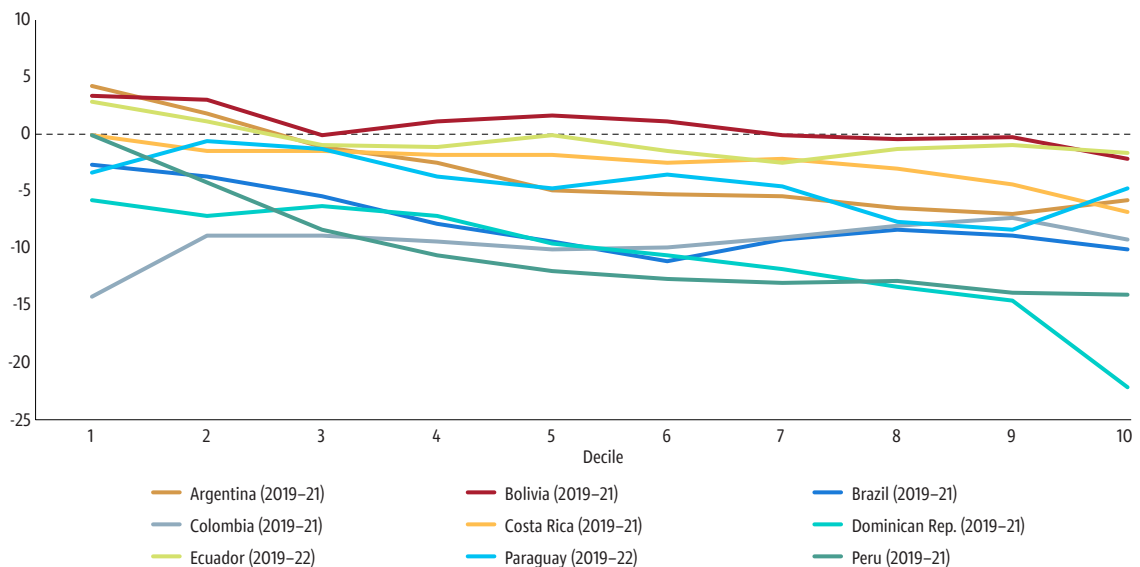
Source: World Bank Poverty and Equity Global Practice.

Overall, Incomes Still Lag Substantially from 2019 Levels, Although Least for the Poor

The combination of lower real wages for many groups and the reduction of social transfers has led to an overall decrease in household incomes relative to their pre-pandemic levels (figure 1.29). This effect becomes stronger with a rise in income strata, with the decrease for middle- and upper-classes exceeding 10 percent in some cases. This pattern predictably has led to a slight improvement in income distribution (figure 1.30), while poverty rates have receded relative to 2020 but remain higher than in 2019 for most countries (figure 1.31).

Figure 1.29. Overall Household Incomes are Decreasing Relative to their Pre-pandemic Levels

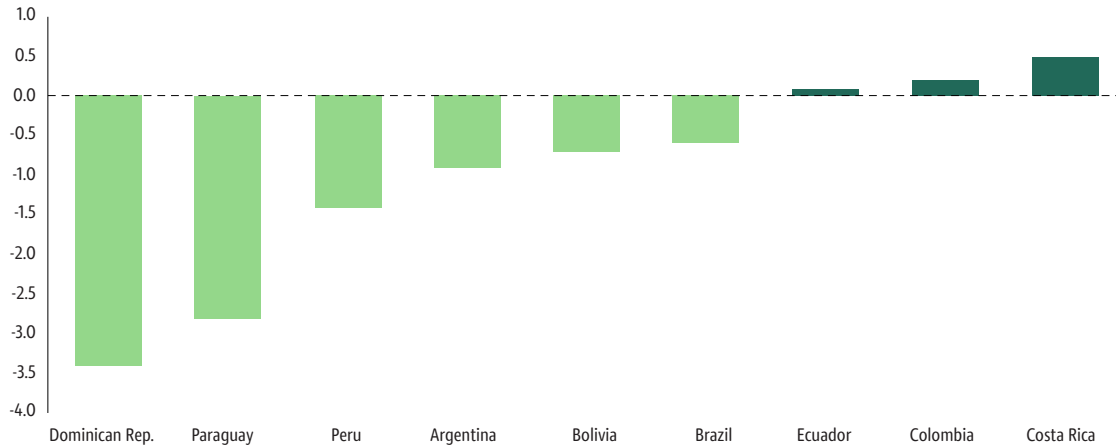
Growth rate of real per capita income between selected years, per decile of the income distribution (percent)



Source: World Bank Poverty and Equity Global Practice.

Figure 1.30. Inequality Decreased during the Pandemic as Households at the Top of the Income Distribution Fared Relatively Worse than the Rest

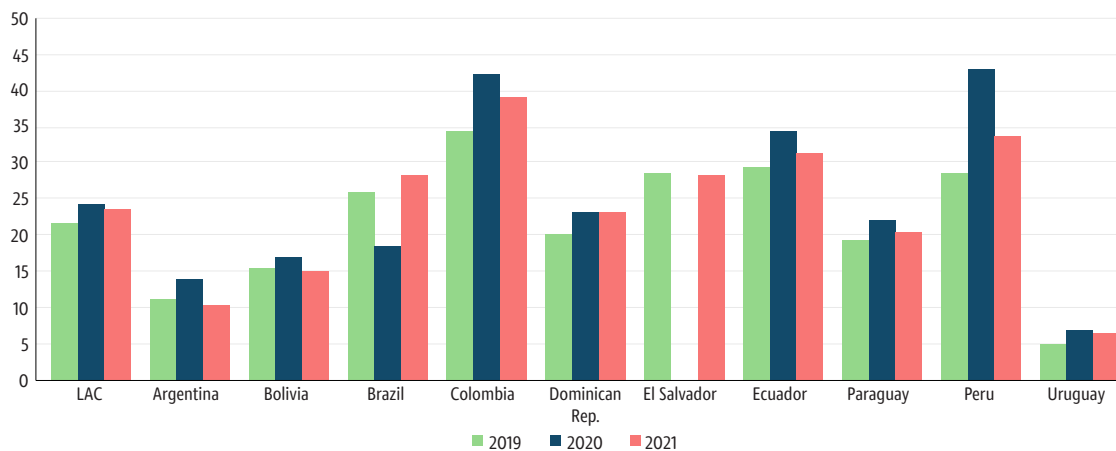
Change in the Gini coefficient from 2019 to 2021 (percentage points)



Source: World Bank Poverty and Equity Global Practice.

Figure 1.31. Poverty Rates are Decreasing After the Pandemic Record-Highs But Remain Higher than in 2019

Monetary poverty rate



Source: World Bank Poverty and Equity Global Practice.

Note: Monetary poverty rate calculated at poverty line of US\$6.85 at 2017 PPP. The LAC average is a simple/unweighted average of 10 countries: Argentina, Bolivia, Brazil, Colombia, Dominican Republic, El Salvador, Ecuador, Paraguay, Peru, and Uruguay. LAC = Latin America and Caribbean; PPP = purchasing power parity.

Social Consensus is a must for Needed Reforms

Undertaking the reforms necessary to stimulate growth, attract reshoring, and attain fiscal sustainability requires a level of social consensus that must continue to improve in the region today. The July 21 Latinobarometro reports citizen dissatisfaction with government performance at 69 percent, recovering 3 percentage points since 2018, but still high. Similarly, Fitch's Short-term political risk index, measuring the government's ability to propose, pass, implement and enforce legislation over the next two calendar years, has been stable across the region, when compared to the values observed in the previous April 2023 *Latin America and the Caribbean Economic Review, The Promise of Integration* (World Bank 2023a), but with a worsening trend for the last years. Voters have rejected the incumbent in 16 out of 19 recent elections and, on average, elected officials do not retain popular support long enough to implement their agendas.

Box 1.3. How a Consensus-building Institution (EPOC) Changed Jamaica’s Fiscal Path

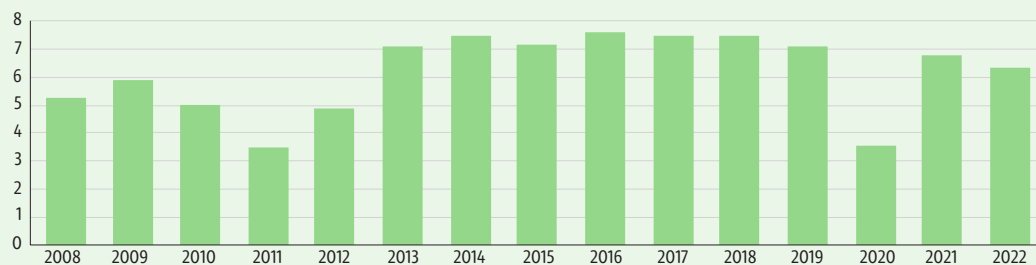
Jamaica has had striking success in reducing debt and running primary surpluses on a scale unequalled in the developing world. Critical to this effort is a consensus-building institution, the Economic Programme Oversight Committee (EPOC), which offers a model to the rest of the region.

After decades of sluggish growth and poor fiscal management and numerous failed stabilization programs with the International Monetary Fund (IMF), Jamaica’s public debt reached 147 percent of GDP in 2013 and was approaching unsustainability: primary surpluses were consistently exceeded by debt service. The authorities sought help again from the IMF, but this time accompanied the program with the creation of the Economic Programme Oversight Committee (EPOC) to ensure transparency, monitor the implementation of the targets established on the agreement, and report their results to the public.

The fiscal plan included targets for public debt to GDP of 60 percent; a primary balance target consistent with the debt target; and a limit on the size of the public wage bill while placing a floor on social spending; as well as provisions for fiscal transparency. The plan led to dramatic and sustained primary surpluses of more than 7 percent of GDP for seven years running (figure B1.3.1). Debt has eroded (figure B1.3.2) and is forecast to be 77 percent of GDP in fiscal year 2022/23, half of its high a decade earlier. Interest payments on debt are expected to be around 4 percent of GDP in the next few years, significantly less than the historic levels, leaving more fiscal space for social expenditures.

Figure B1.3.1. Jamaica Has Enjoyed Remarkably High Primary Surpluses

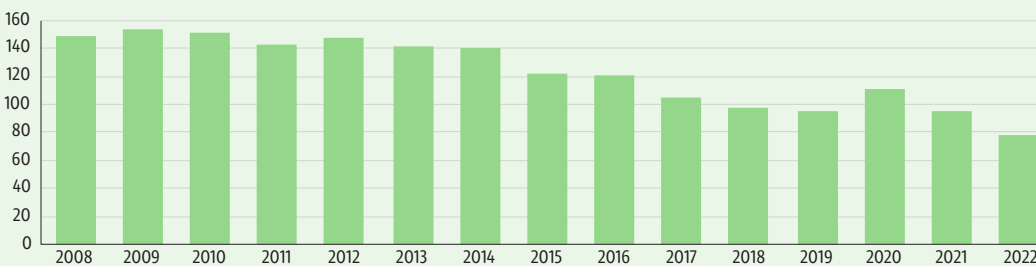
Primary fiscal balance as a percent of GDP



Source: World Bank Macroeconomics, Trade, and Investment Global Practice—Latin America.
 Note: The values are based on projections (as of August 30, 2023); GDP = gross domestic product.

Figure B1.3.2. Government Debt Has Declined

General government debt as a percent of GDP



Source: World Bank Macroeconomics, Trade, and Investment Global Practice—Latin America.
 Note: The values are based on projections (as of August 30, 2023); GDP = gross domestic product.

Continued on next page

Box 1.3. How a Consensus-building Institution (EPOC) Changed Jamaica's Fiscal Path (continued)

EPOC was key for these achievements as a de facto fiscal council. It was designed as an eleven-member committee representing all elements of civil society (the private sector, academia, and unions), resulting in strong bipartisan support for fiscal discipline and the overall program. The legitimacy of the program arose from its perception of being devised by the government with its domestic social partners, with support from multilateral organizations, and the explicit transparency mechanisms to ensure adherence to it. Using high-frequency information from the government, EPOC meets quarterly to assess the targets, while a technical subcommittee meets monthly to follow closely the ongoing outlook which it widely disseminates through traditional and digital media. It has also created digital content to explain to the public the importance of fiscal sustainability and the EPOC's role.

The committee has been resilient to changes of government and, in February 2021, the Senate took a step forward to strengthen its technical capacity by establishing the Independent Fiscal Commission, which is expected to be operational by the end of 2023. Jamaica has been able to change its macroeconomic situation through a consensual reform, which has created a basis for structural changes, decreased poverty, and foster higher economic growth.

Improvements on social consensus would encourage greater long-term investments in infrastructure and innovation—efforts that have long periods of gestation and that require policy continuity and stability in the rules of the game. At the same time, it would contribute to consistent policy planning, thus providing the needed grounds for long-term economic growth. A notable example that offers a way forward for fragmented polities facing difficult decisions is provided by Jamaica, which managed to turn around decades of unsuccessful International Monetary Fund (IMF) stabilization plans into a social consensus around the need for fiscal transparency, improved governance, and macro predictability. As box 1.3 shows, Jamaica has managed through a unit comprised of members from across society, the Economic Programme Oversight Committee (EPOC), to reduce its debt by half (from 147 percent of GDP to 71 percent), finding the political consensus to run primary surpluses of up to 7 percent for seven years in a row.

Chapter 2 focuses on a particular type of long-term investment that spans several of the issues discussed in this chapter: the promise of digital connectivity for LAC. Greater digitalization could help increase growth, make governments more efficient and responsive to the constituencies, reach distant vulnerable populations, and create new service exports.

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CHAPTER 2

Wiring Latin America and the Caribbean for Growth and Inclusion— The Necessary Big Push

Latin America and the Caribbean (LAC) will continue to face the mutually reinforcing triple challenges of low growth, limited fiscal space, and citizen unrest and dissatisfaction described in the previous chapter. Progress on all three fronts may be possible by expanding digital connectivity in the region. Some examples illustrate the potential. Most of the region's high-growth unicorns are operating on digital platforms.¹ e-government programs have slashed tax compliance costs, reduced the time and cost of obtaining government-issued identification, and sped up and decreased the cost of procurement. Digital connectivity has made service provision in areas such as education and health more resilient to shocks, for instance, by allowing students with digital connections to continue studying during the COVID-19 pandemic. In many ways the pandemic has accelerated the digitalization of the economy. The ensuing changes in consumption habits and ways in which services are delivered seem to be permanent. e-commerce and e-finance have grown dramatically and show no signs of retreat.

But the full potential of wiring the region for growth and inclusion remains untapped. LAC has already made great progress installing the necessary hardware—the cables, towers, and interchanges necessary for digital communication. Three critical challenges, however, remain.

First, hard-to-reach locations still lack even basic coverage and access to high quality broadband internet remains limited, particularly in the less profitable segments of the market (rural and peri-urban areas with low population density, low socioeconomic levels, or challenging geography) where private providers are less keen to invest.

Second, the region faces a set of challenges related to increasing the productive use of existing infrastructure: actual access is much lower than the physical infrastructure could support. For reasons of cost, and seemingly lack of interest, many families remain unconnected, leaving a channel that could increase inclusion, strengthen resilience, and build social cohesion underexploited.

Third, as with any other infrastructure “hardware,” critical investments in “software” are necessary complements. Critical software includes digital and traditional human capital skills and complements ranging from primary education in digital skills to managerial capabilities, to the improvement of government protocols, capabilities and regulatory structures, to deeper financial markets. Broadband is not a silver bullet in itself (box 2.1).

All three challenges are important to address if LAC is to maximize the social benefit of digital connectivity, but also to ensure that such connectivity does not exacerbate spatial, educational, gender, or racial inequalities. A tragic example is the dispersion of educational losses during the pandemic. On average, students lost a year and half of schooling, which will translate to 10 percent lifetime earnings foregone. These losses were not evenly shared across the population; higher-income families with access to connectivity and tablets suffered less significant losses than poorer families that did not, ensuring that income gaps will widen across the next generation (World Bank 2022a). Regions that lack connectivity and complementary factors will slip further behind the richer ones that already do. Women with fewer digital skills will participate less in the high-paying job market than men who have those skills. Hence, the region needs to make an additional big push to fully realize the potential of digital connectivity that includes not only physical infrastructure but a range of digital and traditional human capital skills and complements.

Box 2.1. The Need for Investments in Skills and other “Software” to Complement Digital Hardware

As stressed in a recent comprehensive study of spatially targeted policies for regional development (Grover, Lall, and Maloney 2023), the hardware of all types of infrastructure needs to be complemented by a variety of software, ranging from human capital of various types to financial institutions to regulatory structures. Evidence from around the world supports this conclusion. For instance, construction of road networks in India generate the most new economic activity in areas with higher levels of human capital and finance.

The same is true for digital infrastructure. Lack of complementary interventions, such as business training or access to credit, can also explain the lack of positive effects of digital investments on local communities on the production side. This was the conclusion of a study of rural Chinese counties (“Taobao villages”) that sell clothing and other consumer items, mostly obtained from small local factories, on Alibaba platforms (Couture et al. 2021). In Japan, regional variation in the intensity of e-commerce sales is entirely driven by the share of college-educated people, rather than urban-rural divides or young-old divides, once the analysis controls for education (Jo, Matsumura, and Weinstein 2019).

These findings strongly suggest that improving digital connectivity in schools in LAC by installing more hardware will be no substitute for remedying the deficiencies and barriers to improving the region’s poor performance in elementary and secondary public education—as registered in lagging results on the Programme for International Student Assessment (PISA) tests—or facilitating access to good-quality higher education.

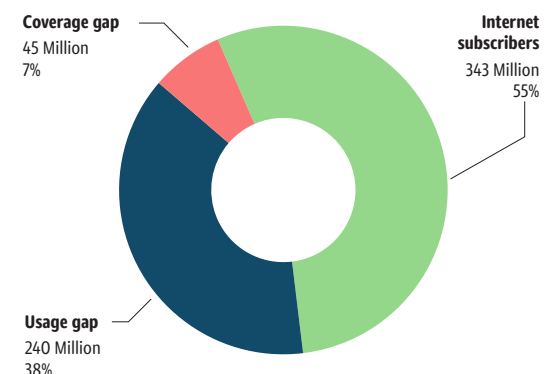
Finally, successfully introducing any new technology into society requires an iterative process of experimentation and evaluation to establish what works and what must be abandoned lest scarce resources be wasted. The developing world has seen its share of digital promises unfulfilled, most notably in education. Hence an active knowledge agenda is an essential accompaniment to government initiatives and any subsequent scaling up.

Increasing Digital Utilization

LAC has made significant progress in expanding coverage of mobile internet connectivity, with a coverage gap (areas without a mobile broadband network) of only 7 percent of the population (45 million people) (figure 2.1). About two-thirds of Latin American households have fixed internet connections, which are necessary to facilitate high-capacity data transactions such as video-based calls for work or learning. While this marks a rapid improvement from the regional pre-pandemic average of nearly 50 percent, disparities across countries and within countries persist (figure 2.2).

On average, 74 percent of the region’s urban households have access to fixed internet, compared to only 42 percent of their rural counterparts (World Bank and UNDP 2022).

Figure 2.1. Gaps in Internet Coverage and Use Persist in LAC

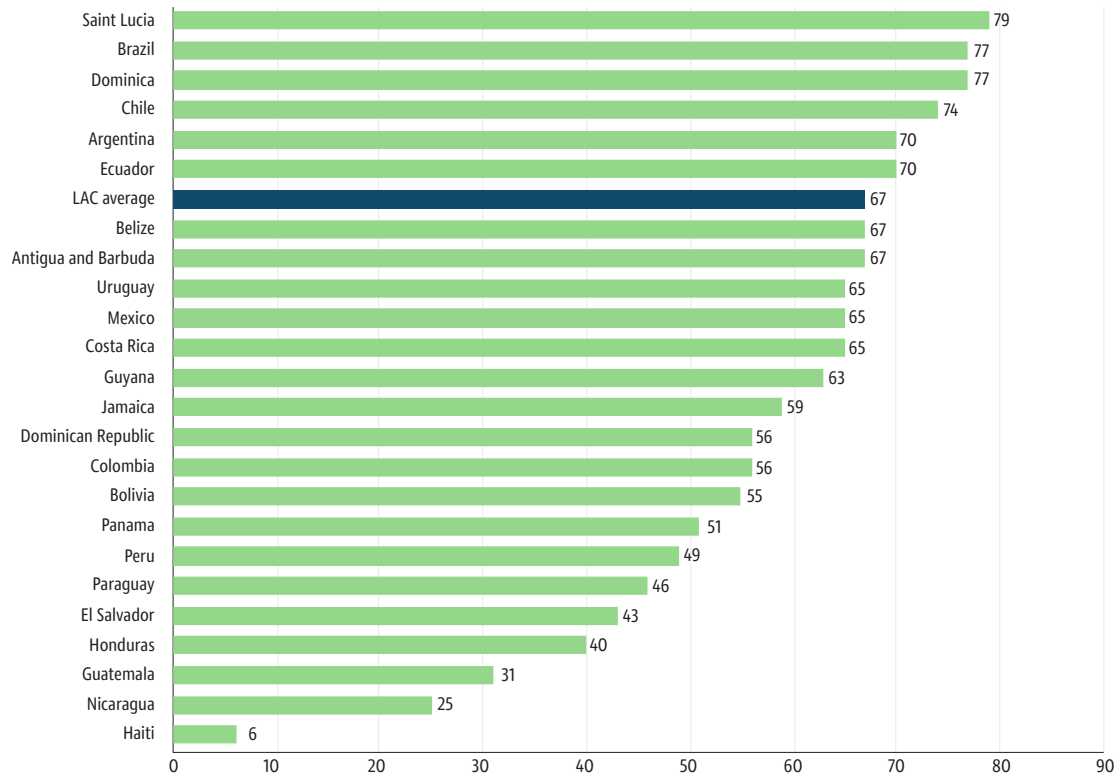


Source: GSMA 2021.

These rural-urban gaps are greatest in Peru and Bolivia, two countries with vast variations in topography, underscoring that adverse geography significantly increases the costs of connectivity (figure 2.3).

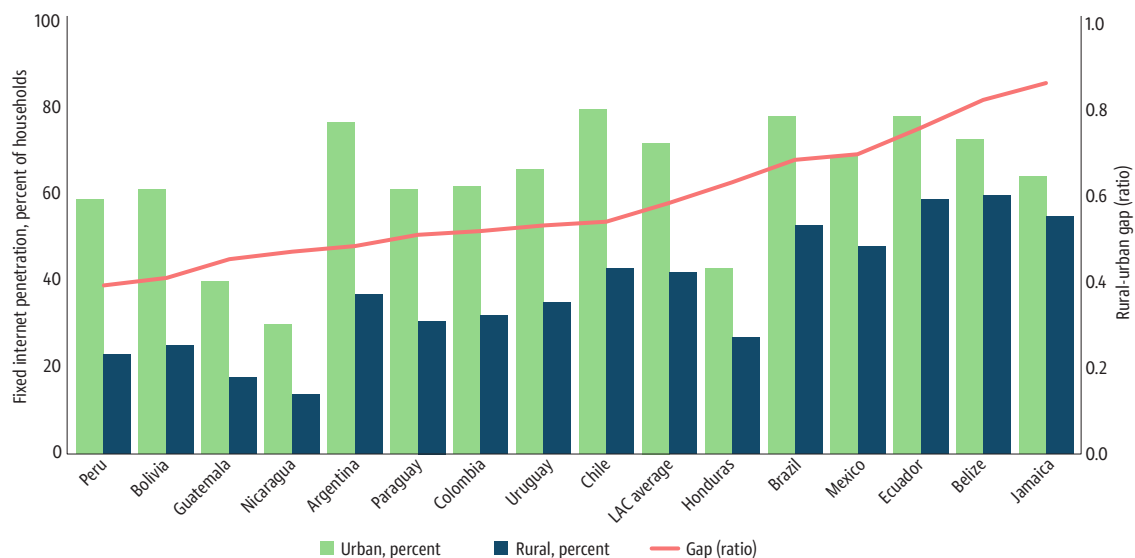
Figure 2.2. Access to Broadband Internet Varies across LAC Countries

Percent of households with fixed internet connection



Source: World Bank staff calculations based on World Bank and United Nations Development Programme (UNDP) LAC High-Frequency Phone Survey (HFPS) Phase 2 Wave 1 data.
Note: LAC = Latin America and the Caribbean.

Figure 2.3. Large Rural-Urban Gaps Persist in Fixed Internet Penetration



Source: World Bank staff calculations based on World Bank and United Nations Development Programme (UNDP) LAC High-Frequency Phone Survey (HFPS) Phase 2 Wave 1 data.
Note: LAC = Latin America and the Caribbean.

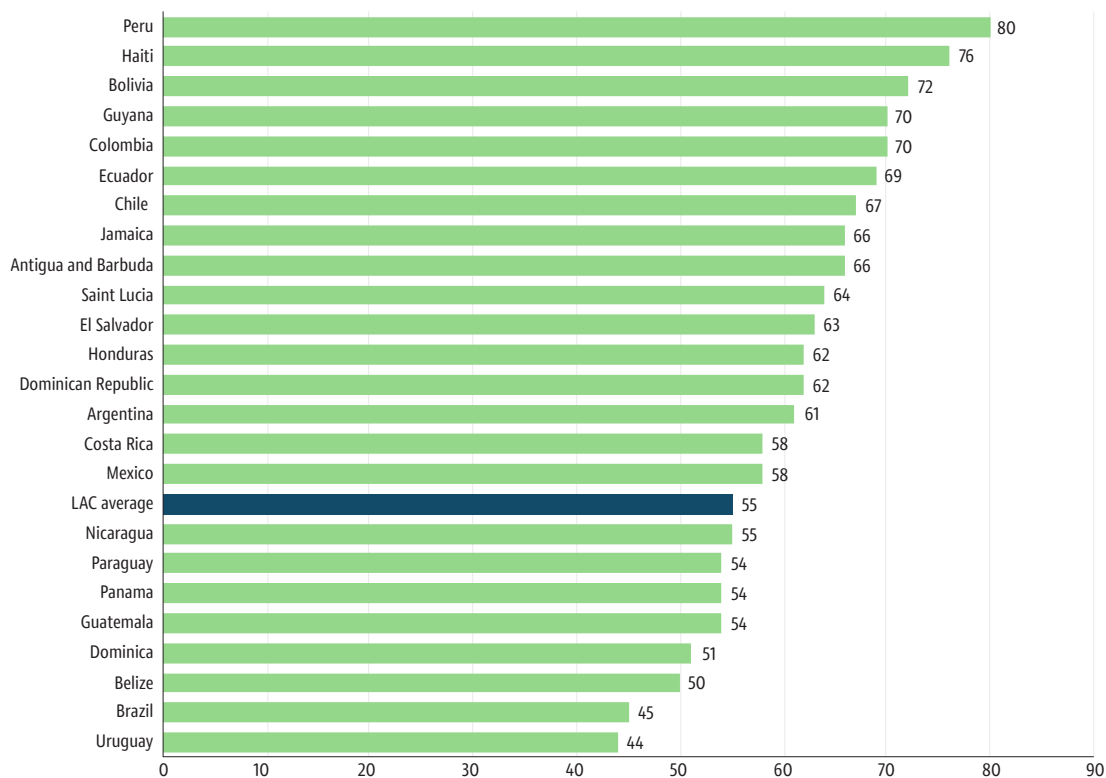
Importantly, the quality of internet service is low for many households. Across LAC, 55 percent of households that have some internet connectivity note that low quality of services is a major challenge. In Peru, up to 80 percent of households identify quality as major obstacle to internet use. Haiti, Bolivia, Guyana, and Colombia also stand out in the low quality of service (figure 2.4). There are also important gaps in rural and urban areas, with the largest gaps in Peru (29 percentage points), Chile (24 percentage points), Argentina (21 percentage points), and Bolivia (20 percentage points) (Srinivasan et al. 2022).

Addressing the infrastructure challenges in the region will require a mix of technological and institutional innovations. There are no one-size-fits-all solutions as each country faces its unique set of challenges. About half of the countries in the region have developed digital strategies that aim for universal coverage and expansion of high-quality connectivity in rural areas (IICA et al. 2022). Policy makers in the region have several potential mechanisms and institutional set-ups available for their policy toolbox.

On the technological side, the emergence of satellite connectivity can provide more cost-effective solutions to more isolated and geographically challenging locations than laying cable or building towers in low-density and mountainous regions. Argentina, for example, plans to deploy a geostationary satellite (ARSAT-SG1) with a transmission capacity of more than 50Gbps that can provide connectivity to more than 200,000 rural households in Argentina and more than 80,000 rural households in Bolivia, Chile, and Paraguay—potentially reaching nearly one million people. Orbith, another satellite internet provider in Argentina, is servicing rural and isolated areas in the Buenos Aires province with a focus on schools, benefiting more than 50,000 students and teachers, and is participating in a partnership with big agricultural producers to implement climate-smart and precision agriculture techniques. In Peru, the “Conecta Selva” initiative plans to install satellite internet capabilities in rural communities in the hard-to-reach regions of Amazonas, Loreto, Madre de Dios, and Ucayali that are estimated to benefit more than 180,000 people.

Figure 2.4. Low-Quality Internet is an Obstacle for Internet Use

Percent of households reporting low quality as a barrier to internet use



Source: World Bank staff calculations based on World Bank and United Nations Development Programme (UNDP) LAC High-Frequency Phone Survey (HFPS) Phase 2 Wave 1 data.
 Note: LAC = Latin America and the Caribbean.

In the policy arena, several innovations are under way with potential to increase coverage with only marginal improvements in physical infrastructure. The Bahamas, Bolivia, Colombia, Jamaica, and Peru have implemented free or very low-cost connectivity access points in public spaces, such as public libraries or schools, in rural areas, financed through universal access fees or general government receipts. These access points are usually paired with educational programs that seek to develop the basic digital skills of the population. These types of programs offer a first step in providing basic access to unconnected communities, and developing the basic digital capabilities of the population that can be built upon for more sophisticated uses and as justification for further deployment of better digital access options.

Another important policy tool has been the implementation of shared infrastructure agreements. For example, tower-sharing agreements among service providers generate savings in both the deployment of digital infrastructure and operational costs and can result in more competition and lower prices for consumers. For 5G technologies, savings in capital expenditure are estimated to be as high as 40 percent.² As an example, “Internet para Todos,” a partnership between CAF, Telefonica, IDB Invest, and Facebook, plans to reach more than 6 million Peruvians in rural areas across the country. It has already reached more than 2 million in 12 communities across 23 departments. Lessons from around the world suggest that all network industries—roads, railroads, electrical—can contribute to digital infrastructure by making their infrastructure available for telecom operators to build parallel digital networks, helping lower deployment costs of infrastructure (Zaballos and Foditsch 2014).

Spectrum auctions that stipulate extending coverage to more peripheral areas offer an alternative funding mechanism. The experience of Brazil suggests that while financial returns from spectrum licenses were reduced, as predicted, the stipulations led to increased coverage of previously underserved areas. The design of the auction explicitly incentivizes the joint deployment of infrastructure among internet providers, thus lowering costs and benefiting final customers. This financing mechanism also implies a trade-off between maximizing auction revenues (which can help finance alternative investments) and supporting the benefits of expanding digital coverage in rural areas.

Successful programs from around the world that achieved universal (or nearly universal) broadband access and service share common characteristics (Zaballos and Foditsch 2014; Puig Gabarró et al. 2021). The programs were well planned. Funding was included for network-mapping initiatives that allowed for comprehensive gap analysis, which enabled policy makers to understand the most pressing needs and bottlenecks and better deploy resources. Cooperation and coordination between central and federal government agencies and other actors were also essential, including local governments, and between public and private sectors. Defining clear and measurable goals and objectives with monitoring mechanisms allowed for regular evaluation of progress and identified problems and unexpected bottlenecks.

Along with investments and innovations in the expansion of digital infrastructure, parallel complementary developments are needed in cybersecurity infrastructure and regulatory frameworks for data privacy, ownership, and use. According to recent World Bank estimates, in 2017 alone, cybercrime cost LAC between \$US15 billion and \$US30 billion, amounting to between 0.24 percent and 0.52 percent of the region’s GDP. Cyber incidents are rising, increasing by 153 percent in 2022. As more government and private services move online, more and more sensitive data will be vulnerable to digital criminals. Thus, investments in digital security are a key complement and enabler to accelerate digitalization in the region.

Existing Networks Remain Underutilized

Finally, the most successful programs allocated funds not only to the deployment of infrastructure, but also funded initiatives on the demand side: developing digital skills in the population, as well as engaging with community leaders and nongovernmental organizations (NGOs) to raise awareness of the benefits of connectivity for different communities. These efforts are key given the important “usage gaps” between physically feasible and actual connectivity observed in many Latin American countries. About 38 percent of the population (240 million people) lives in an area with coverage but chooses not to access the internet, according to GSMA (2021). These gaps reduce the profitability of installing the hardware and forestall gains from household connectivity.

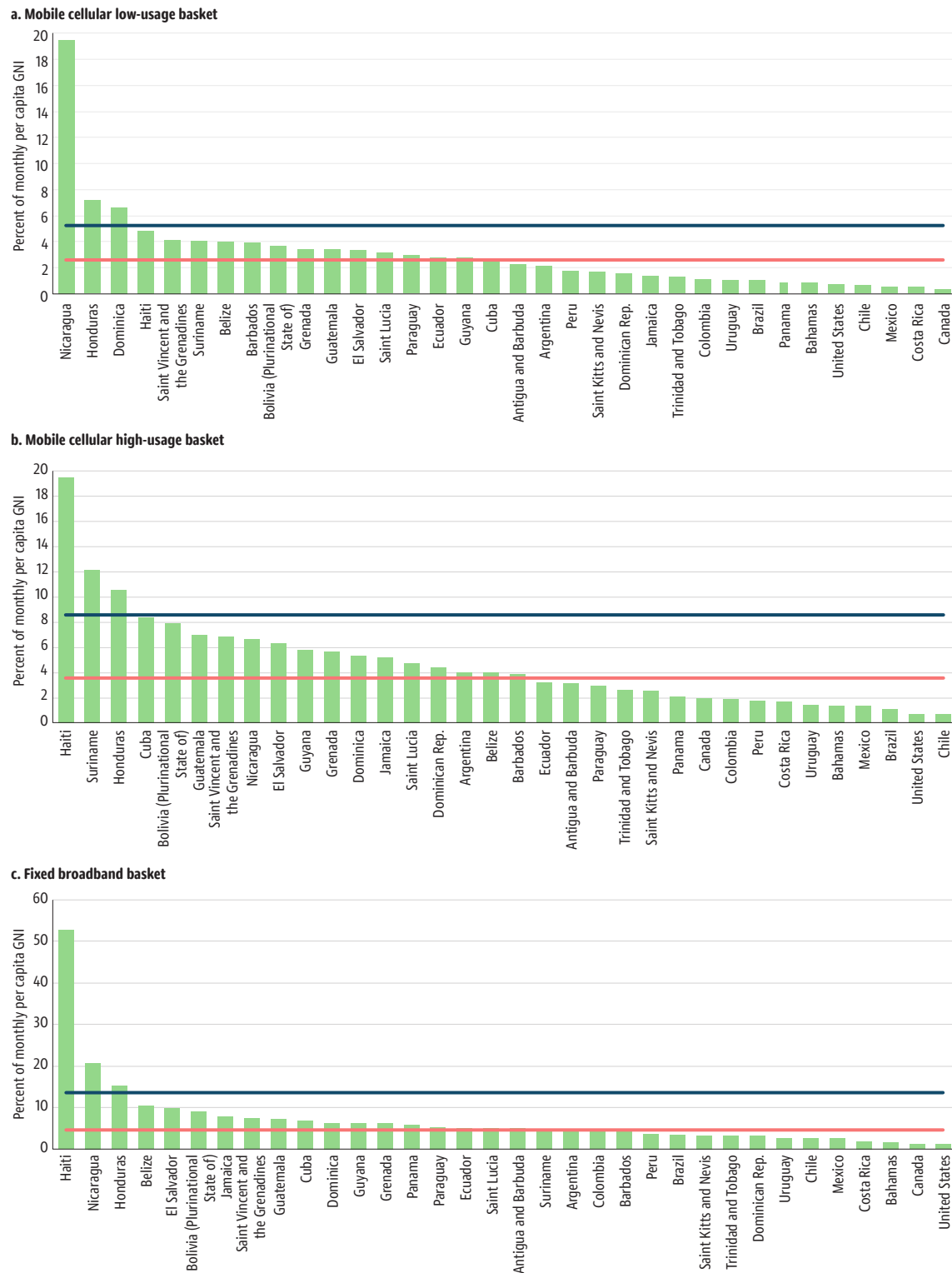
The high cost of internet services is the most common reason for not accessing internet (cited by 50 percent of surveyed households) (World Bank and UNDP 2022). As shown in figure 2.5, in much of the Caribbean and Central America, the cost of connectivity for all types of cellular and fixed connectivity programs is more costly measured as share of per capita gross national income (GNI) than the average for high-middle-income countries (pink line) and in some cases, for lower-middle-income countries (blue line), where costs are higher. The United Nations (UN) goal is for entry-level broadband (close to the low-usage basket) to cost no more than 2 percent of per capita GNI by 2025.

It is important to recognize that average affordability measures mask significant variations across the income distribution. The region has long-standing issues related to high levels of income inequality which translates into widely different levels of affordability across income quantiles. As the in-depth analysis provided by the World Bank’s LAC Digital Economy: Country Diagnostics shows for Ecuador, El Salvador, and Jamaica (see box 2.2), the share of gross national income (GNI) per capita for the poorest quintile of the income distribution can be an order of magnitude higher than for the richest quintile (figure 2.6).

Tackling affordability issues, particularly to improve access among the poorest households is thus an important area for government focus. In particular, ensuring competition at various stages of service delivery is critical to holding down costs. In India, rapid entry of mobile operators offering 4G service in 2016 boosted coverage from 4 percent in 2015 to 94 percent in 2018,³ the price per gigabyte dropped dramatically, and data consumption per subscriber increased from 0.3 gigabytes to 7.7 gigabytes per month.⁴ In Cambodia, a combination of measures such as migrating spectrum and users to 4G to achieve lower operating costs, outsourcing construction work, and moving software to the Cloud intensified competition among providers, bringing down the cost per gigabyte of data from US\$4.56 in 2013 to one of the world’s lowest at US\$0.13 in 2019, driving up data consumption to 6.9 gigabytes per capita per month.⁵ Regulatory policies, such as early release of competitively priced spectrum, along with retail competition, can accelerate transitions toward higher-generation mobile technologies and lower prices for customers (World Bank 2021). Allowing operators to “refarm” their spectrum holdings can also accelerate migration to next-generation mobile, encouraging operators not only to be more efficient in their use of spectrum, but also to rapidly upgrade their existing subscribers to reclaim the spectrum used for the older technology.

In addition to promoting competition in digital infrastructure markets, as digital services become more dominant and offline markets are less able to discipline online actors, effective tools to prevent anticompetitive practices and mergers become more important. For example, as of September 2022, competition authorities in Brazil, Chile, Colombia, Mexico, and Uruguay had taken final decisions on cases involving digital platforms, including 9 abuse of dominance cases, 4 anticompetitive agreements, and 17 merger reviews. Anticompetitive practices in transportation, e-commerce, online search and advertising, and accommodation have become focuses of attention (World Bank, Global Digital Antitrust Database).

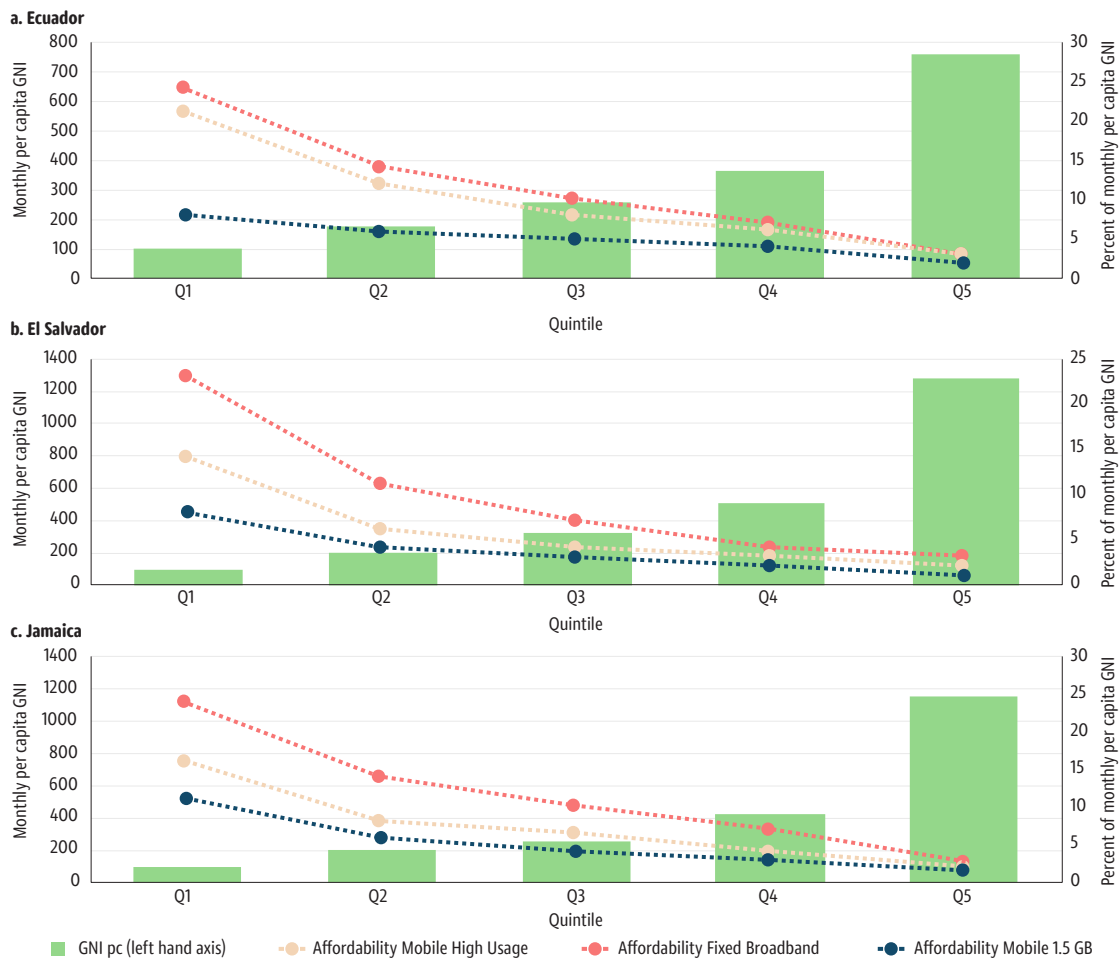
Figure 2.5. Costs of Cellular and Fixed Connectivity are Higher for Many LAC Countries than Comparators in Other Regions



Source: World Bank calculations using ITU (International Telecommunications Union) data.

Note: The pink line represents the simple average of the cost of a basket as a percent of monthly GNI per capita for upper-middle income countries. The blue line represents the simple average of the cost of a basket as a percent of monthly GNI per capita for lower-middle income countries. Mobile cellular low usage basket = 70 minutes + 20 SMS. Mobile cellular high usage basket = 140 min+70 SMS + 2 GB.

Figure 2.6. The Costs of Mobile and Fixed Connectivity in LAC Are Much Higher for Those with the Lowest Income



Sources: World Bank, LAC Digital Economy: Country Diagnostics: Ecuador (panel a); World Bank, LAC Digital Economy: Country Diagnostics: El Salvador (panel b); World Bank, LAC Digital Economy: Country Diagnostics: Jamaica (panel c), using ITU (International Telecommunications Union) data.

Note: Quintiles are organized from the poorest to wealthiest households in each country. Q1 = poorest 20 percent of households and Q5 = richest 20 percent of households in each country. GNI pc = per capital gross national income.

However, beyond the issue of cost, about 20 percent of unconnected households in LAC declared no interest in or need for the internet, suggesting a lack of awareness about the potential advantages of connectivity (World Bank and UNDP 2022). Lack of digital skills is also cited as an important reason for avoiding use.

Also important, is for governments to foster the trust environment around use of digital platforms. The rapid growth of the digital economy goes hand in hand with a rapid rise in cyber threats and increasing concerns about personal data protection. A strong governance framework that balances data enablers and safeguards and supports digital transformation while protecting individuals, businesses, and institutions from cybersecurity risks is a key complement to digital infrastructure and the growth of the digital economy. Beyond the framework and regulations, strong investments in government enforcement capabilities are needed as well as an evolutionary mindset in regulations as new technologies and challenges—such as artificial intelligence and machine learning—appear.

Hence, to fully exploit the potential of digital connectivity, a multidimensional “big push” is needed, including not only the installation of hardware but also sustained investments in expanding digital skills—with a particular focus on addressing gender disparities and reaching marginalized communities that have persistent gaps in access and skills. Efforts are also needed to foster demand among potential users by funding awareness campaigns and engaging with citizens to demonstrate the many benefits of connectivity, including enhancing their earnings capacity.

Box 2.2. Diagnosing the Digital Economy and Digital Divides in LAC Countries

The World Bank's LAC Digital Economy: Country Diagnostic reports provide a cross-cutting diagnostic of a country's digital economy and offers policy recommendations to help the country address its digital divide and accelerate the pace of digital transformation. Each report provides an assessment across six pillars or foundational elements outlined in the World Bank's Digital Economy Assessment (DEA) methodology: digital infrastructure, digital public platforms, digital financial services (DFS), digital businesses, digital skills, and trust environment.



Digital infrastructure. This refers to the facilities that are involved in the effort to collect, exchange, store, process, and distribute data across first-mile (international links), middle-mile (backbone), and last-mile (access) networks. Aside from connectivity, digital infrastructure encompasses the Internet of Things (IoT) (such as mobile devices, computers, sensors, voice-activated devices, geospatial instruments, and machine-to-machine and vehicle-to-vehicle communications) and data repositories (such as data centers and Clouds). It also includes all the active and passive infrastructure necessary to develop the digital economy downstream.



Digital public platforms. Digital public platforms can help deliver more and better services to individuals. They may be developed for the public sector or as a public good—either by government agencies, in partnership with private companies, or through a hybrid model. The development of digital public platforms enables the expansion of e-government services and can support the efficiency, transparency, and accountability of core government systems.



Digital financial services. DFS provide individuals and households with convenient and affordable channels by which to pay as well as to save and borrow. Digital payments and financial services are critical to financial inclusion and are key enablers of e-commerce and digitally enabled business models.



Digital businesses. Digital businesses can be divided into two categories, each with its distinct characteristics: (1) digital start-ups, which refer to early-stage ventures that create new digital solutions or business models as part of their core products or services; and (2) established digital businesses, which are the digitally intensive businesses that have managed to scale up and consolidate their position in local or international markets and include medium and large platform-based and data-driven firms.



Digital skills. Economies require a digitally savvy workforce in order to build robust digital-intensive sectors and competitive markets. Digital skills encompass foundational, technology, and business skills for building or running a digital start-up or running a digitally intensive business. Greater digital literacy further enhances the adoption and use of digital products and services among governments and the larger population.



Trust environment. The rapid growth of the digital economy goes hand in hand with a rapid rise in cyber threats and increasing concerns about personal data protection. This pillar assesses the presence of a governance framework that balances data enablers and safeguards and supports digital transformation while protecting individuals, businesses, and institutions from cybersecurity risks.

Continued on next page

Box 2.2. Diagnosing the Digital Economy and Digital Divides in LAC Countries (continuation)

The reports are based on the World Bank's Digital Economy Assessment (DEA) methodology, which examines the international experiences of digital businesses and public sector institutions. This cross-country methodology has identified a set of foundational elements that play a critical role in the digital transformation of economies, including the availability of internet or broadband that brings people online, the ability to identify and authenticate people digitally, and the ability to pay or transact digitally. Digital economies further energize when there is a sizable tech-savvy workforce and an ecosystem that supports digitally intensive firms in entering the market or scaling up. Once those foundations are in place, a wide array of use cases can emerge that indicate all the ways by which a digital economy may take shape, serving people, businesses, and government in a process typically referred to as digital transformation. The diagnostic and recommendations are based on analysis of secondary data, structured interviews, surveys, and focus group discussions with key government and private sector stakeholders.

Digital Opportunities to Promote Growth and Reduce Poverty and Marginalization

By now, the huge value that digital technologies can create in the economy is well established. Several studies have found a positive relationship between penetration of digital technologies and development.⁶ Studies that focus on broadband find that higher fixed broadband penetration rates raise GDP per capita⁷ and that the magnitude of the effects is related to the degree of adoption.⁸ For the LAC region in particular, estimates indicate that a 10 percent greater broadband penetration, on average, is associated with a 3.19 percent increase in gross domestic product (GDP), a 2.61 percent increase in productivity, and more than 67,000 jobs (García Zaballos and López-Rivas 2012).

Growth may be promoted through multiple channels: reducing transaction costs, improving matching between producers and consumers, enhancing information flows, and increasing competition.

Like the telegraph cables of the 1860s, the mobile phone revolution in developing countries during the 1990s and the advent of Amazon fulfillment and delivery and e-commerce in the 2000s have progressively lowered transaction costs, with dual effects. They permit dispersion of routine activities, while encouraging agglomeration of complex productive activities by improving matching between producers and consumers.

The internet itself has facilitated trade in digital services, enabling new forms of cross-border collaboration and creating new market opportunities.⁹ The value of cross-border trade in digitally-deliverable services worldwide increased from US\$240 billion in 2005 to US\$2.8 trillion in 2018, the World Trade Organization estimates (WTO 2019). This trade facilitation is critical because service trade in LAC as a share of GDP is among the lowest in the world (Spring 2023 *Latin America and Caribbean Economic Review* [LACER], World Bank 2023), and the value of cross-border trade in digitally-deliverable services in LAC amounted to only US\$29 billion in 2017 (IDB 2018). The upside potential in service exports is potentially large.

The internet has enabled new forms of collaboration in digital services, as well as the outsourcing and offshoring that have characterized the past thirty years. These new forms of collaboration have allowed service providers to tap into new sources of expertise and to access markets that were previously out of reach. In light of the global shift toward reshoring (Spring 2023 LACER, World Bank 2023), high-quality and low-cost digital connectivity is critical. Connectivity is also key to integrating rural regions in agricultural value chains (Fuglie et al. 2020).

At the firm level, the potential economic benefits of expanding access to digital technologies stand to be large for a region like LAC. Adoption of digital technologies can bring large gains for firms through higher productivity and/or expanded access to new markets (Goldfarb and Tucker 2019). Productivity can increase, for example, because the transfer of information and data over the internet helps reduce production costs and therefore expands the demand for firm’s goods and services—in turn, increasing factor demand. Additionally, reductions in search costs improve matching outcomes between buyers and sellers by increasing the speed or efficacy with which firms find workers or input suppliers.¹⁰ Reductions in search, transaction, or tracking costs allow firms to overcome geographical barriers, penetrate new markets, and enlarge the volume of domestic and foreign trade (World Bank 2020a).

Research using firm-level data suggests that there is a positive and significant association between adoption of digital and information technologies and productivity.¹¹ Emerging evidence from advanced economies provides room for optimism. Gal et al. (2019) document that digital adoption in an industry is associated with productivity gains at the firm level in 20 countries in the European Union and Türkiye. Czernich et al. (2011) find that in member-countries of the Organisation for Economic Co-operation and Development (OECD), a 10 percent increase in broadband penetration resulted in a 0.9 percent to 1.5 percent gain in annual per capita growth. In Asia, Ng, Lye, and Lim (2013) find that broadband penetration increased the GDP of the Association of Southeast Asian Nations (ASEAN) members. These findings, however, contrast with recent evidence by DeStefano, Kneller, and Timmis (2018) for the United Kingdom, which shows that information and communication technology (ICT) causes increases in firm size (captured by either sales or employment) but not in productivity. While evidence for developing countries is scarce, a recent World Bank study for a sample of 82 developing countries estimates a firm productivity premium of 1.3 percent by adopting digital business solutions (Cusolito, Lederman, and Pena 2020). Hjort and Poulsen (2019) find positive effects of the arrival of internet on firm-level productivity in Africa. Studies analyzing firm-level data in Argentina, Brazil, Chile, Colombia, and Mexico find that digital technology adoption offers a pathway to higher productivity (Dutz, Almeida, and Packard 2018). A review of 150 studies concludes that most of them find that ICT has significant positive effects on productivity, with larger real gains in the medium and long term, as the output elasticity of ICT tends to increase with time (Cardona, Kretschmer, and Strobel 2013).

These flows of knowledge and technology are critical to growth. Uneven digital connectivity can exacerbate the widening divergence across firms in technological adoption. As Comin and Mestieri (2018) argue, historically, lags in the transfer of new technologies can explain much of the divergence of Latin America from the rest of the world. While the adoption lag among leaders in Latin America is steadily closing, the variance across domestic firms is expanding. Not only does this limit growth but the growing gap between productive and unproductive firms effectively reduces competition because the early adopters face fewer challengers (Akcigit and Ates 2023). Using detailed firm-level surveys of tech transfer, Cirera, Comin, and Cruz (2022) note that access to reliable and high-quality internet service and other infrastructure is a necessary condition for technology upgrading, but not a sufficient one (see box 2.3).

The establishment of platforms and networks has been shown to help stimulate industry in less connected regions into the global economy. Broadband access is viewed as a new source of productivity and jobs for displaced workers, from coal miners in the US state of West Virginia to the farmers in the Sahel region. The COVID-19 experience has demonstrated the potential of new technologies to enable teleworking from regions that were previously excessively remote—so much so that some observers have even forecast the demise of the city.

Box 2.3. Bridging the Technological Divide for LAC Businesses

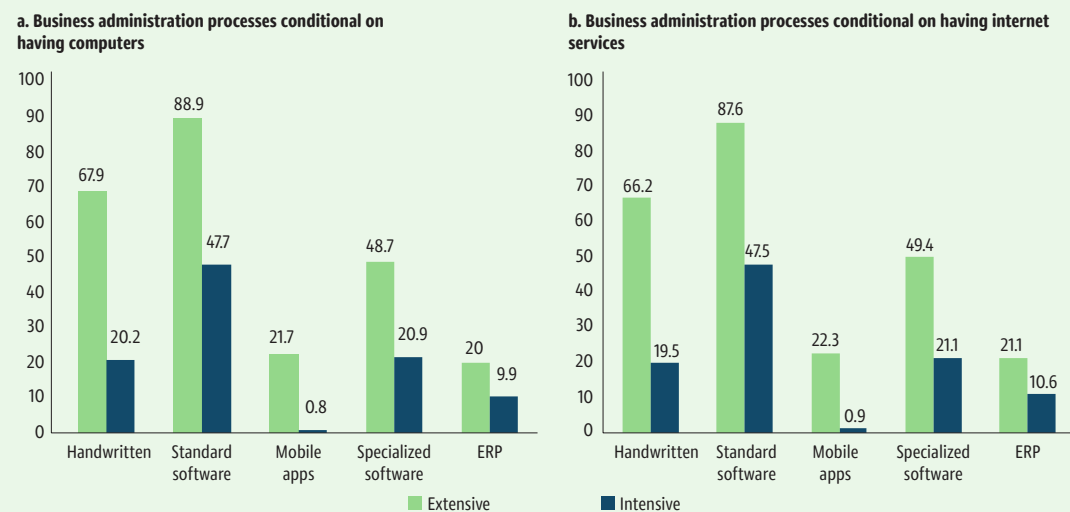
The widespread diffusion of computers, smartphones, and the internet has enabled a wide variety of information and communication technologies (ICT) used for business purposes. Digital technologies significantly reduce costs associated with searching, replication, transportation, tracking, and verification of information (Goldfarb and Tucker 2019). From this perspective, business functions comprising tasks that are intensive in processing information (such as business administration, marketing, and sales) can be expected to benefit more from digital technologies.

What steps are needed to encourage firms in Latin America and the Caribbean (LAC) to adopt and use more digital technologies? Figure B2.3.1 sheds light on this issue. It shows the share of firms from eight developing countries around the world that use different levels of technology on both the extensive margin (whether they use the technology or not) and the intensive margin (which technology they use most intensively) to perform business administration tasks related to accounting, finance, and human resources, conditional on having computers and/or the internet. Most of those firms use standard software (such as Excel) to perform this task (extensive margin). This is also the technology used most frequently by those firms (intensive margin). But about 21 percent of firms rely on specialized software, while 11 percent use enterprise resource planning (ERP). There are significant differences in terms of technology sophistication between processing data manually, using standard Excel software, and utilizing ERP in terms of the capabilities to perform tasks, the efficiency gains of the processes, and the outputs produced. But there are also important differences in terms of just using a technology (the extensive margin) or using it intensively as the most used technology (intensive margin).

As the first two sets of bars (use of handwritten methods or standard software) in figure B2.3.1 show, approximately one-fifth of firms (with 5 or more workers) still rely mostly on handwritten methods despite the fact that those firms have access to computers or the internet. What factors are holding them back?

Figure B2.3.1. Many Firms in Developing Countries Still Do Not Use Advanced Digital Technologies

Percent of firms



Source: Cirera, Comin, and Cruz 2022.

Note: The figure shows the percentage of firms from eight developing countries that use different levels of technology on both the extensive margin and the intensive margin to perform business administration tasks related to accounting, finance, and human resources, conditional on having computers and/or the internet. ERP = Enterprise Resource Planning.

Continued on next page

Box 2.3. Bridging the Technological Divide for LAC Businesses (continuation)

A variety of factors affect the diffusion of existing technologies and a firm's decision to adopt and use them. Internal factors are related to firm capabilities. This includes the knowledge and know-how accumulated and implemented through management and organizational practices, as well as the information available and biases of the entrepreneurs in the decision to adopt a technology. External factors include market dynamics and the regulatory environment, as well as access to funding to finance technology projects. The supply of knowledge and technology solutions from other firms or from public institutions is also very important. Different market failures affect these elements, from information frictions that result in the underprovision of finance to externalities and spillovers that are not appropriated and reduce investment in technology, or distortions that affect factor prices favoring more energy-intensive or labor-intensive technologies, for example.

A breakdown in the digital business database by subsector in the number of digital solution firms and investment flows to these firms shows that developing countries are generally catching up with consumer-facing digital solutions such as e-commerce and fintech, but less so on business-to-business (B2B) solutions. Incentivizing local firms to develop B2B products tailored for local needs can not only increase supply but can provide more technology options for traditional businesses that fit their specific needs, lowering barriers to adoption.

Similarly, management extension services in countries such as Brazil are experiencing a shift of demand toward digital upgrading programs, and new programs are being created to tailor to the needs of small and medium enterprises (SMEs) in this area. These programs combine the provision of information with technical assistance and are taking advantage of greater interest among SMEs for technology upgrading. Policy makers should seize the opportunity to accelerate and complete the digital transformation of SMEs.

Source: This box is based on *Bridging the Technological Divide* (Cirera, Comin, and Cruz 2022).

Fintech and the Rise of LAC Unicorns

In the past decade, fintech has shaken up the financial sector in LAC. In 2021, there were more than 300 million users of digital payments and more than 30 million users of digital banks in the region. The number of fintech companies in LAC more than doubled between 2018 and the end of 2021, to reach 2,482. According to data from the Global Fintech Index 2021, LAC fintech companies represent more than 22 percent of the global total. Payment and remittances services continue to be the segment with the highest number of ventures (25 percent), but lending (19 percent) and business technology solutions for financial institutions (15 percent) have been growing significantly in the past few years.

Fintech is boosting competition in the financial sector. The proliferation of new financial technology and digital banks has helped reduce lending spreads (Bakker et al. 2023). This is important because lending spreads have traditionally been high in Latin America. Different types of new ventures are spurring different types of competition and offering new services. While one segment is competing with the traditional financial sector, another segment is providing banks and insurance companies with new technologies and services. This segment is offering digital banking software solutions to comply with money laundering regulations, including “know your customer” (KYC), smart contracts, and other white-label solutions designed for financial institutions.¹²

Fintech has increased inclusion. About three-quarters of digital banks' customers were previously unbanked or underbanked consumers and SMEs (IDB 2022). Fintech firms have innovated and disrupted the market with new techniques and sources of information to assess credit risk. Online financing platforms have expanded access to financing for micro, small, and medium enterprises (MSMEs). Payment solutions and digital tools to achieve better corporate financial performance have facilitated the digitalization and formalization of these businesses. According to a 2023 study by the International Monetary Fund (IMF), a higher level of fintech adoption is associated with lower income inequality (Bakker et al. 2023).

Fintech, however, also presents some risks, ranging from financial stability risks to technology risks related to cybersecurity and data privacy. Fintech companies may not be fully equipped to handle market volatility, which could result in losses for their customers. Technology that facilitates instantaneous bank transfers and withdrawals may also boost the speed of bank runs.

It is remarkable how policy makers in the region are supporting fintech development, balancing innovation with learning and regulatory adaptation to ensure financial stability in the markets. Many countries are using innovation hubs and regulatory sandboxes to test new solutions before they implement them more widely. Open banking and open finance may further boost innovation.¹³ These advances should be matched with a developing regulatory environment; so far, only Brazil and Mexico have such an environment in place. Governments need to quickly develop the government and regulatory capabilities that can support further development of this sector while ensuring overall stability of the system.

One of the most encouraging green shoots in an otherwise bleak regional growth story has been the emergence of unicorns. Their emergence and success testifies to both the importance of digital platforms, particularly in fintech, but also the need for critical complementary factors. The number of unicorns has grown from a mere 4 in 2018 to a record of 17 new unicorns in 2021 (Rudolph, Miguel, and González-Uribe 2023). Most are operating in fintech (34.6 percent); followed by e-commerce and direct-to-consumer (23.1 percent); supply chain, logistics, and delivery (9.6 percent); and internet software and services (9.6 percent) (Rudolph, Miguel, and González-Uribe 2023). Half (50 percent) of LAC unicorn companies (26) hail from Brazil. Mexico and Argentina tie in a distant second place with 9 each (17 percent). Colombia and Chile come in third place with 3 each (6 percent), followed by Uruguay and Ecuador, which each have 1 unicorn company.

However, LAC still trails most other world regions in terms of total unicorn valuation by GDP—only exceeding that of Sub-Saharan Africa. This lackluster performance, again, points to the need for complements to digital infrastructure in the start-up ecosystem, particularly in finance and capabilities. Foreign investors contributed about 90 percent of the value of venture capital (VC) deals during 2013–21, confirming the lack of depth of LAC financial markets. And the region has not been immune from the global retrenchment in VC funding and slowdown in the tech sector. The emergence of high-growth companies is not only a problem of financing, but also of developing complementary capabilities.¹⁴ The reliance of the region on foreign financing testifies to a need not only for venture capital, but venture management (box 2.4).

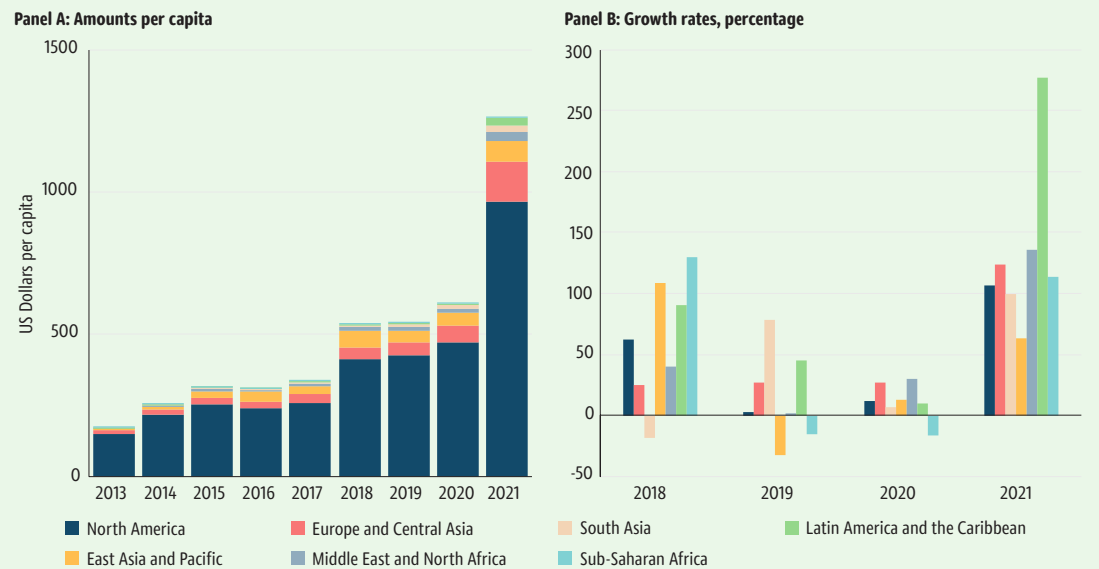
Local business accelerators that support programs for entrepreneurs that train, coach, and sometimes fund start-ups and other support institutions have also helped empower the large, young, tech-savvy population in LAC and are critical elements of ecosystems that foster and promote high-growth company clusters. The experience in developing countries shows that accelerators attract venture capital and talent to their surroundings, helping entrepreneurs raise financing and grow—including those that are not part of the accelerator (González-Uribe and Hmaddi 2022).

Box 2.4. The Growing and Important Role of Venture Capital in LAC

Research shows that venture capitalists play two important roles, as stressed in the recent World Bank report, *Venture Capital in Latin America and the Caribbean* (Rudolph, Miguel, and González-Uribe 2023). First, they provide capital to companies that might otherwise have difficulty attracting financing; less than 1 percent of companies ever raise venture capital (VC), yet they account for approximately 50 percent of the total market capitalization and 60 percent of the innovation in the United States (Strebulaev and W. Gornall 2015). Second, venture capitalists also build and strengthen clusters by helping attract, train, and provide resources to new generations of entrepreneurs. VC investors add value to the companies in their portfolios in three main ways. First, they design financial contracts and compensation schemes that help align the incentives of entrepreneurs and investors (Lerner and Nanda 2020). Second, they guide entrepreneurs through their active involvement with the businesses (Bernstein, Giroud, and Townsend 2016; Ewens and Malenko 2020; Hellmann and Puri 2002; Lerner 1995). Third, they facilitate the efficient reallocation of resources between portfolio companies (González-Uribe 2020; Lindsey 2008). These roles provide a rationale for the worldwide policy efforts supporting venture capital (Klingler-Vidra 2018; Lerner 2009).

VC funding for LAC start-ups had been steadily on the rise during the last decade, culminating in an unprecedented spike in 2021 (figure B2.4.1, panels a and b). In 2021, VC funds invested US\$18.5 billion in LAC start-ups, a substantial increase from the previous funding record of US\$4 billion in 2020. LAC was the fastest-growing region in the world for venture funding in 2021, with a staggering 288 percent increase in value from 2020 (Rudolph, Miguel, and González-Uribe 2023) (figure B2.4.1, panels c and d). Unfortunately, the region is now suffering from the generalized retrenchment in VC funding for startups, with funding in 2023 experiencing a significant decline, particularly in the seed to growth stage funding which decreased by 84 percent compared to the same period last year. Jumbo-sized funding rounds of \$100 million or more have become rare, with no such rounds closed in the first quarter of 2023. Two-thirds of Latin American startups have laid off staff since December 2022.

Figure B2.4.1. The Value of Venture Capital Funding and Number of Deals Spiked in 2021

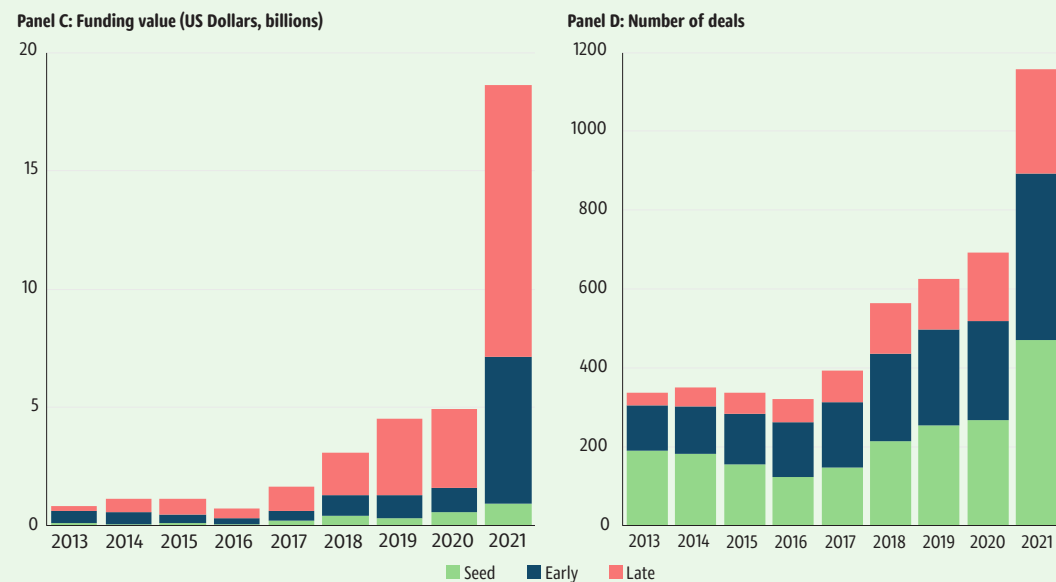


Source: Rudolph, Miguel, and Gonzalez-Uribe 2023, based on Pitchbook data.

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Box 2.4. The Growing and Important Role of Venture Capital in LAC (continuation)

Figure B2.4.1. The Value of Venture Capital Funding and Number of Deals Spiked in 2021 (continuation)



Source: Rudolph, Miguel, and Gonzalez-Uribe 2023, based on Pitchbook data.

The LAC region was an early adopter of accelerators during the 2000s and at least 80 programs have been created since 2003.¹⁵ Their support programs for early-stage entrepreneurs are some of the most active investors in the region, according to a recent report by SlingHub. Topping the list is Start-Up Chile (SUP), which extends funding to nearly 1 percent (250) of all LAC start-ups. Another active accelerator program is Wayra—Telefonica’s corporate investment arm that started out as an accelerator—which ranks third on the list with 164 invested start-ups. Nondomestic accelerators topping the list include 500 Startups and Y Combinator, which rank fifth (114 invested companies) and eighth (91 invested companies), respectively. Notably, Endeavor’s Catalyst Fund has backed 22 of the LAC unicorns, and selected an Argentinian “decacorn” (a relatively new company that is worth at least \$10 billion), Mercado Libre, in 1999 as one of its first investments.

These support programs helped foster demand for VC in the region by selecting and training large pools of participants before they go on to raise venture capital. For example, more than one-third of LAC unicorn companies are the alumni of accelerators. By several accounts, these programs have also spawned domestic entrepreneurs. For example, SUP in Chile led to higher business creation rates in the industries targeted by the program, as well as in areas close to the program’s headquarters in Santiago de Chile. Successful founders and their reinvestments in the region are another factor behind the growth of VC funding in LAC in 2021. Indeed, they are crucial; the backing from successful founders has had multiplier effects by providing capital, as well as connections, know-how, and legitimacy to domestic start-ups with less experience.

For all their successes, there is plenty of room for growth and improvement—particularly in the area of gender diversity. Women are underrepresented both as investors and founders in the region. LAC lags the United States, where, on average, 12 percent of venture capitalists with funding abilities are women, while only 7 percent are in LAC (Diaz-Ortiz 2020). Only 10 percent of LAC start-ups have at least one female founder—a figure that is on par with Israel, but significantly smaller than in the United States (22 percent) (IDB 2022). Among unicorn companies, less than 6 percent of founders are female, and less than 14 percent of start-ups have at least one female founder. However, diversity is improving in the case of fintech companies. A survey by the IDB shows that between 2018 and 2020, the average number of fintech start-ups with a female founder or co-founder grew from 35 percent to 40 percent (IDB 2022).

Wiring LAC Agriculture for the Twenty-First Century

As a region with a huge agricultural sector that is the world's largest net exporter of agricultural commodities and products, LAC could enjoy enormous gains by adopting digital technologies that improve productivity on farms. LAC, especially Argentina, Brazil, Colombia, Chile, and Uruguay, is a major and very advanced producer of crops (such as coffee and soybeans) that have several supply chain structures that are favorable to digitalization (OECD 2019a). Yet, agtech adoption at the farm level in LAC has not reached the same scale as in Asia and Africa (GSMA 2020; Fuglie et al. 2020). In many countries of the region, however, technologically advanced large producers coexist with rural communities whose cultivation techniques have changed little in centuries, and which could benefit from greater connectivity, in terms of both production and integration in the national project.

Adoption of digital technologies in agricultural settings can improve market efficiency by reducing transaction costs, easing information asymmetry problems, and facilitating access to agricultural extension services. Agricultural producers using digital technologies can better plan and resolve production issues, manage weather-related risks, and facilitate financial transactions (Baumüller 2018). At the aggregate level, the evidence suggests that ICT has a positive impact on agricultural productivity (Lio and Liu 2006). There is now substantial evidence on the impact of market information and agricultural extension advisory services delivered through mobile phones. A meta-analysis of randomized control trials on efforts in Kenya and Rwanda finds positive impacts of text message (SMS)-based agricultural extension programs on input adoption and cost-effectiveness (Fabregas, Kremer, and Schillbach 2019). Research on the impact of smart farming and use of mobile agricultural apps¹⁶ also suggests positive impacts, although most evidence is based in developed economies.¹⁷

Exploiting these new technologies requires the basic infrastructure—cable backbone plus wireless connectivity—as well as appropriate regulatory conditions. However, it is absolutely critical to emphasize that ICT infrastructure cannot be a substitute for content. It cannot take the place of excellence in agricultural research, active connectivity with external centers, and well-trained extension specialists who—although working in a different modality—still understand how to approach farmers and know their needs (box 2.5). ICT offers the opportunity to greatly increase the flow of information among research, extension, and farmers, enhancing the role of extension agents as intermediaries and communicators (Fuglie et al. 2020).

Fortunately, several governments in the region recognize the value of incorporating the latest digital technologies for agricultural development. New programs in precision agriculture and climate-smart agriculture programs are being developed in Argentina and Brazil, with the potential not only to adapt to the changing conditions due to climate change, but also to mitigate emissions by optimizing the use of fossil fuel-based fertilizers. The use of sensors and digital tools enable water-saving and efficiency techniques which will become more important as climate change is gravely affecting hydrological cycles in the region. The Amazon region, with its unique ecological and geographical characteristics, can benefit from various uses of the internet to support sustainable development, conservation efforts, and improve the quality of life for its inhabitants. Often in partnership with private service providers and agricultural companies, governments have launched programs advancing digitalization in different agro-industrial production chains in Argentina, Brazil, Colombia, Ecuador, and Peru.

Beyond the impact on agricultural productivity, several studies suggest that access to digital technologies can increase economic diversification in rural areas, creating employment opportunities outside traditional agricultural tasks (Nakasone and Torero 2016) and that this could particularly benefit women in rural areas (IICA et al. 2020). Economic activities that are uncorrelated with the cyclical nature of agriculture production could be particularly effective in improving the well-being and reducing vulnerability and poverty of rural households.

Colombia launched the program “Mujer Rural, Agente de Transformación Digital,” building three digital centers where children and the community, with a strong focus on women, can develop their digital skills, enroll in social assistance state programs, access educational programs (including higher education), and participate in entrepreneurship

Box 2.5. Strengthening Agricultural Advisory Services

Evidence on the impact of public agricultural extension systems on farm productivity is mixed. Some systems achieve high returns (Evenson 2001), but many others are plagued by design failures (Anderson and Feder 2007). Some of the key challenges facing agricultural advisory services include linking extension more closely with research and other sources of knowledge generation, being responsive to diverse needs of farmers, and assuring the fiscal sustainability of programs. Many countries have decentralized responsibility for extension services to local governments in an effort to make services more demand-driven and accountable to local communities. Agricultural advisory services have also experimented with alternative models for program delivery (such as the training and visit system and farmer field schools), service provision (such as contracting delivery to private service providers), and financing (including fee-for-service and producer levies for extension services). Reform experiences point to a number of steps governments can take to strengthen agricultural advisory services. A survey of research on the topic highlight key elements of successful reforms (Birner et al. 2006; Feder, Birner, and Anderson 2011).

- **Encourage pluralistic delivery systems.** Although the public sector will continue to play a leadership role in funding, managing, and coordinating agricultural advisory services, multiple actors can be effective service providers. Private companies and nongovernmental organizations (NGOs) may possess specialized skills and local capacities that can be contracted to provide high-quality advisory services. But to address the information asymmetry problem, extension services led by private firms and NGOs often need to be subsidized and provided with technical support.
- **Reform governance structures.** Public extension agencies need to be accountable and responsive to needs of farmers and other clients. Several countries have decentralized responsibility for the delivery of extension programs to local governments and increased the voice of farmer and commodity organizations in setting program priorities and planning. Producer organizations can also be involved in cofinancing advisory services, such as through commodity levies.
- **Invest in new skills and capacities.** As market value chains respond to the growing complexity of consumer demands for safe, convenient, and diverse food products, this creates the need for new types of advisory services. Farmers will need more timely information about market opportunities and detailed technical knowledge about how to meet higher product quality standards. With greater diversity of potential service providers, public extension agents will need increased networking and coordination skills to make sure this knowledge and information are accessible to diverse groups of farmers, including smallholders and women.
- **Maintain strong links between research, extension, and farmers.** In an efficient innovation system, information and understanding must flow efficiently among researchers, extension providers, and farmers. A challenge posed by the decentralization of extension services is that looser coordination may result between research and extension. Explicit attention needs to be given to maintaining strong links and coordination among these groups. Extension systems often employ highly trained subject specialists to provide an accessible link between field agents and research institutes.

Source: This box is based on Fuglie et al. 2020.

training programs based on locally grown crops such as cacao. Similarly in northwest Argentina, digital connectivity was extended to reach more than 1,600 women of the indigenous Pilaga community paired with digital skills training and market development for their artisanries. In Guatemala, the DIGITAGRO project piloted digital technologies to improve market access for women agri-preneurs while helping schools improve children's nutrition (box 2.6).

Box 2.6. Supporting Women Agripreneurs in Guatemala

Guatemala’s School Feeding Program (SFP) guarantees nutritious and culturally appropriate meals for schoolchildren, and mandates that 50 percent of food purchased by schools come from local smallholder farmers. Informational asymmetries are present on both sides of the market as schools lack information on reliable producers and smallholders are unclear on the administrative procedures to participate in the program. Moreover, producers frequently struggle with low production capacity and lack basic knowledge about good food safety and quality standards. These challenges are exacerbated for women (especially indigenous women), who face higher information gaps, lower market access, and higher informality than their male counterparts, compounded by restrictive social norms. Yet, school feeding represents a crucial opportunity for women agripreneurs, whose production specializes in foods in high demand by schools.

The World Bank’s DIGITAGRO project piloted digital technologies to improve market access for women agripreneurs so they could supply the SFP in a fair, safe, sustainable, and profitable way—while helping schools improve children’s nutrition. The intervention aimed to address, from a variety of angles, the information gaps and asymmetries that impeded the smooth functioning of the SFP, on one hand, and held back women from taking advantage of the program as a profitable market opportunity, on the other. The project developed three digital tools to promote smallholders’ inclusion in the SFP, in partnership with the Food and Agriculture Organization of the United Nations (FAO) and the World Food Programme (WFP):



1. An e-commerce platform (available as a web tool and as a smartphone app). The platform was developed with accessibility in mind and based on a mapping of the process and information flows of purchasing food for school meals.



2. Extension videos. A soft extension system was targeted to women agripreneurs to engage them as suppliers of the SFP. The videos provide extension agents with an additional tool to convey simple, basic information to large audiences and in a remote fashion, informing potential participants about child nutrition, market opportunities, administrative procedures, and food hygiene and post-harvest practices to ensure food safety and quality and avoid food loss and waste.



3. Information campaign. Carried out entirely by phone, the campaign consisted of a summary video on the SFP registration process, food quality standards, and functioning during the pandemic; and a tailored set of text messages (SMS) with reminders on how to access the SFP, information on products and prices, and relevant contact information.

The information campaign reached 1,000 women in 252 villages in San Marcos. An impact evaluation showed that it improved their knowledge of the SFP, their entrepreneurial attitudes and sales, and the prices they receive on the market. The impact evaluation, however, also unveiled that the SFP still faces challenges that hold small producers back, particularly women. In its current setting, the program is better suited to comparatively larger producers with more sophisticated production systems and a higher capacity of supplying a broad pool of products throughout the year.

Recommendations to keep aligning the structure of the SFP to the reality of smallholder producers and women include a blend of digital and analog strategies, to overcome barriers in terms of awareness, empowerment, agricultural productivity and skills, market structure, and institutional challenges. For instance, the promotion of women’s association, as well as women’s access to land ownership and formal rights can increase women’s intrahousehold bargaining power and entrepreneurship. Additionally, streamlined and well-targeted technical assistance is necessary to ensure deeper human capital formation, interventions aiming at improving access

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Box 2.6. Supporting Women Agripreneurs in Guatemala (continuation)

to finance and productive inputs and the promotion of rural producers' groups. Thanks to their ability to penetrate among broad audiences and to reduce the cost of remoteness, digital technologies can support this agenda. To be effective at scale, however, they require complementary investments in terms of infrastructure, regulatory environment, and human capital.

Source: Perego et al. 2022.

Finally, digital technologies can also open up new markets in rural and isolated regions. The emerging interest in advancing the decarbonization and net-zero agenda has promoted the interest in developing carbon markets where efforts to reduce or eliminate emissions can be financed through the sale of carbon credits in these markets. These could potentially help mitigate climate change. Digital technologies can foster the development of these markets through monitoring, reporting, and verification technologies (box 2.7)

GovTech to Increase Fiscal Space and Promote Higher-Quality Provision of Government Services

As documented in chapter 1, LAC is confronted by three interrelated challenges: low growth, limited fiscal space, and dissatisfaction with government. The adoption of digital solutions can make governments more efficient and more responsive to their constituencies by easing government services with citizens, improving their efficiency and quality of service provision, promoting inclusivity, and increasing transparency. Reducing transaction costs associated with government procedures not only makes the government more accessible in general but particularly benefits more remote and disadvantaged segments of society that have difficulty accessing services. In addition, if effectively used, digital transformation can also help expand tight fiscal space. Onerous bureaucratic procedures have been linked to lower uptake of social programs (Linos et al. 2021), higher tax evasion (Cox and Eger 2006; Pau, Sawyer, and Maples 2007; Richardson 2006; Saad 2014), and lower business formalization rates (Djankov 2009). Further, employing digital networks and tools can help reduce the large share of GDP—as much as 4 percent—lost in inefficiencies in public expenditures and spending leakages (Spring 2023 LACER, World Bank 2023); such “savings” could be redirected to growth or social investments. Digital techniques could also raise government revenues by reducing the estimated 6 percent of GDP lost in tax evasion (ECLAC 2021a).

In addition, the data generated in the process of adopting digital government solutions can be used to improve government functioning as part of a larger process of diagnosis and reform of government processes. The forthcoming World Bank *Government Analytics Handbook* will offer practitioner insights on how to leverage data to strengthen public administration using a range of micro-data sources. LAC compares well with other parts of the world in terms of its development of digital government, but by experimenting in new areas and exploiting new sources of data, it can go further.

Box 2.7. Opportunities for Digital Technologies to Unlock Carbon Markets in Colombia's Orinoquía Region

Digital tools are supporting low-carbon development in the Orinoquía region in Colombia by enabling the implementation of low-carbon practices; facilitating monitoring, reporting, and verification of emissions abatements; and helping unlock green financing. Digital technology solutions (DTS) are being used in the following areas.

- **Farm management for low-carbon agriculture practices.** A range of DTS are providing advisory services to the region on how to improve access to (and reduce cost of) farming practices and technologies for low-carbon and climate-smart agriculture and collect data to provide evidence on their adoption. DTS for the livestock value chain, for instance, include technologies such as Radio Frequency Identification (RFID) tags and sensors enabled through the Internet-of-Things (IoT) (for example, to detect animal body temperature and motion), which help optimize animal performance and well-being as part of sustainable livestock intensification systems. Remote sensing tools and Unmanned Aerial Vehicles (UAVs) (drones) are generating data that help assess the nutritional value of pasture as an input to pasture management and analyze sustainable carrying capacity. At the same time, such DTS are reducing costs substantially through the management of the pasture through rotational grazing (for example, by means of virtual fencing technologies) and optimizing fertilization (for example, by foliar applications) and animal dietary support. Examples of DTS with these functions already in use within Colombia include Software Ganadero, Control Ganadero, and TaurusWebs.
- **Carbon balance assessment and monitoring.** Carbon credits and different forms of product sustainability or eco labelling require certification and methods of data collection through DTS that can evaluate, simulate, and monitor the effect of low-carbon agronomic practices in terms of greenhouse gas emissions and carbon sequestration. DTS can also play an important role in rigorously assessing other co-benefits and additionality. This is especially important for Payment for Ecosystem Services, where DTS are usually deployed for the collection of in-situ data on co-benefits (for example, in terms of increasing biodiversity, and improving air quality and water and soil protection), or through earth observation tools (derived by satellites or drones) that assess of metrics related to landscape fragmentation, biodiversity, or soil degradation.
- **Accessing finance to promote low-carbon and sustainable agriculture.** Digital financial services can support access to finance and the development of new business models, thus contributing to the transformation process toward low-carbon and sustainable agriculture. Financial DTS can improve the provision of credit by enhancing collection of key data on potential borrowers and their farm operations, as well as by facilitating credit scoring itself. e-commerce DTS can also provide innovative marketing and financing solutions. A number of examples are already in place in the Orinoquía that show potential for further growth. The e-commerce platform Orinoco Origen is being used for the sale of meat products, while Sosty is a crowdfunding platform promoting investments specifically for regenerative livestock production that sequesters carbon and maximizes soil health. Visiprast, in collaboration with Proyeccion Ecosocial, also offers a solution for traceability of sustainable, low-carbon practices that can prove useful for improving the environmental visibility and reputation of the sector in the Orinoquía, and hence, for creating new marketing opportunities.

Continued on next page

Box 2.7. Opportunities for Digital Technologies to Unlock Carbon Markets in Colombia's Orinoquía Region (continuation)

Another promising area is insurance. Innovations in the fintech sector of the digital economy can also support de-risking low-carbon and other forms of sustainable farming through dedicated insurance products. While research on the impact of agricultural insurance on carbon emission reduction is very limited, Jiang, Wang, and Xiang (2023) show that DTS in insurance can reduce high operational costs of agricultural insurance companies (for example, by simplifying procedures of claim settlement), improving their operational efficiency while reducing the risk for farmers to adopt low-carbon, climate-smart technologies.

Source: World Bank staff.

Creating Fiscal Space

Digital solution can improve domestic revenue mobilization (DRM) and the efficiency of government expenditures. Most LAC countries have also implemented e-procurement systems that can generate savings through automation and standardization of processes; facilitation of instant exchange between suppliers and buyers; and improved transparency, traceability, accessibility, and accountability of the public procurement system (OECD 2019b, 2020a, 2020b). The experience in LAC has been mostly positive. For instance, an evaluation of the COMPR.AR e-procurement platform in Argentina shows that adoption of the platform reduced prices, shortened procurement process, and increased the number of bidders (De Michele and Pierrri 2020). Similarly in Chile, a study found price reductions of about 2.6 percent and administrative cost savings of about 0.3 percent (Singer, Guzmán, and Donoso 2009). Adoption of digital tools for public financial management (PFM) can automate and simplify certain tasks, making it particularly beneficial at the subnational level where government capabilities may be more limited. Digitalization of public financial management and financial management information systems implemented around the world have shown great results in terms of savings, improved operational efficiency, detection of malfeasance and wasteful spending, and higher execution rates of projects and social assistance budgets (Dener, Dorotinsky, and Watkins 2011; Dener and Min 2013). Application of digital solutions for asset management, for example, help governments register their nonfinancial assets and enable them to be used more efficiently. In Rio de Janeiro, the registration of properties, their titling, and the improvement of their management helped the state realize a sizable growth in annual revenues from renting some properties, as well as from selling nonutilized assets, recouping approximately US\$200 million, which was used to capitalize the state's pension fund (World Bank 2017).

Digital solutions have also proved useful in improving taxation and raising government revenues. Firms in LAC devote more hours to paying taxes than in other regions—325 hours per year for the region versus 234 hours per year for the world average (PricewaterhouseCoopers 2020). In Ecuador, prefilling value added tax returns reduced taxpayer compliance time from 30 minutes to 6 minutes per taxpayer (González, Romero, and Padilla 2019), increasing compliance. Digitalization might also have a role in reducing the high levels of tax evasion in the region, estimated at more than 45 percent for income taxes (OECD 2021) and about 30 percent for value added taxes (Barreix and Zambrano 2018). While the effects on tax evasion are not conclusive, a study of Denmark showed an increase in tax reporting accuracy with digitalization of tax reporting: among returns audited by the government, the proportion of audit adjustments in tax liability was 0.2 percent for income reported on forms prefilled by the tax agency compared to 17 percent for income self-reported by taxpayers (Kleven et al. 2011). Increasing the adoption of digital solutions by tax administrations by 50 percent could increase collection of value added taxes by 1.7 percent of GDP in developing countries, the IMF estimates (IMF 2018). Moreover, it is estimated that the use of big data and data analytics could recover about 20 percent of the loss in public revenue, which was estimated at a global level to be between US\$4 trillion and US\$5.5 trillion in 2015 (Cunningham, Davis, and Dohrmann 2018).

Strengthening the interoperability of digital solutions can generate efficiency gains by reducing the need for duplicative collection of data or verification of credentials and has the potential to increase revenues. For example, the integration of identification (ID) systems with tax administration systems and other databases—such as property, customs, cadaster, and social benefits registers—can more precisely identify businesses or individuals that are underreporting their earnings or assets and better target compliance audits. In Argentina, integration between tax databases and other registries via a unique ID rendered US\$44 million in additional revenue from a reduction in tax fraud through improved audit targeting (Clark 2018). In Brazil, the Internal Revenue Service introduced the Public Digital Bookkeeping System (Sistema Público de Escrituração Digital, SPED) to integrate and share tax information across the 27 state-level tax authorities that, otherwise, would manage only fragmented information. The system has increased voluntary compliance in reporting and filing taxes mainly by increasing the probability of detecting tax violations (Da Silva et al. 2013).

Overall, the emergence of digital solutions along with big data analytics and the arrival of artificial intelligence (AI) algorithms have significantly increased the value of intelligent data-rich fiscal ecosystems. Chile, for example, has developed a system that links data for 43 state agencies and 345 municipalities, compiling information on 12 million people (about 72 percent of the population). Argentina implemented an informational system in 1997 that gathers data from private and public entities in real time, informing policy makers on programs that better target social assistance programs (Fenochietto and Pessino 2011), reduce tax evasion, and improve spending efficiency. This system generated public spending savings of US\$134 million in Argentina by 2001 (World Bank 2006).

Delivering Better Government Services to Citizens

The costs of interaction with governments are high in LAC; half of administrative services require two or more trips to government offices and long wait times (Dalio et al. 2023). They are a source of corruption as well; according to Transparency International (2017), one-third of Latin Americans paid a bribe to access a transactional public service.

Digital delivery of government administrative services is cheaper and appears to be much faster. In addition, by reducing interactions between government officials and citizens, they lead to less opportunities for bribes and corruption (Banerjee and Mukherjee 2020). In LAC, estimates show that central governments conduct between 5 and 20 transactional services per person every year, for items such as birth certificates, drivers licenses, permits, receipts for benefits (Roseth, Reyes, and Santiso 2018).

By producing an accurate and secure way of identification, digital ID systems can facilitate the delivery of a variety of services while reducing public expenditure, detecting financial fraud stemming from identity theft, reducing errors, and promoting social and financial inclusion. Digital ID authentication and verification services reduce administrative costs by automating procedures for verifying identity in both private and government transactions. They tackle one of the main barriers to financial inclusion—the provision of the proof of identity required to open a bank account—and expand the penetration of digital financial services.¹⁸ They also reduce identity theft; related financial fraud was cut by 20 percent to 50 percent in Mexico (World Bank Group 2020). Digital IDs, when designed to be interoperable with other registries, can identify potentially ineligible beneficiaries and help clear multiple and ghost beneficiaries from government rolls. For example, in Thailand, the national ID was used by a cash transfer program to cross-check eligibility of beneficiaries against tax, employment, and other databases, resulting in savings between US\$29 and \$US59 million (Clark 2018).

Adoption of biometric authentication technologies can also lead to savings and improve targeting in aid disbursement programs. In India, biometric systems to identify recipients of government subsidies enabled beneficiaries to collect their payments faster, and reduced leakages by 3 percentage points to 13 percentage points; 90 percent of beneficiaries reported that they preferred the new system (Muralidharan, Niehaus, and Sukhtankar 2016, 2020).

Digitalization of justice services can generate savings and improve operational efficiency of the judiciary, while enhancing citizen trust and satisfaction. The transition from paper-based to electronic case management reduces the costs in terms of supplies, decreases the time needed to complete transactions, and improves traceability. For example, in Peru, the development and implementation of a digital case management system helped save nearly US\$40 per case file;¹⁹ it is estimated that Peru will save nearly US\$3.2 million a year from the transition to a digital case management system (World Bank Group 2019). Similarly, in Colombia, it is estimated that the digital transformation of the judiciary could substantially reduce operating costs, improve communications, and increase efficiencies, generating a yearly average savings of nearly US\$25 million over a four-year period. These savings are estimated to account to nearly 2 percent of the 2019 total judiciary budget (World Bank 2020b). In Peru, the pilot introduction of electronic notifications to courts and users is estimated to have reduced processing time by nearly 30 percent, saving approximately US\$2.8 million in courier services alone, while saving users, on average, two trips to the courts.²⁰ The judiciary in Colombia has developed an Integrated Management and Quality Control System (SIGCMA), creating performance indicators to analyze the delivery of justice services, user satisfaction, and overall quality of the services delivered.

Digital solutions can also help governments increase formalization of firms through online business registration. Lower registration costs appear to be associated with higher registration rates, especially among microenterprises. The experiences of Guatemala and the Dominican Republic provide good evidence of the positive outcomes. After Guatemala introduced electronic business registration in 1999, the number of registrations jumped by 40 percent (Klapper, Miller, and Hess 2019). Similarly, after the Dominican Republic introduced a digital one-stop shop for firm registration, the registration rate climbed to 33 percent in 2018 from 5 percent in 2014 (Bobic et al. 2023).

In sum, governments can view the new digital technologies as providing a space for experimentation and innovation in service delivery across all sectors. Such experimentation needs to take place in a formal context of learning, where clear goals and measurable objectives are defined, programs are constantly monitored, and results are evaluated periodically, allowing the necessary adjustments for improvements to be made. The most successful programs in digital education and telehealth in the region were all designed with these elements in place. The systems that evolve offer the potential to help promote greater responsiveness to citizens and greater social inclusion, while greatly increasing the productivity and effectiveness of the government. Two examples are examined next.

Improving Health Care Delivery

Digital technologies in health care can improve efficiency, increase the quality of care, and help extend care to previously underserved communities. The COVID-19 pandemic exposed weaknesses and vulnerabilities in the regional health systems: large differences in the quality of care among different geographical areas; lack of access for many marginalized and isolated communities; outdated, redundant, and inefficient bureaucratic procedures; and fragmented systems. Comparisons of 22 LAC health care systems with peer middle-income and OECD countries along key health metrics such as life expectancy, infant mortality, access to care, and immunization rates place all the systems in LAC in the bottom half of the sample, and 12 in the bottom 25 percent (Izquierdo, Pessino, and Vuletin 2018). While 30 percent of avoidable deaths were due to lack of access to health care services, about 70 percent can be attributed to substandard care (Puig Gabarró et al. 2021). A study by the World Health Organization (WHO) suggests that low-quality care in low- and middle-income countries cost society about \$US1.5 billion per year in lost productivity (WHO 2020). Moreover, there is great room for improvement in preventative care, early detection, and proactive management of chronic diseases, as well as educating the general population about behaviors and habits that are detrimental to health. Digital technologies offer the potential for improvement along several dimensions.

Telemedicine—the delivery of health care through digital means—and electronic health record keeping allow patients to save time and money.²¹ They can reduce the associated costs of going to medical appointments (the direct costs of transportation as well as potential loss of time and income), which may be particularly beneficial for low-income

patients and those in rural areas (Avidor et al. 2020).²² Savings of \$US32 to \$US3,523 per consultation are possible depending on the underlying condition and improved effectiveness of clinical interventions (Snoswell et al. 2020). Telemedicine, personal electronic health records, and personal health care devices (“wearables”) empower patients to take better care of their health and promote behaviors and habits that can lower risks of certain conditions (such as exercise, for hypertension). Interventions based on reminders sent through text messages significantly improve adherence to medicine treatments (Sarabi et al. 2016; Thakkar et al. 2016), and digital health interventions have been found to be effective in preventing cardiovascular disease (a reduction of 40 percent in relative risk) (Widmer et al. 2015) and improving glycemic control in poorly controlled type-2 diabetes (Kebede et al. 2018).

A review of nine studies in lower- and middle-income countries found that telemedicine is cost-effective, and had positive effects on quality of care, clinical results, and quality of life in patients (Berratechea 2014). However, successful implementation requires several complementary investments beyond connectivity: necessary physical infrastructure for consultations, devices that function well, and enough data centers to store information securely and reliably. In addition, governments must develop training programs for health care providers in using these technologies and platforms and ensure there are enough ICT professionals on hand to resolve technical issues. There also needs to be an enabling environment in the form of strong policies and regulatory frameworks, including cybersecurity and data privacy protections.

Integrated electronic health care systems can greatly improve the quality of care and support coordination between public and private health care providers. Creating a national health record database allows the government to coordinate with public and private providers in creating treatment plans for specific subpopulations, assess underlying morbidities and risks, improve medical procurement, and deal better with medical emergencies such as pandemics. Health information exchanges have been found to significantly improve the quality of care and profitability of the health care sector, while increasing patient satisfaction (Sadoughi, Nasiri, and Ahmadi 2018). In addition, telementoring programs can greatly reduce the quality gap in primary attention centers or community clinics in isolated or marginalized communities, training frontline health care professionals in the highest-quality and state-of-the-art protocols to deal with difficult or infrequent conditions. The Tele-ICU case in Brazil during the pandemic is a great example in the region (see box 2.8).

National health care information systems and digital health records reduce the administrative burden on health care practitioners, significantly reduce unnecessary and redundant exams and analysis, and improve diagnostic precision and speed.²³ They also empower governments to make better procurement decisions, avoid duplicate examinations and analysis, better monitor communicable and seasonal diseases, assess underlying morbidities of the population, improve disaster response, and facilitate public health research. They may also reduce the cost of studies that require high number of participants (Bagolle et al. 2022).

Digital technologies can help minimize medical errors and support health care professionals in decision making. Through digital decision support systems, health care professionals can receive alerts and reminders regarding allergies, dangerous medicine interactions, or specific patient contraindications. Easy access to medical analysis results, prescriptions, imaging, and state-of-the-art medical protocols and procedures can help doctors and nurses provide the best possible care, avoiding duplications and redundant medical exams or analyses. Electronic prescriptions can avoid mistakes deriving from illegible handwritten prescriptions. Evidence suggests this type of intervention reduces medical errors and adverse effects from medicines while promoting higher adherence to established protocols.²⁴

If well designed, programs can begin to tackle the inherent biases in medical research due to limited data of certain marginalized groups (so-called “data poverty”) that are currently excluded from digital systems. Also, governments can recognize the opportunities of greatly expanding medical research, making appropriate investments in complementary research and development (R&D), while experimenting and innovating in new programs to improve the overall health of the population or learn about the effectiveness of new interventions. An inclusive digital health care system significantly lowers the costs of experimenting and learning.

Box 2.8. Telementoring during the COVID-19 Pandemic

The Tele-ICU program at the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo (HCFMUSP) emerged during the COVID-19 pandemic. The program focused on training health care professionals in public hospitals of São Paulo in the best practices for treating COVID-19 patients. Due to its success, the project was expanded to other hospitals in different regions of Brazil. More than 11,500 online consultations—where health care professionals using a licensed online platform exchanged relevant information and discussed clinical cases—in 40 hospitals occurred during the pandemic and nearly 15,000 health care professionals were trained in best practices to treat COVID-19 patients. Results showed that this project reduced mortality and length of stay of hospitalized patients (Scudeller et al. 2023). This program is the largest digital health intensive care unit (ICU) program ever established in Brazil’s national health system. The results were unprecedented and proved to be crucial for supporting health care professionals nationwide during the COVID-19 pandemic and hopefully will guide future initiatives in digital health in Brazil’s national health system.

Source: Based on Scudeller et al. 2023

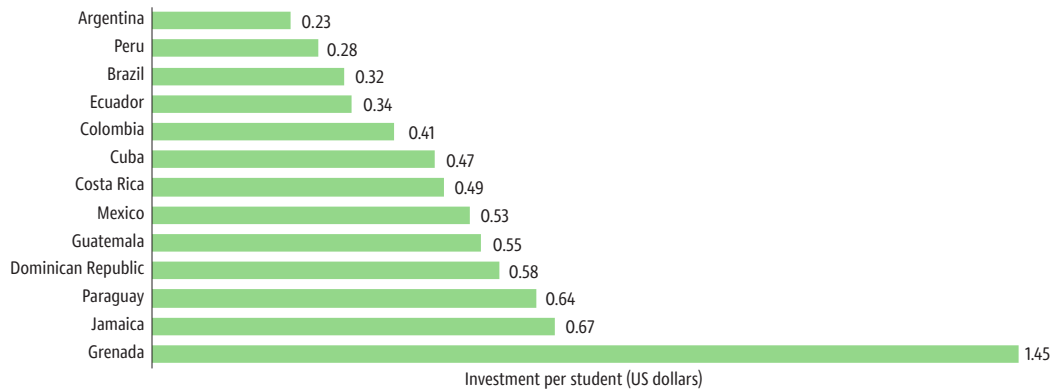
Improving Education

Similarly, digital technologies offer potential for improving both the quality and accessibility of educational services. Education technology—or EdTech, the use of hardware, software, digital content, data, and information systems in education—supports and enriches teaching and learning and improves education management and delivery. The potential was dramatically revealed when school shutdowns during the pandemic forced the educational system to go completely online. The rushed, massive, and improvised transition still could not prevent significant learning losses. Lack of digital access of the poorer households is likely to exacerbate income inequality over the next generation (World Bank 2022a). However, the effort of governments to expand coverage and distribute digital devices can be leveraged going forward to improve the quality of educational services and to experiment and innovate with new technologies and educational modalities.

The lessons learned during this period will help inform long-term strategies that ensure improving the quality of education, including in rural and remote areas and in vulnerable and marginal communities, and they can make education systems more resilient to future shocks. Most investments in educational technologies to date in middle- and low-income countries have been related to improving access to devices and to the internet. Much less focus and attention has been directed to how exactly the use of these devices, and the approaches that they enable, are meant to improve teaching and learning processes in meaningful ways. The impact of EdTech on student performance has therefore been mixed at best. As stated in the report *Reimagining Human Connections: Technology and Innovation in Education at the World Bank*, “Today, the use of EdTech is no longer a question of ‘if’ but rather of ‘how.’” Five interrelated principles appear to offer guidance in successful use of EdTech: articulate a clear purpose and focus on educational objectives; reach all learners; empower teachers; engage an ecosystem of partners; and rigorously and routinely use data to learn what strategies, policies and programs are effective to maximize student learning” (Hawkins et al. 2020).

Addressing the gaps in high-quality internet coverage remains a basic challenge, particularly in low-income peri-urban areas and rural communities. Estimates indicate that more than \$US47 billion is needed to connect students and schools to the necessary connectivity standards (figure 2.7). But, to continue an underlying theme of this chapter, exploiting the possibilities of digital connectivity will require training for teachers and education professionals, both in digital skills and, when lacking, in foundational pedagogical skills. Digital solutions are not a replacement for qualified, motivated and digitally literate teachers. The rushed deployment during the pandemic revealed the region’s shortfalls in these areas. Massive training programs had to be developed and deployed in a short time frame.

Figure 2.7. Investments in Educational Connectivity Vary by LAC Country



Sources: International Telecommunications Union (ITU)/Xalama Analytics/United Nations Children's Fund (UNICEF).

Finally, as discussed in the World Bank volume *Managing for Learning: Measurement and Strengthening Education Management in Latin America and the Caribbean* (Adelman and Lemos 2021), it is also necessary to invest in government and educational management capabilities to develop the right regulatory and monitoring frameworks for implementing, evaluating, and scaling up the use innovative digital education tools and platforms.

Remote communities often face daunting challenges, including a lack of resources (notably, textbooks and other teaching materials) and lack of training and feedback for teachers related to their isolation from peers. EdTech can enrich and scale up continuous professional development for teachers and school leaders through online learning tools and just-in-time, in-service coaching. The increased availability of very low-cost video cameras to record instruction can provide opportunities for reflection and constructive feedback for teachers who may have received little training on pedagogical approaches to delivering their curricula. In Indonesia, for example, teachers take short videos of their peers and then jointly review and discuss pedagogical approaches and ways to handle topics that are particularly difficult to teach in informal, low-stakes ways as part of their professional development. The use of Interactive Educational Television in places such as the Amazon helps remote schools with situations where there are many students but no teachers. EdTech requires teachers to utilize new skills, competencies, and pedagogical approaches, in addition to those that they traditionally employ. Related teacher support and training are essential.

Connectivity can help support teachers by providing access to more engaging, relevant content to inspire and motivate learners and teachers and tips on how to best teach it. EdTech can complement, extend and help reimagine traditional approaches to teaching and learning by using digital textbooks, digital simulations of scientific processes, educational games, open educational resources, “edutainment,” and more cutting-edge technologies. Finally, EdTech can be integral to providing learners and teachers with better “formative” assessments of how much students are learning on a daily, weekly, or monthly basis, as well as with the types of high-stakes “summative” assessments that are administered at scale by education systems to assign grades and determine promotion to higher levels. Artificial intelligence and machine learning algorithms can help to support the use of more adaptive, and in some cases, personalized learning assessments and opportunities (Hawkins et al. 2020).

Experimental evidence shows that carefully designed and implemented technology in education programs can generate important benefits, especially when teachers and students are given clear guidance on how to use the technological resources provided (Arias Ortiz and Cristia 2014; Arias Ortiz, Cristia, and Cueto 2020). However, the experience of the One Laptop per Child (OPLC) program in Peru also cautions against the idea that providing hardware and technology will solve the educational problems in our schools. A large-scale randomized evaluation of the OLPC program in 319 schools in rural Peru showed that while the program increased the ratio of computers per student and their use in both school and at home, no evidence was found of effects on enrollment and test scores in Math and Language. Some positive effects

were found, however, in general cognitive skills as measured by Raven's Progressive Matrices, a verbal fluency test, and a Coding test (Cristia et al. 2012). The experience illustrates the importance of developing programs with monitoring and evaluation mechanisms to learn about their effectiveness, while investing in the necessary complementary capabilities: in this case, enhancing digital skills of teachers by providing them with tech coaches (Dalio et al. 2023).

Perhaps the most successful regional program in digital connectivity to date is Plan Ceibal in Uruguay, inspired by the One laptop Per Child initiative, which installed internet and deployed devices prioritizing rural areas at a national scale and equipped the country to respond better and faster to the pandemic crisis (Cobo 2020; Han 2023). The program is managed by an independent agency with strong political support across the spectrum and has a secure long-term financing stream, helping ensure stability as it plans and implements its roadmap. Volunteers organized local community activities, while municipal councils provided transportation and funded some volunteer initiatives (Han 2023). Key to its success was having a talented workforce and repair strategy in place before deploying devices, but more fundamental has been the monitoring of internal processes and careful evaluation, especially of the two separate goals of meeting service delivery targets and improving academic achievement.²⁵ Competing with private technology firms for talent, the Ceibal Center fosters an autonomous environment, trains homegrown talent, and recruits skills from abroad. Although the employees are not civil servants, emphasizing better work-life balance and a mission-driven approach attracts motivated and qualified staff.

The region is now moving toward experimenting with new digital educational tools. For example, in the Dominican Republic, the Ministry of Education launched “Programate” (Program Yourself), which uses adaptive learning technology to improve math learning for students in the third year of secondary school.²⁶ Similarly, Ecuador implemented a Digital Personalized Learning Software (the ALEKS software) to remediate cognitive skills gaps in mathematics for first-year students entering technical and technological higher-education programs. Evaluations suggest that adaptive technology can be a cost-effective solution for math remediation with the potential for large-scale application. A randomized controlled trial assessing the effects on academic outcomes shows a large and significant decline in the probability of repeating a course, as well as a very large positive impact on standardized test scores in math (Angel-Urdinola, Avitabile, and Chinen 2023). The experience in Dominican Republic also showed positive outcomes, with student scores improving in standardized testing (World Bank 2021).

Another area of innovation is in developing early warning systems (EWS) to predict which students are most at risk of dropping out of school. Given the huge costs that leaving school imposes on children and their future earning capacity, this is an area worth experimenting with and learning about. Extended school closures due to the COVID-19 pandemic increased concerns about students dropping out of school. Belize, Chile, Colombia, the Dominican Republic, Guatemala, and Peru have implemented early warning systems to prevent dropouts. Evidence of their effectiveness is limited. In Peru, the World Bank and the Peruvian Ministry of Education collaborated to design, implement, and evaluate Alerta Escuela to derive lessons to achieve greater effectiveness of these early warning systems. While results show no reduction in school dropouts, they demonstrate the importance of designing programs with monitoring and evaluation mechanisms to learn about what works and what does not. A recent paper shows that prediction models based on data routinely collected in many information systems and relatively simple analytical techniques can achieve great accuracy in predicting which students will drop out. More importantly, the study finds that by providing an accurate means of targeting, these models could substantially reduce the misallocation of program resources. In a simple simulation of a modest dropout prevention program, targeting students based on these models rather than targeting poor municipalities or high-dropout schools in Guatemala or Honduras could reduce misallocation of resources by 30 percent to 80 percent (Adelman et al. 2018).

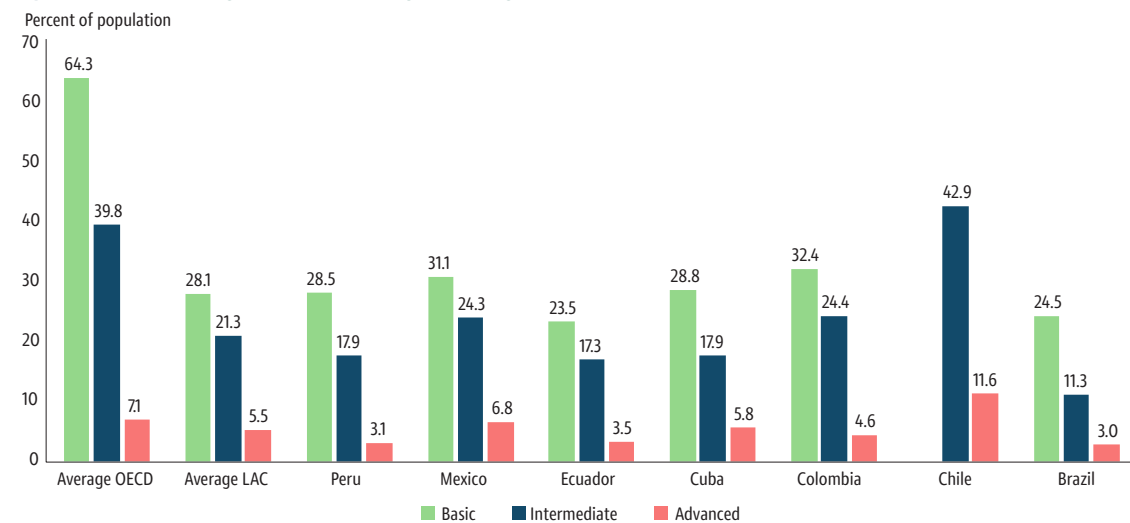
In sum, EdTech offers opportunities for more evidence-based and transparent decision making at the level of the learner, classroom, school and education system. Utilizing technology in support of teaching and learning leaves a “digital footprint” that can be collected, analyzed and shared in ways that were simply not possible previously. Caution is necessary around issues of privacy and data ownership, as well as digital security (Hawkins et al. 2020). However, iteration, controlled experimentation, and nimble evaluations can create cultures of learning that can help separate “hope” from “hype,” informing the design of future EdTech programs.

Developing Complementary Skills

Given the challenges facing the region, what targeted policies and steps can best be pursued to improve the crucial set of complementary skills needed to help LAC realize its digital potential? This section focuses on the development of digital-related skills per se, defined as the ability to obtain, use, manage, and create digital tools and information in a safe and appropriate manner (UNESCO UIS 2018; World Bank 2021) both to increase usage and effectiveness of connectivity. Regarding usage, as noted, 38 percent of the population in LAC has access to the internet but chooses not to connect GSMA (2021). In part, this has to do with affordability issues, but the gap can also be traced to problems with digital capabilities and skills. Twenty percent of households claimed they did not know about the internet or had no interest in using it (World Bank and UNDP 2022), suggesting a lack of awareness regarding the benefits of connectivity. Increasing digital skills can contribute to eliminating the usage gap, making those segments of the market more attractive for private service providers, while increasing household ability to pay. This conclusion is borne out by a study of European Union countries, which shows that an increase of 1 percent in basic digital skills is associated with a 2.5 percent increase in labor productivity, and an increase of 1 percent in advanced digital skills is associated with a 3.7 percent increase in labor productivity, hence supporting higher wages (OECD 2020b).

Regarding the gap in skills, the region as a whole is lagging the average of OECD countries in basic, intermediate, and advanced digital skills (figure 2.8). Particularly concerning is the large proportion of the LAC population that lacks even basic digital skills: the region as a whole (28 percent) lags significantly behind OECD countries (64 percent). Chile appears to be the clear front runner in the region in both intermediate and advanced digital skills, in both cases beating the OECD average and nearing the top performer (Norway) in advanced skills. Colombia and Mexico come in second place, beating the regional average but significantly behind Chile and the OECD average. Brazil shows up significantly behind the regional average as the worst performer at most skill levels.

Figure 2.8. LAC Lags OECD Averages in Digital Skills



Source: World Bank staff calculations, using ITU 2022.

Note: LAC = Latin America and the Caribbean; OECD = Organisation for Economic Co-operation and Development.

Developing digital skills requires a long-term strategy with sustained political and financial commitments, and coordination between different national ministries as well as subnational governments in partnership with private service providers, the private sector, and community leaders and local NGOs. Digital skills need to be embedded in educational curricula at all levels of the formal educational systems. However, governments can go further and promote usage and digital skill trainings in libraries, government buildings, community centers, and social or neighborhood associations, and by offering trainings and skills development in the free connectivity zones in rural areas.

Addressing Disparities in Digital Skills

For all the potential benefits that connectivity can bring to the region, addressing existing disparities in access and digital skills for women, Afro-descendants, and indigenous communities is key to ensuring that such connectivity does not exacerbate spatial, educational, gender, or racial inequalities. The digital divide reinforces prior forms of exclusion while access to technologies is becoming a key aspect of social capital in increasingly globalized Latin American societies. Communities without connectivity and investments in complementary factors, such as digital skills, will slip further behind the better-off ones that already do. Groups with fewer digital skills will participate less in the high-paying job market than those who have these skills.

Even though on average access to basic connectivity in LAC appears to be quite similar among both genders, there are important differences in some countries and within countries—gaps in rural areas, for example, average 37 percent. In Colombia, a study suggests that in terms of meaningful connectivity—that is, daily access, with enough data in suitable devices with high download speeds—the gap between genders reaches almost 17 percent (Web Foundation 2021). Part of this gap is due to the lower likelihood that women will own a smartphone, but part is due to differentials in levels of digital skills across gender. Studies show that around the world, women are less likely to know how to operate a smartphone, surf the web, use social media, and browse the web safely—thus undermining their earning capacity (García Zaballos and Dalio 2022). The gap is larger for more sophisticated skills, such as programming skills: men are more than four times more likely to have advanced digital skills than women (UNESCO 2019). Unfortunately, even in the United States, the share of women in ICT-related careers has been falling for the past 30 years (Mundy 2017).

In LAC, employment in ICT-related industries constitutes 1.6 percent of male employment but only 0.9 percent for women (ECLAC 2021b). This outcome is counterintuitive because, in principle, ICT-related careers may be particularly well-suited for female labor force participation patterns, as they appear to allow for more flexibility, more ability for remote work, and more potential for part-time arrangements.

The study *Afro-descendant Inclusion in Education: An Anti-Racist Agenda for Latin America* emphasizes the fact that Afro-descendants have limited access to digital technologies, achieve poorer learning outcomes, and are more likely to drop out of the education system early (Freire, Schwartz Orellana, and Carbonari De Almeida 2022). Access to computers among Afro-descendants is low in all countries in their sample, for example (figure 2.9, panels a and b). For students at the primary level, Afro-descendant children have lower access to a computer at home compared to their non-Afro-descendant peers, except in Uruguay, which implemented the highly successful and inclusive Plan Ceibal (see previous section). In Brazil, while more than half of white students have access to computers at home, only about one in three Afro-descendant students do. Similarly, in Colombia and Peru, access to computers at home for Afro-descendants (one in six) is half of the proportion of non-Afro-descendants. While the data is prior to the pandemic, it shows that access to internet services is also one of relative exclusion for Afro descendants in most countries, and more concerningly there has been limited progress in narrowing the gap (figure 2.9, panels c and d).

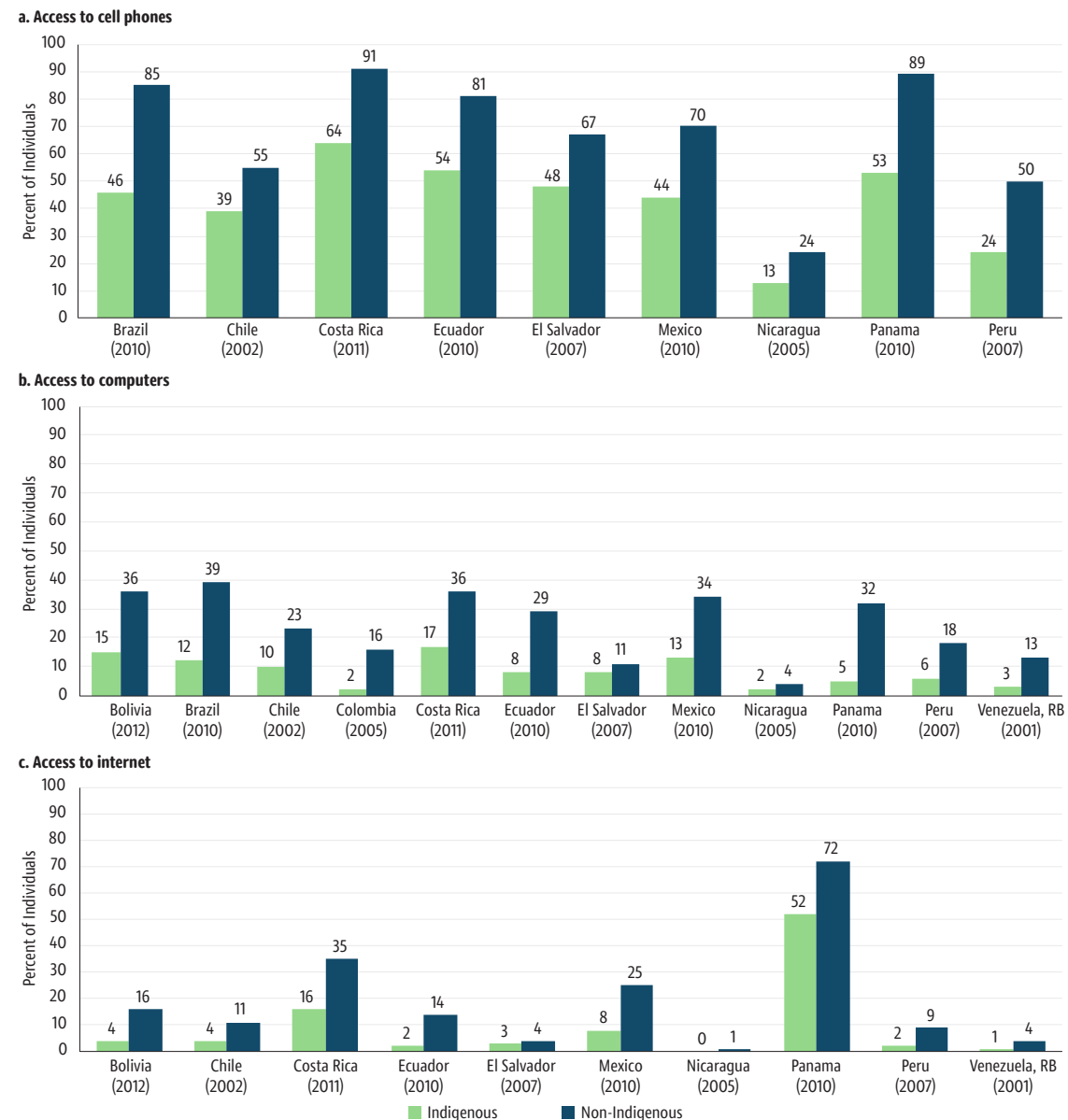
Similarly, the study *Indigenous Latin America in the Twenty-First Century* (Freire et al. 2015) finds that indigenous people in general have access to cell phones—which is the main access point to the internet for most people in the region—about half as often as non-indigenous persons (figure 2.10, panel a). Similarly for computers, indigenous people have access to computers half as often in Bolivia, one-third as often in Brazil and Peru, and one-eighth as often in Colombia (figure 2.10, panel b). While the data are from before the pandemic and do not reflect the increased level of connectivity in the region, they show large gaps in access to internet for indigenous people. In Bolivia, for example, access is four times less for indigenous people and seven times less in Ecuador (figure 2.10, panel c). More recent data show a mixed picture. In the Colombian Amazonia, 70 percent of the indigenous population does not have access to the internet, compared to 20 percent of non-indigenous communities (World Bank 2023). In Brazil, on the other hand, 80 percent of indigenous population uses internet.²⁷

Figure 2.9. Afro-descendant Students Lag in Access to the Internet and Computers at Home



Sources: Freire et al. 2018, using SEDLAC (Socio-Economic Database for Latin America and the Caribbean).

Figure 2.10. The Digital Divide: Indigenous People Are Being Left Behind



Source: Freire et al. 2015, using census data.

Narrowing gender and racial inequities by improving the availability of digital skills in women, Afro-descendants, and indigenous communities should be a priority for governments in the region. This could include special incentives such as scholarships, recruiting educators from those communities or educators who have received gender and/or ethnoracial sensitivity training, creating safe educational spaces free from gender biases and racism, highlighting women and representative community role models, tailoring training material and skill development to the tasks and economic activities that are relevant and meaningful to these groups, ensuring that educational material is inclusive, setting realistic and achievable goals of diversity and inclusion, and constantly monitoring and evaluating results to improve and share best practices.²⁸

In sum, it is important to see digital infrastructure as one element of a multidimensional push that includes various types of human capital accumulation if it is not to exacerbate existing geographical, income, or gender disparities. Digital hardware is not a silver bullet; it needs to be accompanied by programs to ensure skills across divides.

Conclusion

LA AC has made significant progress in reaching almost universal basic digital coverage. The challenge now is reaching universal broadband access and usage, particularly in the market segments—such as low-income peri-urban and rural areas—where private services providers are less keen to invest. A combination of new technological solutions and innovative institutional mechanisms, paired with strong political and financial commitments, will enable the region to meet this goal.

The challenge, however, goes beyond the infrastructure needs. A “usage gap” of almost 40 percent is high and concerning, particularly when 20 percent of potential users claim they “don’t know” about the internet or “have no interest” in it. Therefore, a well-rounded digital strategy will require sustained investments in expanding digital skills—with a particular focus on groups that have persistent gaps in access and skills, notably women and marginalized communities. Demand among potential users can be fostered by funding awareness campaigns and engaging with citizens to demonstrate the many benefits of connectivity, including enhancing their earnings capacity.

Developing digital skills can increase the productivity of workers and their earning capacity, lessening problems in affording digital technology. Similarly, reducing the usage gap makes markets more attractive for private providers, reducing the need for government support. Therefore, a comprehensive “big push” approach, investing in all complementary capabilities in a smaller set of areas, appears to offer much higher social returns than “light touch” incrementalist strategies in many areas at once.

Digital connectivity also can be viewed by governments as an exciting new space for experimentation, innovation, and learning. New service delivery models in education, health, agricultural extension programs, technology extension programs in manufacturing, entrepreneurship programs, social assistance, and the like can be developed and put to the test. These programs have to be embedded in a framework of experimentation and learning, where clear goals and measurable objectives are defined, programs are constantly monitored, and results are evaluated periodically, making the necessary adjustments for improvements. These emerging technologies offer the region new opportunities to innovate, enhance productivity growth, and promote social inclusion, while greatly increasing the productivity and effectiveness of government.

Notes

- 1 Unicorns are companies backed by venture capital (VC) with market valuations exceeding \$US 1 billion in revenues.
- 2 Hounghbonon et al. (2020); Tognisse and Degila (2021).
- 3 BBC News, "Mobile Data: Why India Has the World's Cheapest." BBC News, March 18, 2019. <https://www.bbc.com/news/world-asia-india-47537201>.
- 4 BBC News, "Reliance Jio: India's Cheapest Data Provider to Raise Prices." BBC News, November 20, 2019. <https://www.bbc.com/news/world-asia-india-50484594>.
- 5 Based on information provided by one of Cambodia's seven mobile operators, Smart (Smart Axiata 2019).
- 6 See, for example, Calderón, Meroño, and MacPhail (2020); Djiofack-Zebaze and Keck (2009); Roller and Waverman (2001); Torero and von Braun (2006); Waverman, Meschi, and Fuss (2005).
- 7 See Czernich et al. (2011); García Zaballos and López-Rivas (2012); Qiang, Rosotto, and Kimura (2009).
- 8 Gruber, Hätönen, and Koutroumpis (2014) find that the effect on GDP is greater for a broadband adoption rate above 15 percent, while Koutroumpis (2009) argues that growth returns to broadband infrastructure are considerably larger at an adoption rate of 30 percent, highlighting the role of critical mass and network effects.
- 9 Alaveras and Martens (2015); Blum and Goldfarb (2006); Lendle et al. (2016).
- 10 De Loecker (2019). For a review, see Cusolito, Lederman, and Pena (2020).
- 11 See literature reviews by Draca, Sadun, and Van Reenen (2006) and Syverson (2011), which conclude that there is a positive and significant association between ICT and productivity.
- 12 A white-label product is a product or service produced by one company (the producer) that other companies (the marketers) rebrand to make it appear as if they had made it (Investopedia 2015).
- 13 Open banking is a banking practice that provides third-party financial service providers open access to consumer banking, transaction, and other financial data from banks and nonbank financial institutions through the use of application programming interfaces (APIs).
- 14 Círrera and Maloney (2017); González-Uribe and Reyes (2021); Leatherbee and Gonzalez-Uribe (2017).
- 15 Data obtained from PitchBook. This estimate is most likely a lower bound, given that PitchBook traces investments and many of the accelerator programs in the region provide no capital.
- 16 Mobile agriculture apps can be used to monitor crops, optimize input sourcing, control pests, and manage equipment, as well as for marketing and financial decisions. Apps are increasingly using big data and artificial intelligence. For example, the Leaf Doctor is an app that diagnoses the severity of plants disease from images based on an algorithm, which has been found to provide accurate estimates (Pethybridge and Nelson 2015).
- 17 A notable exception is Qiang et al. (2012), which studies 92 mobile applications for agricultural development in developing countries (typically run on 2G phones).
- 18 According to the 2017 Global Findex Survey, 57 million people aged 15 and above do not have a bank account in Mexico, among which 15 million reported not having the necessary documentation to open one.
- 19 According to data from the Peruvian Judiciary, each case file has on average 650 pages.
- 20 According to estimates from the Ministry of Finance, it takes on average 1.5 hours for a user to travel to a court office, review and submit documentation.
- 21 Telemedicine is defined by the World Health Organization as "the delivery of health care services where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries all in the interests of advancing the health of individuals and their communities."
- 22 It is important to note that different telemedicine interventions will require different levels of connectivity. Text-based (SMS) interventions require that the patient have 3G connectivity, while a video conference call with a doctor requires reliable 4G connectivity standards on both sides.
- 23 Cheung et al. (2015); Menachemi and Collum (2011); Moore et al. (2020); Poissant et al. (2005).
- 24 Campanella et al. (2016); Moja et al. (2014); Roumelioti et al. (2019).
- 25 The Ceibal Center monitors service delivery targets with indicators such as device, connectivity, and usage indicators. These include the number of days schools have stable broadband access annually, the user count for educational platforms, and device repair times. Cost are closely monitored, including those for digital devices (laptops and replacements after four years), repairs, internet, fiber optic costs, robotics, videoconference facilities, the portal and platforms for the learning management system, and digital educational resources (Fullan, Watson, and Anderson 2013). The National Public Education Administration monitors academic achievement indicators. Using complementary tools for an Education Management Information System, the institutions closely exchange data with one another and with other public institutions.
- 26 Adaptive learning, also known as adaptive teaching, is an educational method that uses computer algorithms as well as artificial intelligence to orchestrate the interaction with the learner and deliver customized resources and learning activities to address the unique needs of each learner.
- 27 According to CETIC.BR.
- 28 Dalio et al. (2023).

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