Africa's Pulse

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AN ANALYSIS OF ISSUES SHAPING AFRICA'S ECONOMIC FUTURE

COVID-19 AND THE FUTURE OF WORK IN AFRICA: EMERGING TRENDS IN DIGITAL TECHNOLOGY ADOPTION

WORLD BANK GROUP

A PRODUCT OF THE OFFICE OF THE CHIEF ECONOMIST FOR THE AFRICA REGION

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Executive Summary

Macroeconomic Outlook

- ***Globally, COVID-19 continues to spread, but vaccination campaigns have made substantial progress in some countries, including the United Kingdom and the United States.*** Improved management of the pandemic is allowing the global economy to recover. Global financial conditions remain benign, notwithstanding recent tightening due to rising inflation expectations. Major central banks have reaffirmed their commitment to maintain asset purchases and keep monetary policy steady. Commodity prices have continued their recovery, supported by Covid-19 induced supply disruptions and a gradual rebound in global demand, with broad-based increases across most commodities. Oil prices have risen by more than 25 percent since the start of 2021, metals prices are at their highest level since 2011, and agricultural commodity prices have increased substantially.

- ***In Sub-Saharan Africa, the economic impact of the COVID-19 shock is severe. However, countries in the region are weathering the storm so far.*** Economic activity in Sub-Saharan Africa is estimated to have contracted by 2.0 percent in 2020—the lower end of the forecast range of the April 2020 issue of Africa's Pulse, and less than in some emerging markets and developing economies. Available data from the last two quarters of 2020 point to a rebound in economic activity that explains why the contraction in the region was in the lower bound of the forecasts. It reflected a slower spread of the virus and lower COVID-19-related mortality in the region, strong agricultural growth, and a faster-than-expected recovery in commodity prices. Nevertheless, COVID-19 has plunged the region into its first recession in over 25 years, with activity contracting by nearly 5.0 percent on a per capita basis. Vulnerable groups, such as the poor, informal sector workers, women, and youth, suffered disproportionately from reduced opportunities and unequal access to social safety nets.

- ***Economic activity in the region is expected to strengthen as actions are deployed to contain new waves of the pandemic and vaccine rollouts gain speed.*** Growth in the region is forecast to rise to between 2.3 and 3.4 percent in 2021, depending on the policy measures adopted by countries in the region and the international community. The 2021 baseline growth forecast is revised up 0.2 percentage point relative to the October 2020 *Africa's Pulse* projection, as the positive impact of a carry-over from the rebound in the second half of the year and a more supportive external environment are offset by the impact on activity of the persistence of social distancing restrictions and the limited scope for additional fiscal support.

- ***The 2021 baseline projection for the region is partly dragged down by the second wave of COVID-19 infections, driven by new and more transmissible variants, which appears to be worse than the first wave.*** Daily infections in the region have been about 40 percent higher during the second wave. The emergence of more contagious coronavirus variants and looser adherence to basic health protocols led to a resurgence in the number of new cases and deaths in the region since the second half of December 2020—thus prompting governments such as the Government of South Africa to tighten restrictions. While containment measures have helped to slow the new wave of infections in some countries,

others are still facing an upward trend in infections and fatalities. For most countries in the region, activity will remain well below the pre-COVID-19 projections at the end of 2021. Real gross domestic product growth for 2022, estimated at 3.1 percent, remains broadly unchanged compared with the previous projections.

- ***Sub-Saharan Africa's recovery is expected to be multi-speed, with significant variation across countries.*** Nigeria, South Africa, and Angola, the region's three largest economies, are expected to return to growth in 2021, partly owing to higher commodity prices, but the recovery will remain sluggish. Growth is projected to rebound to 1.4 percent in Nigeria, 3.0 percent in South Africa, and 0.9 percent in Angola. Muted near-term growth prospects and slow vaccine rollout in the largest economies will weigh on the region's outlook. Excluding Nigeria, South Africa, and Angola, activity is projected to expand at a more solid pace in the rest of the region. Non-resource-intensive countries, such as Côte d'Ivoire and Kenya, and mining-dependent economies, such as Botswana and Guinea, are expected to see robust growth in 2021, driven by a rebound in private consumption and investment as confidence strengthens and exports increase. A gradual return of tourists, as vaccination efforts ramp up across the world, is expected to support a moderate recovery in tourism-based economies, including Cabo Verde and Mauritius. However, the recovery is expected to remain subdued among oil exporters, due to structural weaknesses, and among fragile countries, particularly in the West and Central Africa subregion, as security challenges compound the impact of the pandemic.

- ***The COVID-19 pandemic has exacerbated public debt vulnerabilities, and significant assistance will be needed to address liquidity and solvency issues.*** Debt vulnerabilities are high and rising in many countries. The region's median debt level is projected to peak in 2021, with several countries on an upward debt trajectory, and debt service relative to tax revenues is projected to exceed 20 percent in others. Financing deficits will remain challenging given limited market access and constrained ability to increase revenues in the near term. Additional assistance will be needed to address liquidity and solvency issues, including the extension of the Debt Service Suspension Initiative (DSSI) along with grants and concessional financing, to help create fiscal space for economic investments. Some countries would need debt treatment beyond the DSSI. Operationalization of the Common Framework, the Sustainable Development Finance Policy, as well as the issuance of new Special Drawing Rights will all be critical. The debt situation in Africa requires an all hands on deck approach. No options should be taken off the table.

- ***The COVID-19 pandemic will continue to exert pressure on the region's macroeconomic policy framework.*** Current account deficits are projected to remain elevated across the region due to rising import costs on the back of higher oil prices. Current account deficits will narrow among oil exporters but remain high among metals exporters and non-resource-intensive countries, owing to the resumption of import-intensive mining and infrastructure projects. Continued support from the international community will help bridge the financing gap in many countries. While inflation is expected to remain at moderate levels in the region, it has been accelerating in some countries, such as Nigeria and Angola, due to higher food prices and currency depreciation. Net oil importers may see higher inflation, relative to oil exporters, as transport inflation rises due to higher fuel prices.

- ***Faster progress on vaccine deployment along with credible policies to stimulate private investment would accelerate growth to 3.4 percent in 2021 and 4.5 percent in 2022 in Sub-Saharan Africa.*** The number of countries with growth exceeding 4 percent in 2021 could more than double, from eight to 17. Stronger progress in the deployment of effective vaccines, which would enable the lifting of social distancing and other containment measures faster than in the baseline, would boost confidence and accelerate spending. Credible policy reforms and availability of concessional financial resources that catalyze public and private investment could trigger a stronger growth response. Growth in the region could be raised by 1.1 percentage points in 2021 and 1.4 percentage points in 2022, compared with the baseline. The pace of the recovery would pick up, with nearly 60 percent of the countries across the region growing by at least 4 percent in 2022.

- ***As countries in Sub-Saharan Africa embark on the road to recovery from the COVID-19 pandemic, ensuring growth beyond 4 percent from 2022 and onward will be critical.*** This is necessary to accelerate per capita income growth and start reversing the COVID-19-induced rise in poverty in the region. Achieving growth above 4 percent will be possible if countries implement a policy package that encourages sustained investments and job creation, and that allows the exchange rate to reflect market forces and enhance the country's competitiveness. Alleviating the debt burden will release resources for public investment in areas such as education, health, and infrastructure. Investments in human capital will help lower the risk of long-lasting damage from the pandemic, which may become apparent over the longer term, and can enhance competitiveness and productivity. The next 12 months will be a critical period for leveraging the African Continental Free Trade Area, to deepen African countries' integration into regional and global value chains. Reforms that deliver reliable electricity, including better functioning of public utilities, can power the manufacturing sector and the digital economy. Finally, reforms that address digital infrastructure gaps and make the digital economy more inclusive—ensuring affordability and building skills for all segments of society—are critical for improving connectivity, boosting digital technology adoption, and generating more and better jobs for men and women.

- ***In their road to recovery, Sub-Saharan African countries will need ample financing for investments in human capital, energy, digital and physical infrastructure.*** Amid mounting stress on the public sector balance sheets, the needs for concessional financing will continue to remain significant in 2021-22. Meeting the public investment needs without further jeopardizing fiscal sustainability would require policy reforms that foster domestic resource mobilization (from the revenue and the expenditure side) and greater access to concessional finance. On the one hand, efforts to enhance domestic resource mobilization will have to account for the position of the business cycle and the extent of the containment measures prevailing in the economy. Amid strict or partial lockdowns, governments should put emphasis on digital solutions to improve tax administration and collection rather than imposing taxes. They should also streamline fiscal incentives and improve the targeting of social and public investment programs. On the other hand, several countries in the region have taken steps toward strengthening debt transparency and management as well as fiscal sustainability within the framework of the Sustainable Development Finance Policy's performance and policy actions (PPAs). Countries that satisfactorily implement their PPAs

will have full access to their IDA country allocations, and can be eligible for frontloading and reallocations in the next year. The focus on debt transparency would enable policymakers to make more educated borrowing and investment decisions, and support accountability mechanisms in government. Finally, the design of the PPAs on fiscal sustainability and debt management are critical to enhance the resilience of the country to future shocks.

Special Topic: Digital Technologies and Jobs during COVID-19 in Africa

- ***The outbreak of the COVID-19 pandemic sharply affected economic activity, including employment, in Sub-Saharan Africa.*** The digital economy has been of paramount importance in ensuring the continuity of activities across governments, businesses, and society in the region during times of social distancing and containment measures. This issue of *Africa's Pulse* examines the relationship between digital technology adoption and new and existing jobs in Sub-Saharan Africa. Drawing on recent firm-level evidence, it provides answers to the following questions. Is the adoption of digital technologies conducive to more and better jobs? If so, what is the digital uptake across firms in the region? How has the pandemic affected firm productivity and employment? Has COVID-19 led to increases in digitalization across firms in the region? What policies are needed to strengthen the digital transformation in Sub-Saharan Africa? Within the realm of technology, the focus is on digital technologies because of their potential for rapid future generation and adoption across the world—including the generation and adoption of low-skill-biased technologies that enable low-skilled workers to learn and upgrade their skills on the job. Digital technologies affect employment through a series of distinct channels, including changes in firm entry, productivity changes among incumbent firms, and changes in exporting.

- ***Policies that foster investments in innovation and digital technologies can help reset economic structures and facilitate catch-up with the rest of the world.*** Digital technologies present an opportunity to diversify African economies away from natural resources, by helping alleviate the financial constraints faced by entrepreneurs—including capital requirements for startups. Nigeria and Kenya have emerged as epicenters of the financial technology (fintech) boom in the region. They are using inexpensive, accessible technologies to mobilize consumers in innovative ways—for instance, digital loans (M-Shwari in Kenya) and savings and investment platforms (PiggyVest and Cowrywise in Nigeria). Digital technologies are critical for addressing the region's major development challenges, such as economic diversification, health, education, food security, and governance.

- ***Mounting evidence prior to COVID-19 suggested that in Sub-Saharan Africa, the future of work is playing out rather differently from the experience in advanced economies.*** New technologies are likely to create new jobs and boost the productivity of existing ones. Recent studies document the presence of large, positive employment effects and no displacement of low-skill jobs in selected Sub-Saharan African countries after the arrival of fast internet connectivity. Prior to COVID-19, firms in Sub-Saharan Africa—formal and informal—that adopted digital technologies were likely to have greater levels of productivity, output, profits, employment, and wages. More specifically, employment and labor productivity

are higher in firms that use smartphones, digital transaction technologies (such as mobile money to pay suppliers and receive customer payments), and digital management solutions (accounting and inventory control/point-of-sale (POS) software). In Senegal, for example, the level of employment among informal firms using inventory control/POS software was 1.6 times that of nonusers, while employment in firms using digital tools to recruit workers was more than twice that of nonusers. Even more interesting, the average wage of firms using digital transaction technologies was 1.5 to 2.4 times that of nonusers.

- ***The uptake of digital technologies among African firms remains low, despite the clear benefits.*** For instance, 7 percent of informal businesses surveyed prior to the pandemic used the internet for business purposes in Sub-Saharan African countries. Among the firms with access to the internet, nearly 25 percent look for suppliers online, while 10 percent use e-commerce solutions. This low uptake might be attributed to the lack of internet-enabled devices (notably, computers); high prices of internet services, smartphones, and mobile data; as well as lack of awareness of and skills for using digital technologies.

- ***The COVID-19 pandemic has spurred the most significant social experiment of the future of work in action, with social distancing and work from home changing the way people work and interact.*** COVID-19 has accelerated the insertion of digital tools and solutions into different tasks and sectors of economic activity. The rising adoption of digital technologies and greater connectivity have led to the emergence of new activities and new modalities for conducting existing work.

- ***The health sector is one of the sectors that witnessed rapid and innovative actions by African governments amid the pandemic.*** To control the spread of COVID-19, more than 120 technology-based solutions were tested or adopted in the region (13 percent of the innovations designed worldwide). Most of the digital innovations were information and communications technology (ICT)–based, including WhatsApp chatbots (South Africa), self-diagnostic tools (Angola), contract tracing (Ghana), and mobile health information tools (Nigeria). Robots were introduced to support medical staff and mass screenings for fever at the airport in Rwanda. Medical devices were manufactured by 3D printing companies in Kenya. And industrial policies that required some technical upgrading involved the repurposing of existing manufacturing firms to meet the demand for personal protective equipment, sanitizers, and testing kits—particularly in the garment industry in Ghana and Kenya. These efforts supported local economies in retaining or creating employment.

- ***In the public sector, tax administration is one of the dimensions that has benefited from progress due to digitalization.*** Digital IDs, electronic tax filing, big data, and analytics, among others, can reduce transaction costs and operation times, as well as improve the efficiency of risk management and audit techniques. Greater transparency of the tax authority's strategy and processes can increase taxpayer satisfaction and voluntary compliance. For instance, digital ID systems are helping to expand the tax base, promote the formalization of the economy, and improve the effectiveness of tax collection (Rwanda, Tanzania, and South Africa). The government of Mozambique has fast-tracked the launch of the e-Taxation System, allowing taxpayers to submit tax returns and make tax payments

online, through 12 commercial banks. The crisis has also been a driver of innovation in service delivery, by promoting government-to-person payments. Digital technologies have expanded the coverage of social safety nets, improved targeting, and protected beneficiaries amid social distancing requirements. Scaled-up payments to beneficiaries were delivered via mobile money accounts (Togo's Novissi program) and e-wallets (Namibia), among others.

- ***Firms in the region mostly adjusted their employment by reducing hours and wages (intensive margin) rather than firing workers (extensive margin).*** Firms were more likely to reduce work hours (39 percent), grant leave of absence (38 percent), and reduce wages (31 percent) in response to the COVID-19 shock. They were less likely to layoff workers in the face of the COVID-19 shock (21 percent). However, the likelihood of reducing employment was higher than that observed in other developing countries (17 percent). Laying off workers was a more common response among countries with stricter lockdown measures and a greater drop in sales and among larger firms. On average, sales declined by 49 percent in the region, and this contraction was even larger in countries with stricter lockdowns, contact-intensive activities, and micro and small firms.

- ***Sub-Saharan African firms expanded the use of digital technologies in response to the pandemic.*** Business Pulse Surveys conducted in 18 countries in the region show that 22 percent of the firms reported starting or increasing use of the internet, social media, and digital platforms. The intensity in the use of digital technologies was higher in financial and ICT services, as well as among larger and formal firms. The growth was particularly notable for e-commerce. For example, the African platform Jumia saw an increase of over 50 percent, from 3.1 million to 4.7 million, in the volume of transactions during the first six months of 2020, compared with the same period in 2019. Digitalization in Kenyan firms increased as the pandemic continued. For instance, over time, a greater percentage of Kenyan firms adopted digital technologies in response to the pandemic (71 percent in September-October 2020, up from 47 percent in June-August 2020), especially among manufacturing firms and small firms (World Bank 2021). Additional evidence shows that firms with higher technological levels prior to COVID-19 were more likely to increase digitalization in response to the pandemic and have greater sales and employment.

- ***Digital interventions by themselves are not a panacea. They need to be complemented by investments in physical infrastructure, electricity, literacy, and smart regulations.*** Whereas mobile phone access has expanded rapidly and is now commercially self-sustaining—even poor farmers can benefit from having a phone and find the money to buy one—the same is not true of the internet and electricity. In the long run, the internet would have an even greater impact on economic growth and would largely depend on adopting a conducive regulatory framework and sustainable business models to encourage its spread and that of its analog complements, such as electricity, in the poorest parts of the world.

Section 1: Recent Trends and Developments

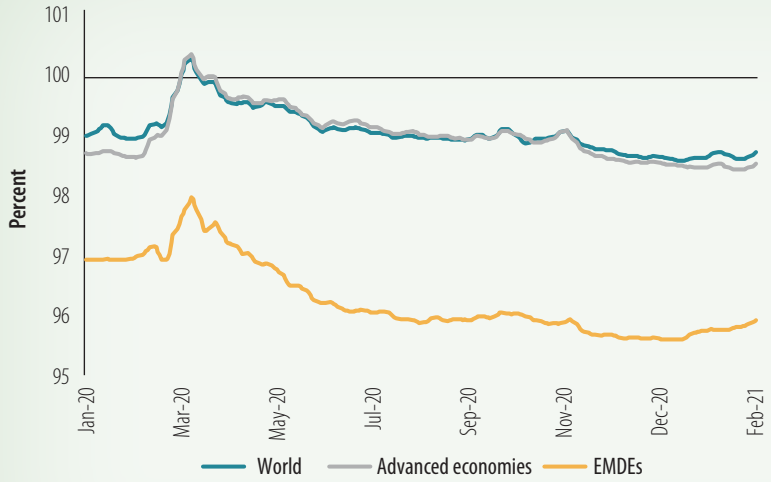
1.1 GLOBAL TRENDS

COVID-19 continues to spread across the world, but vaccination campaigns have made substantial progress in some countries.

Incoming data support the narrative of a gradual global recovery as countries around the world maintain lockdowns with varying degrees of stringency. The U.S. recovery is gathering pace, driven by a rapid vaccine rollout and substantial fiscal support, including the recently approved US$1.9 trillion stimulus package. By contrast, the euro area fell back into recession in 2020Q4, and persistently high COVID-19 infections, extended restrictions, and slow vaccine rollouts are setting the stage for a possible further contraction in 2021Q1. China's strong recovery has started to moderate. The country's gross domestic product (GDP) growth reached 6.5 percent year-on-year in 2020Q4 as investment and net exports surpassed pre-COVID-19 levels, and more recent high-frequency data point to further moderation. The government has set a growth target of at least 6 percent for this year. With a gradual shift away from investment and toward consumption, China's growth has become less commodity intensive. While China's commodity demand is still growing strongly, it may not rise at the pace it did in the 2000s, which could weigh on the growth prospects of commodity exporters in Sub-Saharan Africa.

Global financial conditions remain exceptionally benign as major central banks have reaffirmed their commitment to continued asset purchases and keeping monetary policy steady (figure 1.1). This has fueled significant debt issuance by corporates and governments to start the year. More recently, rising inflation expectations have caused yield curves to steepen in major advanced economies and, to a lesser extent, in local currency and dollar-denominated bonds in emerging markets and developing economies (EMDEs). The steepening of yield curves has spilled over to other financial markets, with valuations of some risky assets experiencing sizable corrections in late February and early March. Portfolio flows to EMDEs have weakened, with many EMDE currencies slipping.

FIGURE 1.1: Global Financial Conditions



Global financial conditions remain accommodative, as major central banks have reaffirmed their commitment to keeping monetary policy steady. However, rising inflation expectations have caused yield curves in advanced economies to steepen.

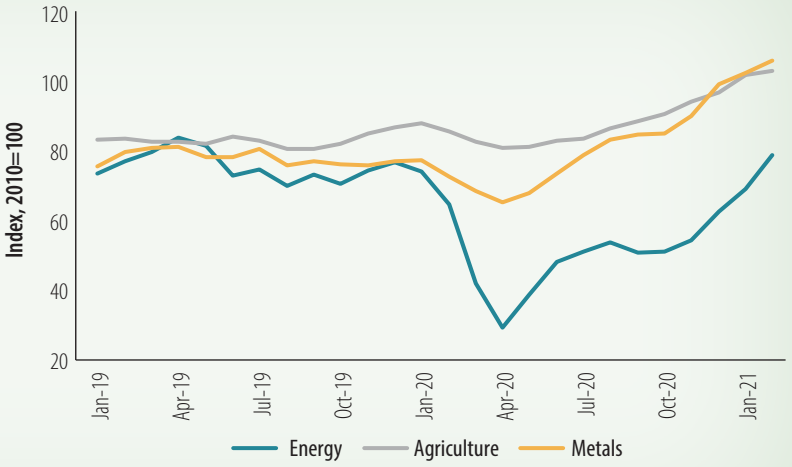
Sources: Bloomberg, World Bank.

Note: EMDEs exclude China. A value above 100 indicates tightening of financial conditions. Based on Goldman Sachs Financial Conditions Indices (FCI) for 12 advanced economies and the euro area, and 12 EMDEs excluding China, weighted by gross domestic product in constant 2010 U.S. dollars. The FCI is a weighted sum of short-term bond yields, long-term corporate yields, exchange rates, and stock market valuations. EMDEs = emerging markets and developing economies.

Following large declines in the early stages of the pandemic, commodity prices staged a broad-based

After sustaining large declines in the early phases of the COVID-19 pandemic, commodity prices have staged a broad-based recovery since the second half of 2020, supported by a gradual rebound in global demand.

FIGURE 1.2: Aggregate Commodity Prices



Sources: Bloomberg, World Bank.
Note: The last observation as of February 2021.

recovery in 2020Q3 (figure 1.2). Most commodity prices now exceed their pre-pandemic levels. Oil prices averaged $57 a barrel during January-February 2021, supported by a gradual rebound in demand and continued production restraint among the Organization of the Petroleum Exporting Countries and the Russian Federation (OPEC+). This year, oil prices are projected to remain around their 2021Q1 level before rising further to about $60/bbl in 2022, reflecting a faster-than-expected recovery of the global economy and strict adherence to continued supply cuts by OPEC+. Oil demand is expected to firm in the second half of 2021, although it will not regain its pre-pandemic level until next year. Metals prices have increased sharply. Their January-February 2021 average was nearly 40 percent higher than a year ago. The recovery in metals prices has been supported by continued strong demand from China. Over the past two years, China's share of global demand exceeded 50 percent for aluminum and copper, the world's most important metals in terms of volumetric consumption—China also increased its share in oil and coal demand. The forecast for metals prices in 2021 has been revised upward, and prices are now expected to be nearly 20 percent higher in 2021 relative to last year. Agricultural prices reached their highest level since 2014 earlier this year. The increase was largest for grains and oilseeds, with maize prices driven by surging demand from China. Production shortfalls in some regions, including South America because of dry weather, are also supporting grain prices.

Despite well-supplied global food markets, food insecurity remains acute in several low-income countries in Sub-Saharan Africa, especially those most affected by climate change or conflict. Lost incomes, compounded in some cases by high food price inflation, are also contributing to the increase in food insecurity. More than 235 million people in Sub-Saharan Africa are food insecure and with insufficient food consumption. Sub-Saharan Africa's food system is under stress and food security challenges have intensified due to the COVID-19 pandemic. The Democratic Republic of Congo, Ethiopia, Somalia, South Sudan, Sudan, and Zimbabwe are among the countries at greater risk of experiencing food security crises over the next 12 months.

1.2 RECENT DEVELOPMENTS IN SUB-SAHARAN AFRICA

COVID-19 Pandemic Developments

Since the October 2020 Africa's Pulse, three salient trends characterize the evolution of the COVID-19 pandemic in Sub-Saharan Africa: a second wave of COVID-19 infections and fatalities, the emergence of new variants of the virus, and the rapid development of vaccines.[1] Despite the logistical challenges to the rollout of vaccination programs worldwide, the accelerated production of vaccines to immunize populations against COVID-19 has been a positive development. Yet, new variants of the virus have been circulating across the globe—for example, the South African variant has spread among several Sub-Saharan African countries. The distribution of vaccines, through the World Health Organization-backed COVAX facility[2] or independent acquisitions, has also been slow and plagued with limited supplies.[3] So far, the vaccine doses received are insufficient for most countries to reach herd immunity in 2021. This slow rollout may keep mobility restrictions in place and slow the pace of recovery. While the containment measures adopted by governments have helped curb the second wave for some countries, infections and fatalities are rising in others.

Throughout the first year of the pandemic, best practices and knowledge about the COVID-19 virus accumulated gradually. Avoiding further infections through the use of masks, handwashing and hand sanitizers, as well as social distance, among others, became more commonly accepted and practiced through a process of learning by doing. Doctors and nurses researched and identified how to treat COVID-19 patients more effectively. However, relaxing behaviors around stemming the spread of the virus—say, not wearing a mask, not practicing social distancing and exceeding restrictions for gatherings—could accelerate infections in the months ahead. Consequently, it is critical for African citizens to continue these practices and remain vigilant against the virus to prevent further increases in infections. Moreover, it is essential for governments to continue running public health campaigns and strengthen public health systems. These responses will mitigate against further infections—especially those from new virus variants that are found to be more contagious and infect younger populations as well. The fight against the coronavirus is far from over in the region.

The new COVID-19 variants have surged the number of new cases and deaths since the second half of December 2020, and hence fueled the second wave of COVID-19 in Sub-Saharan Africa. The B.1.351 variant, first identified in South Africa in mid-December 2020, is believed to be 50 percent more contagious. This variant has been found in some African countries (i.e., Botswana, Comoros, Ghana, Kenya, and Zambia) and non-African countries. It has accelerated the number of cases in South Africa as well as in other countries in the region

1 People infected with COVID-19 and unable to recover for several weeks or months from the start of the illness are being affected with "long COVID." They experience a series of symptoms including profound fatigue, shortness of breath, cardiovascular effects, brain fog, sleep disorders, and depression, among others. These symptoms can persist for months and their impact on individuals ranges from mild to incapacitating (BMJ 2020).

2 The COVAX initiative, which is led by GAVI, the Vaccine Alliance, along with the World Health Organization (WHO), and other partners, aims at delivering over 1.3 billion doses to 92 low- and middle-income countries, covering up to 20 percent of their populations.

3 Many African countries are still unable to secure enough vaccines to reach herd immunity (that is, inoculating 60 percent of the population).

The number of confirmed cases and deaths has increased in South Africa more than the regional average since mid-December 2020.

FIGURE 1.3: COVID-19 Confirmed Cases in Selected Countries in Sub-Saharan Africa (per million people, smoothed)

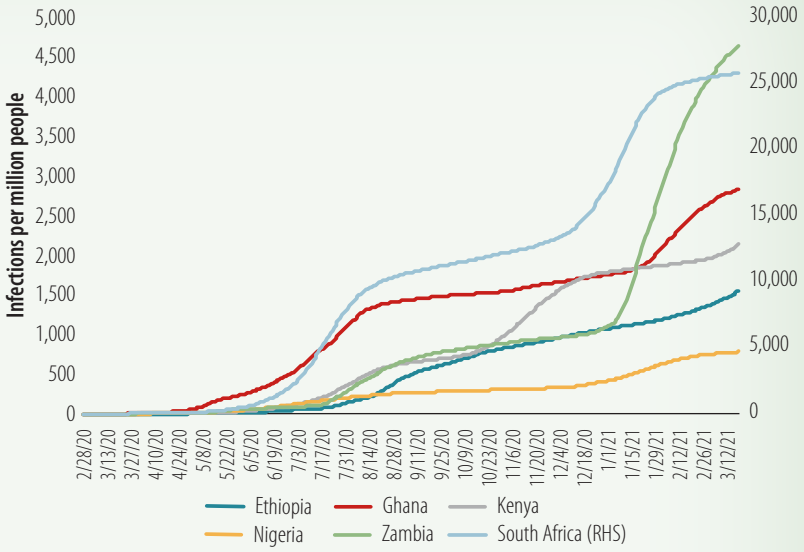
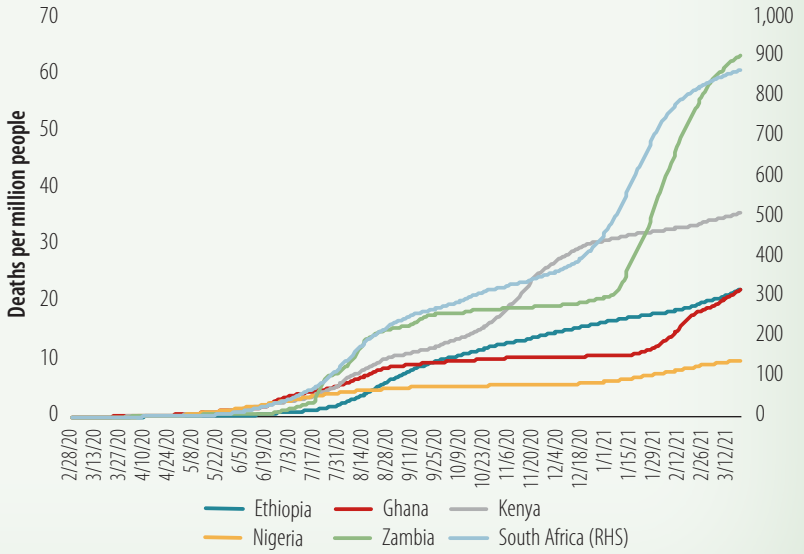


FIGURE 1.4: COVID-19 Deaths in Selected Countries in Sub-Saharan Africa (per million people, smoothed)



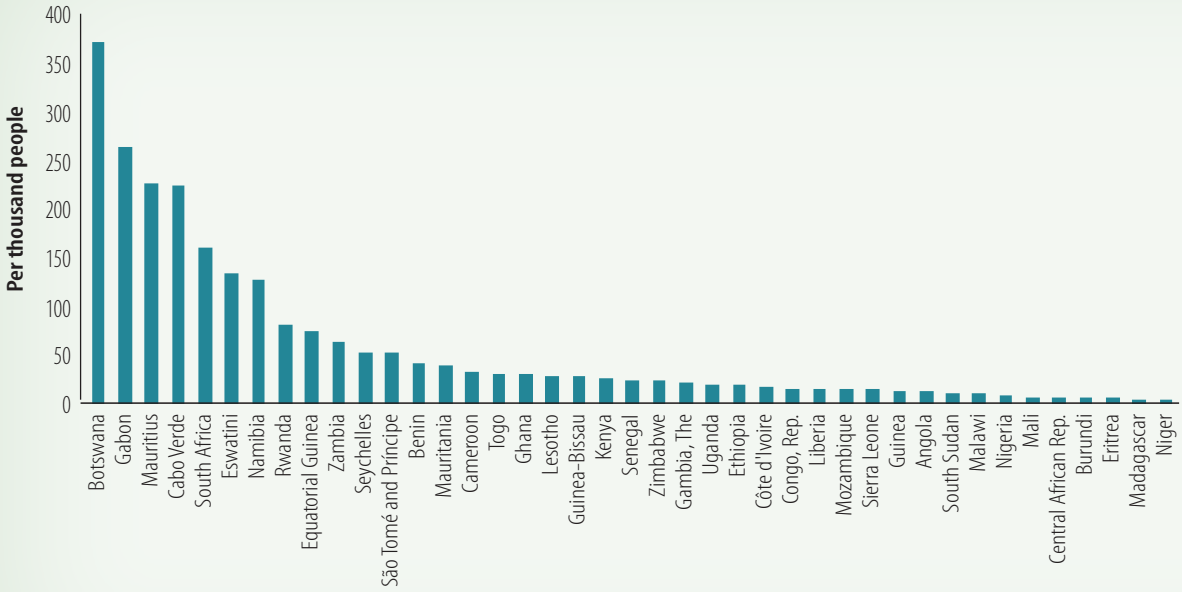
Source: Our World in Data, Coronavirus Pandemic (COVID-19) Statistics.
Note: Data as of March 19, 2021.

(figure 1.3). The number of confirmed cases and deaths in South Africa has increased more than the regional average in this period (figure 1.4). For instance, the number of confirmed cases in South Africa increased from 14,109 per million people on December 10, 2020 to a peak of 24,435 per million people on January 30, 2021. Meanwhile, fatalities grew from 384 per million people to 741 per million people over the same time period.[4] This surge in COVID-19 has translated into an average of more than 12,000 new cases per day (203 per million people) and 416 deaths per day (7 per million people). The regional average, in terms of cases and deaths, has increased at a much slower pace than in South Africa, from 1,339 per million people and 30 per million people on December 10, 2020 to 2,183 per million people and 54 per million people on January 30, 2021, respectively.

4 In absolute numbers, the number of cases and deaths in South Africa increased from 0.84 million and 22,747 on December 10, 2020 to 1.45 million and 43,951 on January 30, 2021, respectively.

The second wave of COVID-19 infections appears to be worse than the first wave in Sub-Saharan Africa due to new variants of the virus[5] which are spreading worldwide. The true transmission of the virus—in terms of magnitude and acceleration—is unknown due to low levels of testing in the region (figure 1.5).[6] The evolution of new daily COVID-19 cases and deaths in Sub-Saharan Africa and its subregions clearly illustrates the presence of two distinct waves of infections and deaths. While East and Southern Africa follows a similar trajectory to that of the entire region

FIGURE 1.5: Total COVID-19 Tests in Sub-Saharan African Countries (per thousand people)



The true transmission of the virus is unknown due to low levels of testing in the region.

Source: Worldometer COVID-19 Data.
Note: March 19, 2021. Countries without testing data include: Burkina Faso, Chad, Comoros, Congo D.R., Somalia, Sudan, and Tanzania.

(SSA), West and Central Africa exhibits a relatively lower daily rate of infections and deaths (figures 1.6 and 1.7). For example, the peak of the first wave (around July 24, 2020) is lower than the peak of the second wave (around January 12, 2021). The East and Southern Africa subregion shows a steeper increase in new cases and deaths. The number of new daily cases in Sub-Saharan Africa has peaked at 14.5 per million people during the first wave while it has reached a maximum of 23.9 per million people during the second wave (i.e. an increase of 9.4 daily cases per million people). The second peak of infections in West and Central Africa and East and Southern Africa is higher than the first peak by 14.7 and 1.5 new daily cases per million people, respectively. The peak of COVID-19 deaths takes place with a lag relative to the new daily cases.

5 This refers to the B.1.1.7 coronavirus variant (first detected in the United Kingdom) and the B.1.351 variant in South Africa.

6 By March 19, 2021, only six countries in the region had conducted more than a million COVID-19 tests, with South Africa and Ethiopia registering more than two million tests. South Africa has so far conducted about 9.6 million tests (more than 160,000 per million people) and Ethiopia more than 2.2 million tests (more than 19,000 per million people). Botswana, Gabon and Mauritius have the highest rates of testing (per million people) in the region while Nigeria has one of the lowest testing rates (about 8,000 per million people).

The East and Southern Africa subregion follows a similar trajectory to that of the entire region; the West and Central Africa subregion exhibits relatively lower daily rates of infections and deaths.

FIGURE 1.6: Daily New Cases of COVID-19 in Sub-Saharan Africa and Its Subregions (per million people, smoothed)

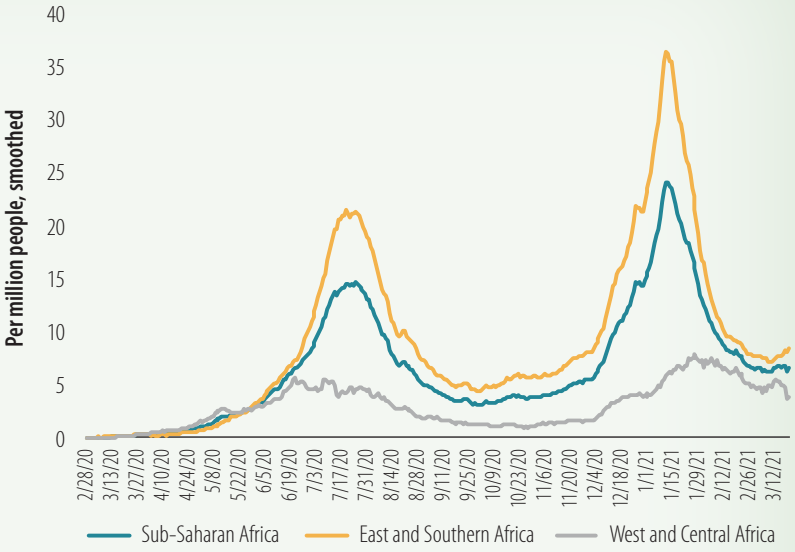


FIGURE 1.7: Daily New COVID-19 Deaths in Sub-Saharan Africa and Its Subregions (per million people, smoothed)

Source: Our World in Data, Coronavirus Pandemic (COVID-19) Statistics.
Note: Smoothed=7-day moving average. Data as of March 19, 2021.

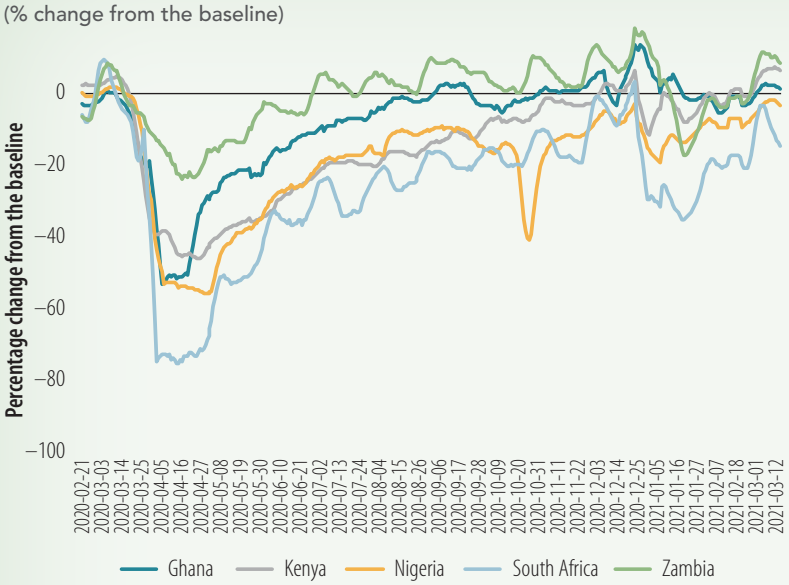
The peak in deaths during the second wave (around January 19, 2021) is also higher than that of the first wave (July 28, 2020). The number of deaths in Sub-Saharan Africa reached a peak of 0.3 per million people in the first wave and 0.65 per million people in the second wave. The peak of death cases has also increased between the two waves in East and Southern Africa and West and Central Africa by 0.57 and 0.03 new daily deaths per million people, respectively.

The combination of a general relaxation of protective measures[7] and the new variants of the virus[8] has caused the expansion of the second wave in Sub-Saharan Africa. For instance, community mobility towards places of retail and recreation places increased during the holiday season among Zambians. On December 28, 2020, community mobility increased by 16.9 percent, reaching even higher levels than the pre-pandemic baseline

7 The relaxation of measures includes not using masks, not following social distancing practices, and lifting restrictions on mobility and cross-border travel.
8 This is particularly the case of the South African variant of the virus.

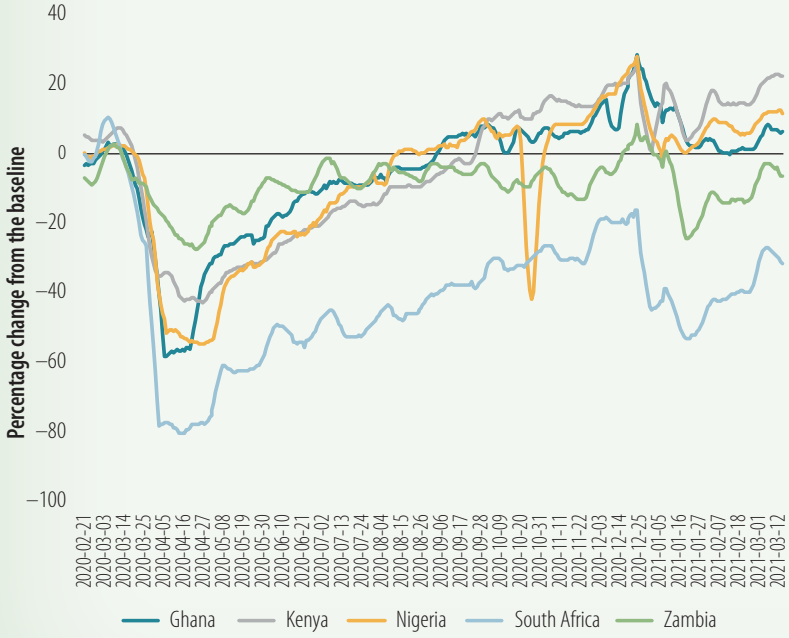
(figure 1.8). Figures 1.10 and 1.11 illustrate the surge in the new daily COVID-19 cases and deaths in the second wave in South Africa and Zambia.[9] The South African variant of the virus was found to have spread among Zambians during the holiday season, given the close ties between these countries in terms of trade and labor migration. Community mobility towards places of public transportation also increased during the holiday season in Zambia. It was 26 percent higher than pre-pandemic levels prior to December 25, 2020, and between 6 and 17 percent higher than pre-pandemic levels between December 28 and 31, 2020 (figure 1.9). Zambia has shown a steeper increase in the number of cases and deaths since the beginning of January 2021. For example, the number of cases and deaths increased from 1,127.3 per million people and 21.1 per million people on December 31, 2020 to 1,508.2 per million people and 25.5 per million people, respectively, on January 10, 2021 in Zambia (figures 1.10 and 1.11). The peak of cases in

FIGURE 1.8: COVID-19 Mobility Changes: Retail and Recreation
(% change from the baseline)



Community mobility to retail and recreation places increased and reached even higher levels than the pre-pandemic baseline by the end of 2020.

FIGURE 1.9: COVID-19 Mobility Changes: Public Transportation
(% change from the baseline)



Public transportation mobility was higher than pre-pandemic levels in December 2020.

Source: Google COVID-19 Community Mobility Report.

Note: Changes for each day are compared with a baseline value for that day of the week. The baseline is the median value, for the corresponding day of the week, during the five-week period from January 3.to February 6, 2020. Data as of March 14, 2021.

9 These figures show the evolution of the daily new COVID-19 infections and deaths (per million people) across selected countries in Sub-Saharan Africa and include the top six countries in the region in terms of their number of cases.

A surge in new daily COVID-19 cases and deaths illustrates the second wave in South Africa and Zambia.

FIGURE 1.10: Daily New COVID-19 Cases in Selected Countries in Sub-Saharan Africa (per million people, smoothed)

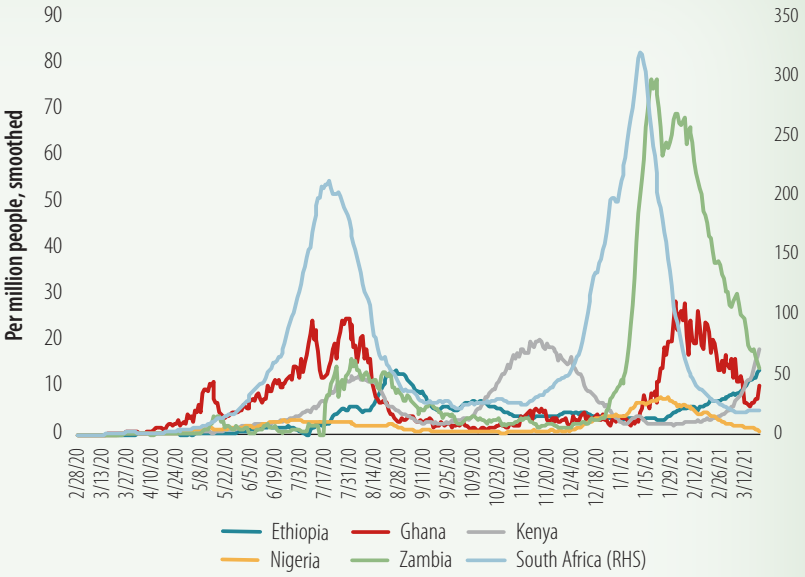
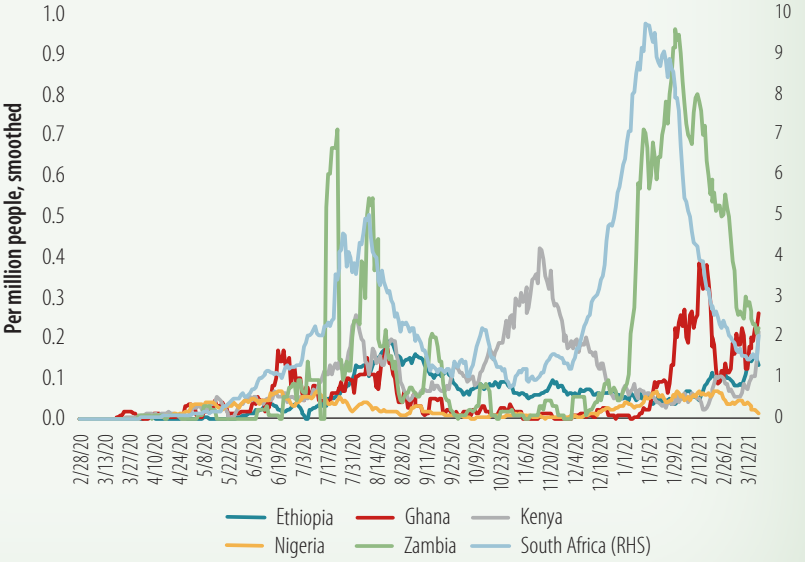


FIGURE 1.11: Daily New COVID-19 Deaths in Selected Countries in Sub-Saharan Africa (per million people, smoothed)



Source: Our World in Data, Coronavirus Pandemic (COVID-19) Statistics.
Note: Smoothed=7-day moving average. Data as of March 19, 2021.

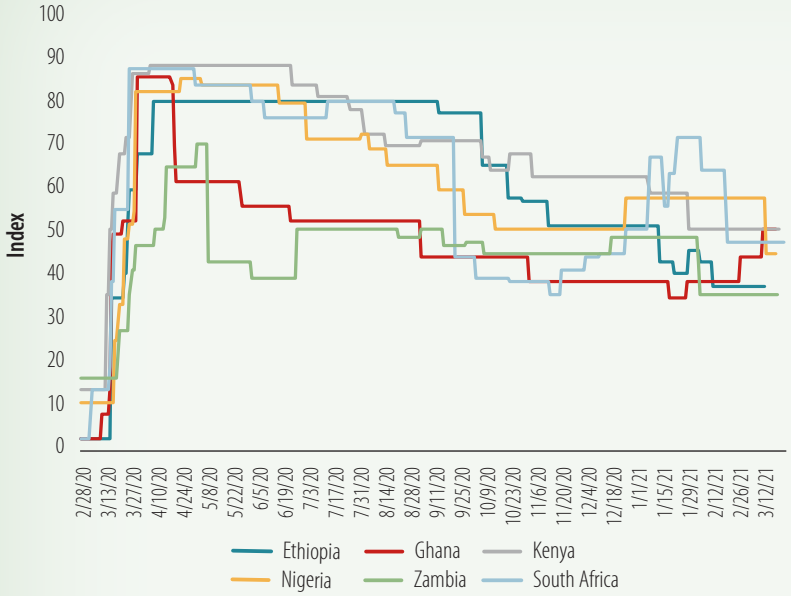
South Africa reached 321.1 per million people (on January 11, 2021) after the emergence of the South African variant. Zambia's peak reached 76.8 per million people on January 17, 2021 immediately following the expansion in South Africa.

Although the containment measures have reduced the number of new daily cases and deaths in the second wave in some Sub-Saharan African countries, other countries in the region are still facing an upward trend in infections.[10] Accumulated knowledge from the global context has helped propel targeted containment measures effectively and efficiently during this second wave. Recent containment measures have been less strict than those in the first wave, and yet, ultimately correspond with a decrease in the number of new cases and deaths so far. Figures 1.10 an 1.11 show, for instance, the sharp

10 For instance, this is the case of Côte d'Ivoire, Cameroon, Ethiopia, Gabon, Guinea, Kenya, Mali, Niger, among others.

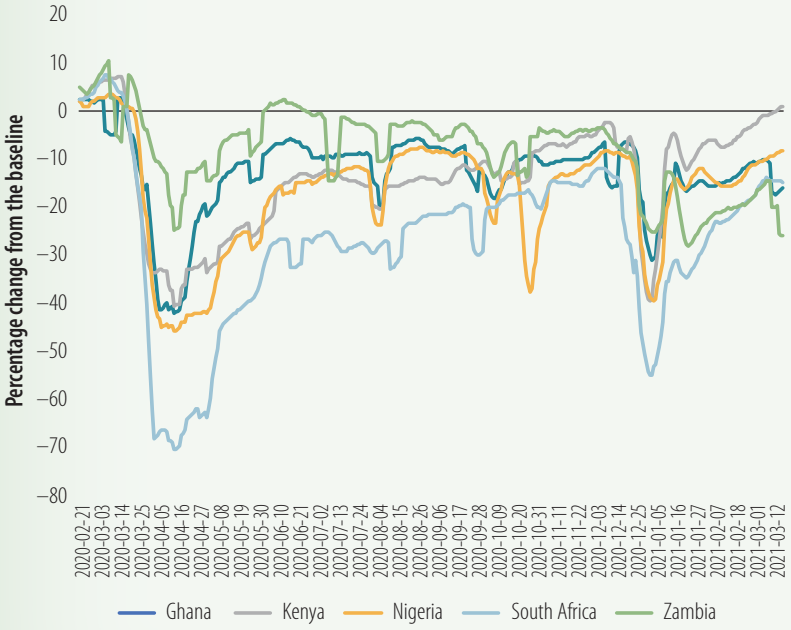
decline in new cases and deaths in South Africa, and to a lesser extent, Zambia. Figure 1.12 shows that the stringency of containment measures declined from the first wave to the second wave in the selected Sub-Saharan African countries. While the stringency of containment measures has relatively declined during the second wave, community mobility towards the workplace fell more in the first wave than in the second wave, indicating that the second wave lockdown has been partial or focused to let people return to their workplaces as much as possible (figure 1.13). Accordingly, many countries could implement targeted policies to flatten the curve of COVID-19 infections—for example, by imposing partial and/or focused lockdowns—while minimizing their adverse impact on the economy. Improved effectiveness and efficiency could be one of the silver linings of the cumulative knowledge on the containment and mitigation measures of the pandemic.

FIGURE 1.12: Stringency Index in Selected Sub-Saharan African Countries (index)



The stringency of containment measures declined from the first wave to the second wave in selected Sub-Saharan African countries.

FIGURE 1.13: COVID-19 Mobility Changes: Workplaces (% change from the baseline)



The lockdown in the second wave has been more targeted, and people have gradually returned to their workplaces.

Source: Oxford Coronavirus Government Response Tracker (figure 1.12). Google COVID-19 Community Mobility Report (figure 1.13).

Note: The higher the stringency index is, the more stringent the containment measures are. Data as of March 19, 2021. For mobility, changes for each day are compared with a baseline value for that day of the week. The baseline is the median value, for the corresponding day of the week, during the five-week period from January 3 to February 6, 2020. Data as of March 14, 2021.

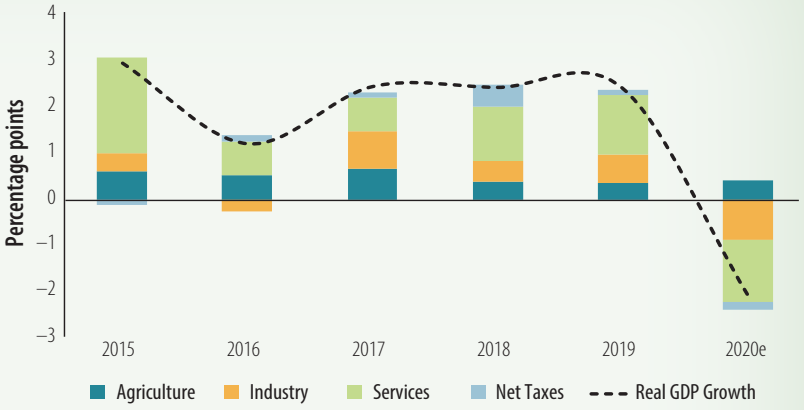
1.3 ECONOMIC DEVELOPMENTS

The COVID-19 pandemic hit Sub-Saharan African economies hard, but the ensuing recession was less severe than previously feared.

Economic activity in the region is estimated to have contracted by 2.0 percent in 2020—at the lower bound of the *Africa's Pulse* forecast range—driven by contractions in industry and services on the production side (figure 1.14), and in private consumption and investment on the demand side (figure 1.15). The contraction was modest compared with other EMDEs excluding China. Swift containment measures combined with the region's young population helped keep infection and mortality rates low. Across the region, governments implemented a range of measures to mitigate the economic damage, including fiscal packages, easing monetary and macroprudential rules, and providing adequate liquidity to firms. Strong agricultural growth in some countries, and a faster-than-expected recovery in commodity prices also cushioned the contraction in activity. Nonetheless, the region suffered its first recession in over 25 years, with activity contracting by nearly 5.0 percent on a per capita basis. The poor and those working in the informal sector and contact-intensive sectors, including women and youth, suffered disproportionately from reduced opportunities and low access to social safety nets.

Economic activity in Sub-Saharan Africa is estimated to have contracted by 2.0 percent in 2020. On the production side, steep contractions in services and industry more than offset moderate growth in agriculture.

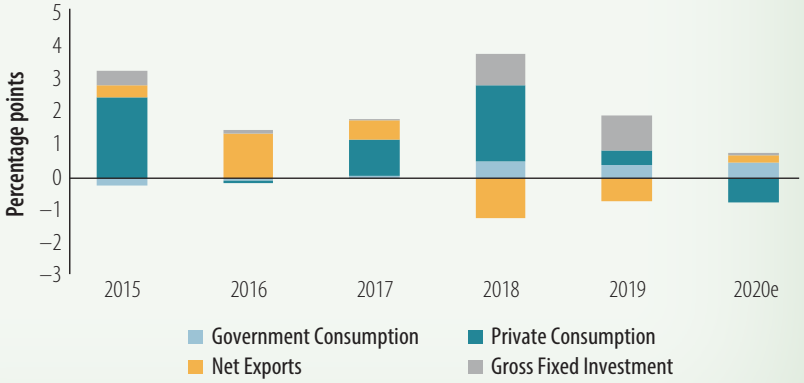
FIGURE 1.14: Sub-Saharan Africa: Contributions to Real GDP Growth, Supply Side (percentage points)



Source: World Bank staff estimates.

On the demand side, contractions in private consumption and investment offset modest gains in net exports.

FIGURE 1.15: Sub-Saharan Africa: Contributions to Real GDP Growth, Demand Side (percentage points)



Source: World Bank staff estimates.
Note: Change in inventories and statistical discrepancy are not displayed.

Following an unprecedented fall in output in 2020Q2, economic activity rebounded across the region in 2020Q3, partially recovering from the deep contraction, as economies reopened. With the easing of the COVID-19 lockdown restrictions, the fall in private consumption slowed, exports increased, and investment stabilized. The rebound surprised on the upside in some large economies, including

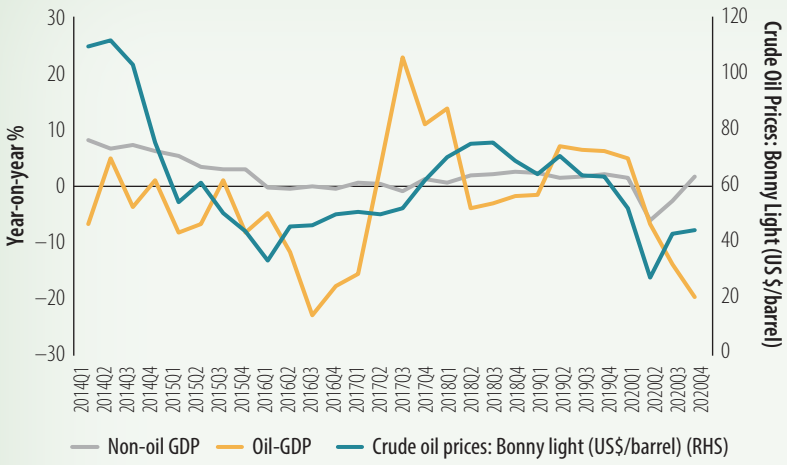
Nigeria and South Africa. However, as a second and more contagious wave of COVID-19 infections forced many governments to impose restrictions on economic activity in late 2020, the recovery in consumption and investment faltered in some countries.

The rebound in activity in the second half of 2020 was uneven and varied between regions and countries.

West and Central Africa

Real GDP in West and Central Africa is estimated to have contracted by 1.1 percent in 2020, less than projected in the October 2020 *Africa's Pulse* forecast, partly owing to a less severe contraction than expected in Nigeria, the region's largest economy, in the second half of the year. Following a 6.1 percent year-on-year contraction in 2020Q2, Nigeria's economy contracted by 3.6 percent in 2020Q3, and expanded by 0.1 percent in 2020Q4, moving out of recession faster than expected. For the year, Nigeria's real GDP is estimated to have contracted by 1.8 percent, a stronger outturn than projected in the October 2020 forecast. Nigeria's oil sector weakened in 2020Q4 despite an increase in oil prices. Partly due to OPEC+ quotas, oil production fell from 1.67 million barrels a day in 2020Q3 to 1.56 million barrels a day in 2020Q4, leading to a sharp fall in oil GDP, which was, however, offset by a rebound in the non-oil sector (figure 1.16). The agriculture sector, which represents about a quarter of the economy, registered growth of 3.4 percent year-on-year in 2020Q4. The recovery in sectors hit hardest by containment measures—including retail trade, transport, and hospitality—continued in 2020Q4, supporting the economy's rebound (figure 1.17).

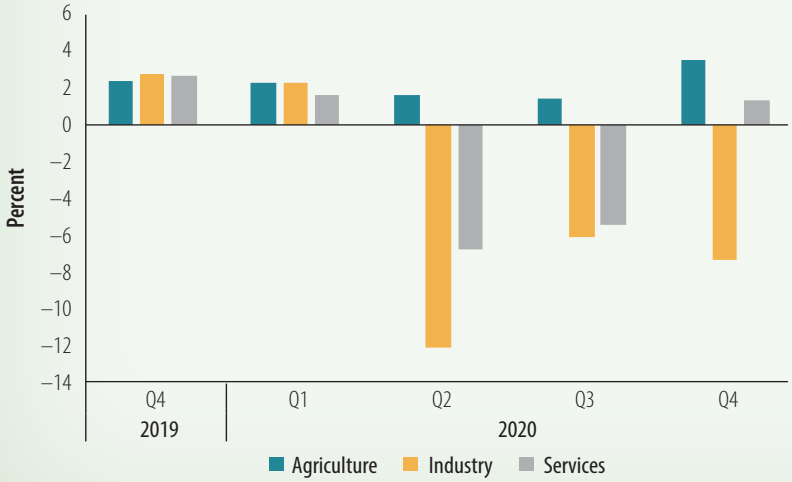
FIGURE 1.16: Nigeria: Oil and Non-Oil GDP Growth (%)



Sources: Nigeria National Bureau of Statistics; Haver Analytics.

In Nigeria, a sharp decline in oil GDP, despite the increase in oil prices, was offset by an expansion in non-oil GDP in 2020Q4.

FIGURE 1.17: Nigeria: Real GDP Growth, by Sector, 2020Q1–2020Q4 (%)

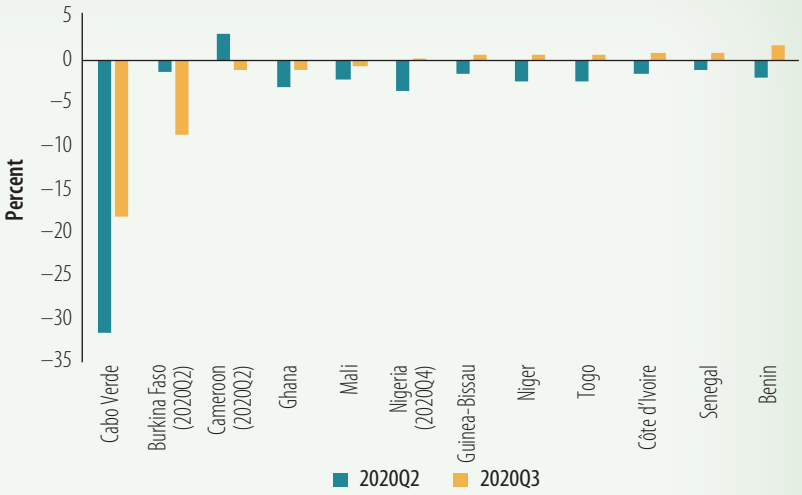


Source: Nigeria National Bureau of Statistics.

Nigeria's non-oil GDP growth in 2020Q4 was driven by robust growth in agriculture and a rebound in the service sector.

The strength of the rebound in economic activity in the West and Central Africa subregion in the second half of 2020 varied across countries.

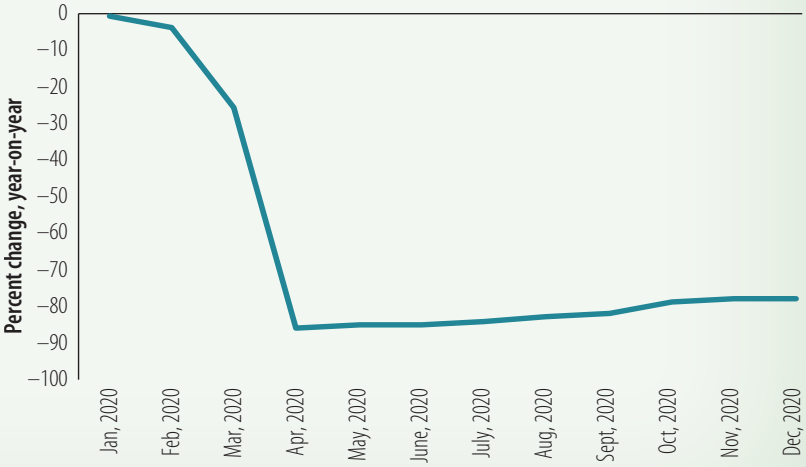
FIGURE 1.18: Annual Quarterly GDP Growth in West and Central Africa, 2020Q2–2020Q3 (%)



Source: Trading Economics.

International tourist arrivals in Sub-Saharan Africa remained weak in 2020Q4, including in the West and Central Africa subregion.

FIGURE 1.19: International Tourist Arrivals in Sub-Saharan Africa (% change, year-on-year)



Source: https://www.unwto.org/unwto-tourism-recovery-tracker.

In the rest of the subregion, economic activity steadied in the second half of the year, but with differences between countries (figure 1.18). Growth slowed sharply but remained positive among West African Economic and Monetary Union (WAEMU) countries, reflecting their relatively more diversified economic structure. Output contractions in Burkina Faso and Mali were offset by expansions in Benin, Côte d'Ivoire, Niger, Senegal, and Togo. In contrast, growth remained largely negative among Central African Economic and Monetary Community (CEMAC) countries. Due to their heavier reliance on oil exports, subdued oil prices and declining output volumes kept economic activity depressed. In countries outside WAEMU and CEMAC, performance was similarly uneven. With an estimated contraction of 18.2 percent year-on-year in 2020Q3, Cabo Verde has been among the harder hit countries by the pandemic owing to its dependence on tourism. While containment and lockdown have hurt all sectors, tourism has been affected the most by the COVID-19 crisis. Data from the World Tourism Organization indicate that international tourist arrivals in Sub-Saharan Africa fell by 78 percent year-on-year in December (figure 1.19), and this adverse impact has been particularly strong on island economies.

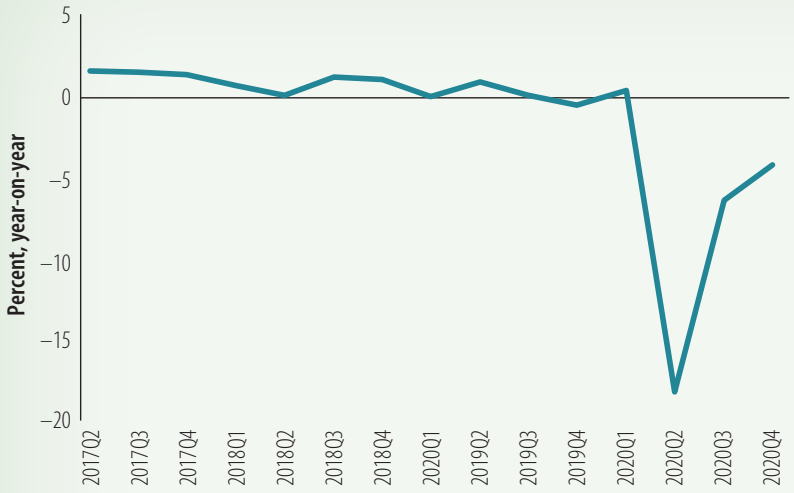
In The Gambia, which also has an important tourism sector, robust agricultural growth, thanks to favorable rains, helped offset a sharp fall in tourist arrivals, but the economy remained fragile. In the countries with a large mining sector, a recovery in industrial metals prices, driven by increased demand from China, supported a rebound in activity in the second half of 2020. Guinea and Ghana registered positive GDP growth in 2020 overall, owing to recovering bauxite

demand from China (Guinea) and rising gold prices as well as higher agricultural production. However, weaker domestic demand prevented a stronger rebound in Ghana. Meanwhile, reduced mineral production due to mine closures weighed on growth in Sierra Leone and Liberia. In Mauritania, recovering iron ore demand was offset by a sharp decline in fish exports.

East and Southern Africa

In East and Southern Africa, the growth contraction in 2020 is estimated at -3.0 percent, 0.9 percentage point less than projected in October, mostly driven by South Africa and Angola—its two largest economies. In South Africa, after a sharp contraction in 2020Q2, growth rebounded strongly in 2020Q3 with the easing of the COVID-19 lockdown restrictions (figure 1.20). The year-on-year rate of contraction moderated from 17.8 percent in 2020Q2 to 6.2 percent in 2020Q3, owing to a rebound in the mining sector and a sizable increase in real agricultural output due to favorable weather conditions. The recovery in activity continued into 2020Q4 amid a resurgence of COVID-19 cases. The contraction slowed to 4.1 percent in 2020Q4, a stronger-than-expected outcome, supported by a continued rebound in the manufacturing, trade, and transport industries. In 2020, South Africa's real GDP is estimated to have contracted by 7.0 percent, following a 0.2 percent expansion in 2019. Meanwhile, in Angola, the region's second largest oil producer, economic activity recovered slightly in 2020Q3, registering a contraction of 5.3 percent year-on-year compared with an 8.3 percent contraction in 2020Q2. Oil production remained low and dropped below OPEC's quota limit in 2020Q4 (figure 1.21).

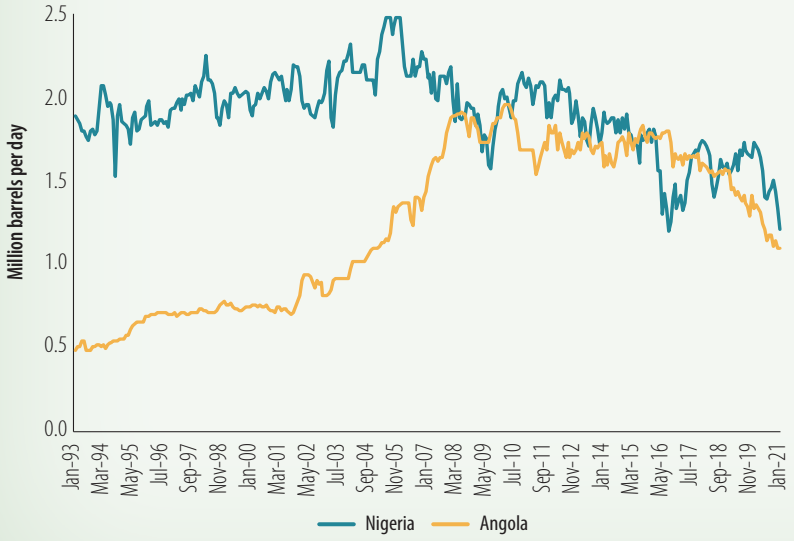
FIGURE 1.20: South Africa: Real GDP Growth (%, year-on-year)



Source: Statistics South Africa.

In South Africa, following a sharp contraction in 2020Q2, activity rebounded strongly in 2020Q3 and continued to expand in 2020Q4.

FIGURE 1.21: Angola and Nigeria: Oil Production (million barrels per day)



Source: U.S. Energy Information Administration.

In Angola, oil production fell significantly in 2020Q4.

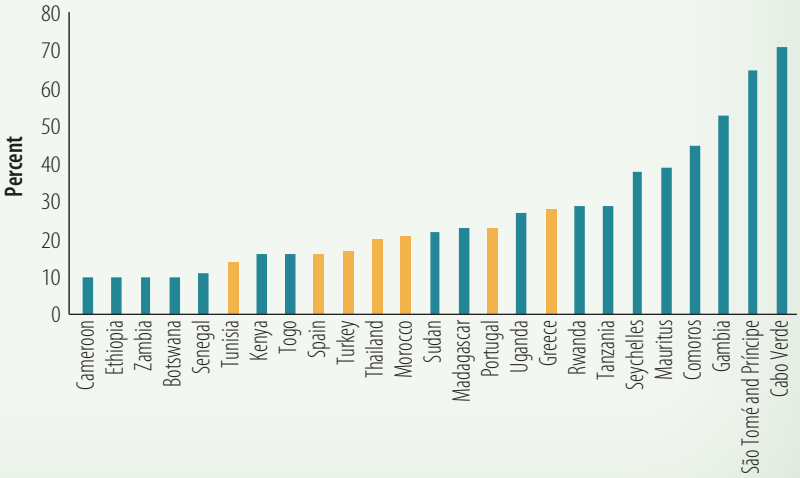
Mining and tourism-based economies in the East and Southern Africa subregion continued to suffer from output contraction in the second half of 2020.

FIGURE 1.22: Annual Quarterly GDP Growth in East and Southern Africa, 2020Q2–2020Q3 (%, year-on-year)

Sources: Trading Economics; Statistics South Africa.

Tourism accounts for a significant share of exports in many countries in Sub-Saharan Africa, especially in the East and Southern Africa subregion.

FIGURE 1.23: Tourism as a Share of Exports, 2019 (%)



Source: United Nations World Tourism Organization.
Note: Latest year available.

Elsewhere, Southern Africa's tourism (Botswana, Mauritius, Namibia, and the Seychelles) and mining (Botswana, Mozambique, Namibia, and Zambia) dependent economies continued to experience output contractions in the second half of 2020 (figure 1.22). Mauritius and the Seychelles were hit particularly hard by the pandemic due to their strong dependence on tourism (figure 1.23). Their economies shrank by 12.5 and 18.5 percent year-on-year, respectively, in 2020Q3 and remained sluggish in 2020Q4. In Botswana and Namibia, continued muted diamond demand held back the recovery in the mining sector. Mozambique's economy, which is driven by coal and aluminum, contracted further in 2020Q4, as the country struggled with terrorist attacks and the pandemic continued to weigh on the service and mining sectors.

In Zambia, the recession deepened in 2020Q3 as a debt crisis exacerbated the impact of the COVID-19 pandemic on the economy. Among non-resource-intensive countries, substantially lower exports in the second half of 2020 pushed growth down in Malawi. In Madagascar, the disruption of tourism, along with reduced exports, saw the economy contract by more than 4 percent in 2020.

Among East African Community (EAC) countries—Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda—economic activity contracted less. Kenya suffered its first recession in nearly two decades, but the output contraction eased substantially in 2020Q3, helped by strong agricultural growth. Similarly, Rwanda experienced its first recession in a decade, but the contraction slowed significantly in 2020Q4, supported in part by a rebound in manufacturing.

In Tanzania, where COVID-19 restrictions have been removed, activity continued to expand, driven by construction and agriculture. Among non-EAC countries, the economic impact of the pandemic was felt late in fiscal year 2019/20 (FY2019/20) in Ethiopia, resulting in relatively robust growth of 6.1 percent, but the adverse effects of the pandemic intensified in FY2020/21.

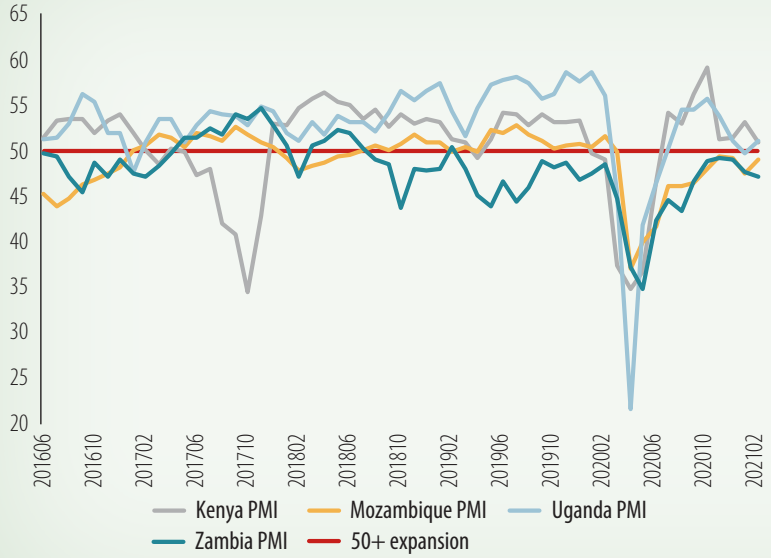
The resurgence of the pandemic and associated containment measures since late 2020 to curb the second wave of COVID-19 infections weighed on regional activity in the first quarter of 2021.

In response to the resurgence of COVID-19, countries in the region tightened restrictions to contain the spread of its new variant, but with varying degrees of stringency, as they sought to avoid the economic fallout of the first half of 2020. In South Africa, the country hardest hit by the pandemic in the region, the government tightened containment measures at the end of December, moving the country from lockdown level one to level three (of five levels). Measures included the reimposition of a ban on alcohol sales, extension of the nighttime curfew, and a ban on most public gatherings. In Mozambique, tighter restrictions that were reimposed in January were extended to end-February. In Rwanda, the government introduced a strict, 14-day lockdown in mid-January,[11] and in Botswana, a curfew was extended to end-March.

The containment measures necessitated by the second wave of COVID-19 infections disrupted activity in the region at the start of the year. In South Africa, the move to lockdown level three implied a shutdown of about 20 percent of the economy. High-frequency data indicated a drop in visits to retail outlets and workplaces, and in transport use, as well as a slowdown in industrial activity in January. Following a 1.2 percent year-on-year contraction in December, retail sales fell by 3.4 percent in January. And, after a 1.9 percent expansion year-on-year in December, manufacturing production contracted by 3.4 percent in January. In the mining sector, output fell more sharply, contracting by 6.2 percent year-on-year in January after a 1.8 percent drop in December.

The latest Purchasing Managers' Index (PMI) survey data pointed to subdued private sector business conditions in several countries at the start of 2021 (figure 1.24). In South Africa,

FIGURE 1.24: Purchasing Managers' Index Readings in East and Southern Africa



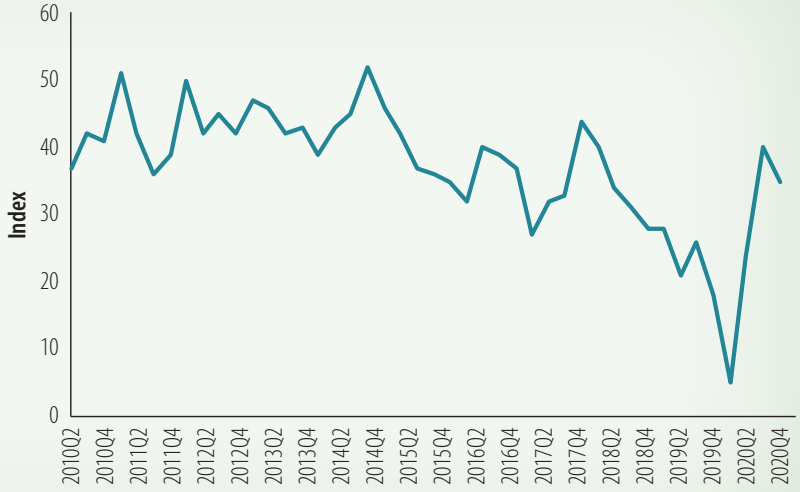
Source: Haver Analytics.

PMI survey data pointed to subdued private sector activity at the start of 2021 in several countries in the East and Southern Africa subregion.

11 Restriction measures in Rwanda in 2021 have included the following: travel restrictions between Kigali and other provinces and between districts were effective from January 5 to March 15. As of now, travel remains restricted in three districts. A strict lockdown, initially 15 days, was introduced in Kigali-city from January 18, and was extended to February 7. Curfew remains into force, with some extension.

In South Africa, business confidence fell in 2021Q1.

FIGURE 1.25: South Africa: Business Confidence Index, 2021Q1



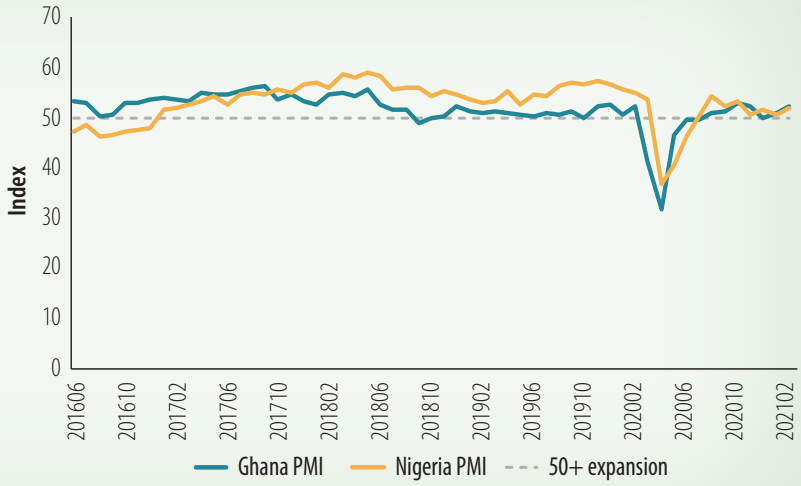
Source: Bureau for Economic Research South Africa.

the PMI data indicated a slowdown in the pace of recovery in business conditions in February. The headline index fell back to 50.2, down from 50.8 in January. Weaker-than-anticipated consumer spending continued to weigh on the economy in February and was a major contributor to the decline in business confidence in 2021Q1 (figure 1.25). In Zambia, the decline in business conditions in the private sector intensified in February as the pandemic hampered operations along with currency weaknesses. In Kenya, the PMI dropped to 50.9 in February, from 53.2 in January, pointing to a slowdown in the rate of expansion of business activity.

In Mozambique, businesses continued to face challenges in 2021Q1, including soft client demand, currency weakness, and border closures. However, at 49.1 in February, the PMI was up from 47.5 in January, signaling a modest deterioration in the health of the private sector economy. In Uganda, the PMI moved back above the 50.0 no-change mark in February, recording 51.2, up from 49.8 in January. However, the latest reading was below the series average of 52.9. In Ghana, the PMI rose from 51.2 in January to 52.5 in February, pointing to a solid improvement in business conditions. And in Nigeria, private sector activity showed signs of a rebound. After falling to 50.7 in January, the PMI rose to 52.0 in February (figure 1.26).

PMI data at the start of 2021 indicated improvements in business conditions in Ghana and Nigeria.

FIGURE 1.26: Purchasing Managers' Index Readings: Ghana and Nigeria



Source: Haver Analytics.

Owing to the slow pace of vaccine rollouts, the domestic economic disruption due to COVID-19 restrictions is likely to persist across the region.

Some countries in the region appear to have passed their second wave peaks. In South Africa, which accounts for the largest number of COVID-19 infection cases in the region, daily new cases have decreased sharply, from a second wave peak of more than 21,000 in January to nearly 1,500 on March 19, 2021. The fall in new cases and fatalities allowed the governments that had imposed tight restrictions to curb the second wave to gradually relax them. On March 1, South Africa moved back to lockdown level one from lockdown level three. While the gradual lifting of restrictions is likely to help support economic activity, the strength of the recovery will depend on progress in vaccine deployment.

The vaccine rollout in the region has been characterized by a slow and delayed distribution process. Most countries in the region rely on vaccine deliveries via the COVAX facility, and several countries received COVAX shipments in February-March. Vaccination began in South Africa in February 2021 and is expected to start in March in several other countries, including Angola, Côte d'Ivoire, Ghana, Kenya, Nigeria, Rwanda, and Uganda. As vaccine rollout is slowly beginning in the region, a return to normality in 2021 seems unlikely for most countries. The COVAX facility is expected to help provide vaccination coverage for up to 20 percent of the population. Issues around the availability, cost, and distribution of vaccines, particularly where cold storage is required, suggest that full national rollouts are likely to take several years, which will delay the lifting of COVID-19 restrictions, with varying economic implications for countries. Box 1.1 presents the estimated benefits and costs of acquiring vaccines to inoculate the population in Sub-Saharan Africa.

BOX 1.1: Potential Benefits of Acquiring COVID-19 Vaccines in Africa

A fast vaccine rollout holds the key to removing containment measures and supporting economic activity. In this context, what are the costs vis-à-vis the benefits of acquiring vaccines to immunize people? Does the speed of distributing vaccines matter? Recent research examines the potential economic benefits of inoculating different proportions of the population across African countries over a 12-month period against a "no vaccination" scenario (Ahuja et al. 2021).[a] The evidence shows that the benefits exceed the costs for nearly all Sub-Saharan African countries across all scenarios—say, inoculating 20, 40, and 60 percent of the population (see table B1.1.1).

Vaccine purchases to immunize 20 percent of the population (at COVAX prices) would have a benefit-cost ratio of at least 6 for all Sub-Saharan African countries—except Burundi (2.1) and Guinea (4.6). For the entire region, benefits under the 20 percent scenario amount to US$89.3 billion, while the costs are estimated at US$2.2 billion—a benefit-cost ratio of 40. Some of the larger countries in the region that are eligible for COVAX stand to benefit the most under this scenario—for instance, Nigeria, Angola, Kenya, and Ghana's benefit-cost ratios exceed 50.

BOX 1.1
Continued

Under the 60 percent of the population scenario, the benefit-cost ratio of moving to "herd immunity" is more than 7 in Sub-Saharan Africa.[b] The estimates suggest that the benefits will not exceed the costs in Burundi and Guinea; however, most countries have significantly large benefit-cost ratios—except 10 countries with ratios lower than 3.

TABLE B1.1.1: Benefit-Cost Ratio of Purchasing Vaccines across Sub-Saharan African Countries, by Scenario

East Africa 20%: 32.0 40%: 13.5 60%: 7.1	Angola	Botswana	Burundi	Comoros	Congo, Dem. Rep.	Eswatini	Ethiopia	Kenya	Lesotho	Madagascar	Malawi
20% Population	78.5	71.9	2.1	42.2	16.3	115.7	34.7	52.7	27.7	25.2	8.2
40% Population	20.9	118.9	0.6	11.3	4.4	30.9	9.2	14.1	7.4	6.7	2.2
60% Population	11.1	62.8	0.3	5.9	2.3	16.3	4.9	7.4	3.9	3.6	1.2
	Mauritius	Mozambique	Namibia	Rwanda	Seychelles	South Africa	Sudan	Tanzania	Uganda	Zambia	Zimbabwe
20% Population	130.1	11.8	30.8	34.9	244.4	33.5	17.2	17.6	18.4	43.8	82.4
40% Population	215.1	3.1	50.9	9.3	404.1	55.5	4.6	4.7	4.9	11.7	22.0
60% Population	113.5	1.7	26.8	4.9	213.3	29.3	2.4	2.5	2.6	6.2	11.6
West Africa 20%: 54.1 40%: 14.9 60%: 7.9	Benin	Burkina Faso	Cabo Verde	Cameroon	Chad	Congo, Rep.	Côte d'Ivoire	Equatorial Guinea	Gabon	The Gambia	Ghana
20% Population	30.5	34.7	255.4	49.9	24.0	158.5	61.5	50.8	34.1	33.1	75.3
40% Population	8.1	9.3	68.1	13.3	6.4	42.3	16.4	83.9	56.4	8.8	20.1
60% Population	4.3	4.9	36.0	7.0	3.4	22.3	8.7	44.3	29.8	4.7	10.6
	Guinea	Guinea-Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra Leone	Togo	**TOTAL SSA**
20% Population	4.6	26.0	12.3	32.4	55.6	13.1	67.2	60.2	18.0	20.6	**40.0**
40% Population	1.2	7.0	3.3	8.7	14.8	3.5	17.9	16.1	4.8	5.5	**14.1**
60% Population	0.6	3.7	1.7	4.6	7.8	1.8	9.5	8.5	2.5	2.9	**7.4**

Source: Ahuja et al. 2021.

Note: The table presents the benefit-cost ratio of purchasing vaccines for 20 percent of the population as well as that of the additional purchases for 40 and 60 percent of the population vaccinated. Countries in the region that are not eligible for COVAX support include Botswana, Equatorial Guinea, Gabon, Mauritius, Namibia, the Seychelles, and South Africa.

The speed at which the population is inoculated plays an important role in the estimation of the benefits of vaccination. Accessing a vaccine just three months earlier could lead to gains of nearly $41 billion on the African continent (Ahuja et al. 2021). Waiting for higher-efficacy vaccines to become available rather than using lower-efficacy vaccines sooner is not cost-effective, due to the high monthly economic costs of the pandemic (around $13.8 billion in gross domestic product losses).

Multilateral organizations can play a crucial role in helping African countries purchase vaccines during this critical period. By the end of January 2021, the World Bank committed US$12 billion in new funding for developing countries to finance the purchase and distribution of COVID-19 vaccines, tests, and treatment for their citizens. This financing program will include technical support to recipient countries to prepare for deploying vaccines at scale. Similarly, the international community can bring technical competence and experience from other countries to support the rollout of vaccination programs across countries in the region.

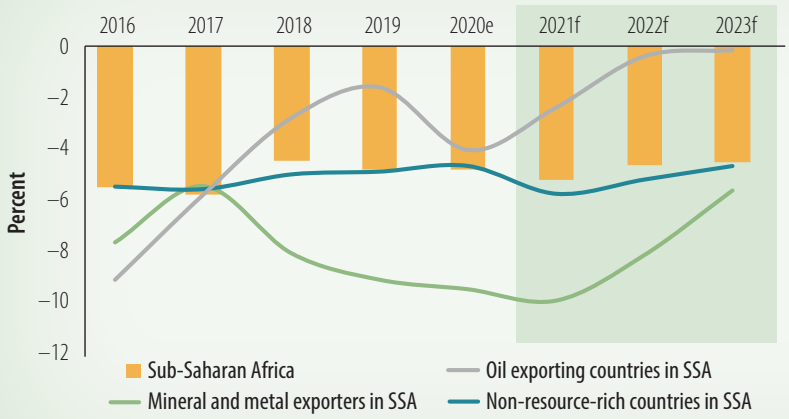
a. The full cost of a typical two-dose vaccine course is assumed to be US$15 (US$3 per dose and US$9 for delivery). In the case of COVAX-eligible countries, the scenario of inoculating 20 percent of the population assumes a zero cost of purchasing vaccines but includes a cost of US$4.5 per vaccine dose for delivering them to the people's arms.

b. Given the age distribution of the Sub-Saharan African population, vaccinating 60 percent of the population (the threshold to assume herd immunity) implies vaccinating nearly all adults in the region.

On key macroeconomic balances, current account deficits are expected to remain elevated in the region this year as import costs rise on the back of higher oil prices.

The median current account deficit is projected to rise from an estimated 4.8 percent of GDP in 2020 to 5.2 percent of GDP in 2021 before narrowing in 2022. Gains among oil exporters will be offset by larger current account deficits among metals exporters and non-resource-intensive countries (figure 1.27). Higher oil prices, owing to rising global demand, are expected to help alleviate the strains on the balance payments of the region's oil exporters as their current account balances improve after falling in 2020. Current account deficits in Nigeria and several CEMAC countries are expected to narrow in 2021. Angola's current account surplus would rise. However, some oil exporters, including Chad and South Sudan, are expected to continue to face high current account deficits in 2021 as oil production remains low due to maturing oil fields.

FIGURE 1.27: Sub-Saharan Africa: Current Account Balance (% of GDP)



Source: World Bank staff projections.

Improvements in the current account balances of oil exporters are expected to be offset by large current account deficits among metals exporters and non-resource-intensive countries as import costs rise due to higher oil prices.

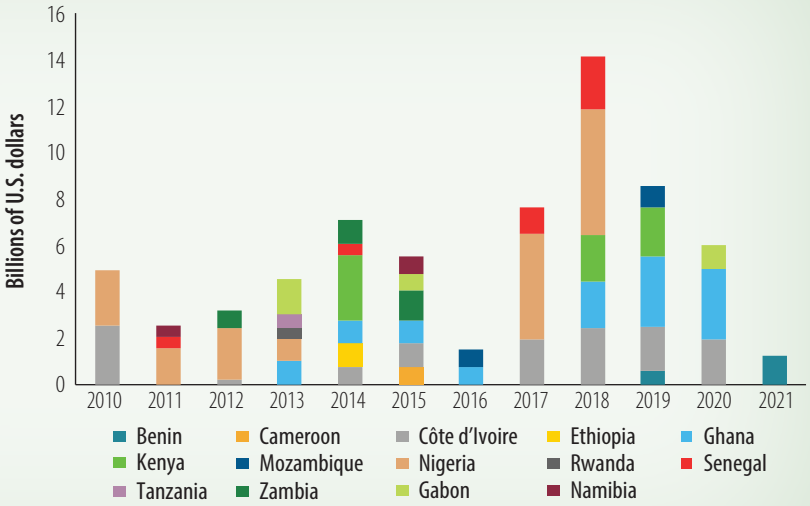
In contrast, metals exporters and non-resource-intensive countries are expected to see their current account deficits widen in 2021, owing to rising import costs on the back of higher oil prices. For metals exporters, the median current account deficit is projected to widen to 10.0 percent of GDP in 2021, up from an estimated 9.5 percent of GDP in 2020, mostly driven by higher deficits in countries in the West and Central Africa subregion, including Guinea, Liberia, Mauritania, Sierra Leone, and Niger, following the resumption of import-intensive mining projects. Among non-resource-intensive countries, the median current account deficit is projected to increase to 5.8 percent of GDP in 2021, from 4.7 percent of GDP in 2020, as capital goods imports to support infrastructure development projects rise, particularly among WAEMU countries, and as export receipts remain subdued, especially among tourism-based economies in Southern Africa.

Improvements in financing conditions have alleviated pressures on domestic currencies.

The current account deficits are expected to be financed by multilateral borrowing, foreign direct investment, and portfolio flows. Support from international financial institutions, including the World Bank Group, is expected to continue this year, helping to bridge the financing gap for many countries. Foreign direct investment is expected to return, albeit at a moderate pace, in line with the global rebound. Following a shift in market sentiment in the second half of 2020, Sub-Saharan Africa's sovereigns have regained access to international bond markets. Since 2020Q4, two

Following a shift in market sentiment, Sub-Saharan Africa's sovereigns regained access to the international bond market in 2020Q3, with Eurobond issuances by Côte d'Ivoire and Benin. However, Eurobond issuance in the region may remain lower than in previous years.

FIGURE 1.28: Sub-Saharan Africa: Eurobond Issuance (US$, billions)

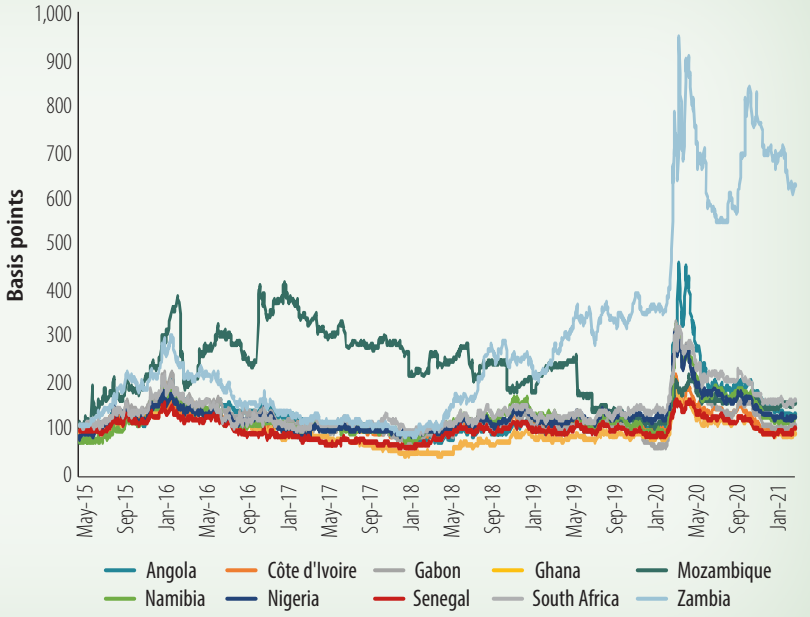


Source: Bloomberg.
Note: Data is as of February, 2021.

countries in the region—Benin and Côte d'Ivoire—have tapped the Eurobond market (figure 1.28). Côte d'Ivoire's issuance of a 12-year €1 billion Eurobond with a 5 percent yield on November 25 was the first in Sub-Saharan Africa since the intensification of the pandemic. Benin followed, issuing a €1 billion bond on January 12, 2021. For this operation, the Government of Benin first issued €700 million at an interest rate of 4.8 percent with a maturity of 11 years. The remaining €300 million was issued with an interest rate of 6.8 percent and a maturity of 31 years. In February 2021, Côte d'Ivoire raised €850 million in a reopened Eurobond sale, consisting of €600 million at an interest rate of 4.3 percent with a maturity of 11 years and €250 million at an interest rate of 5.75 percent with a maturity of 27 years.

Accommodative monetary policy in advanced economies helped ease the cost of borrowing on international capital markets, with bond spreads narrowing in many countries in the region in 2020Q4.

FIGURE 1.29: Sovereign Bond Spread (basis points)

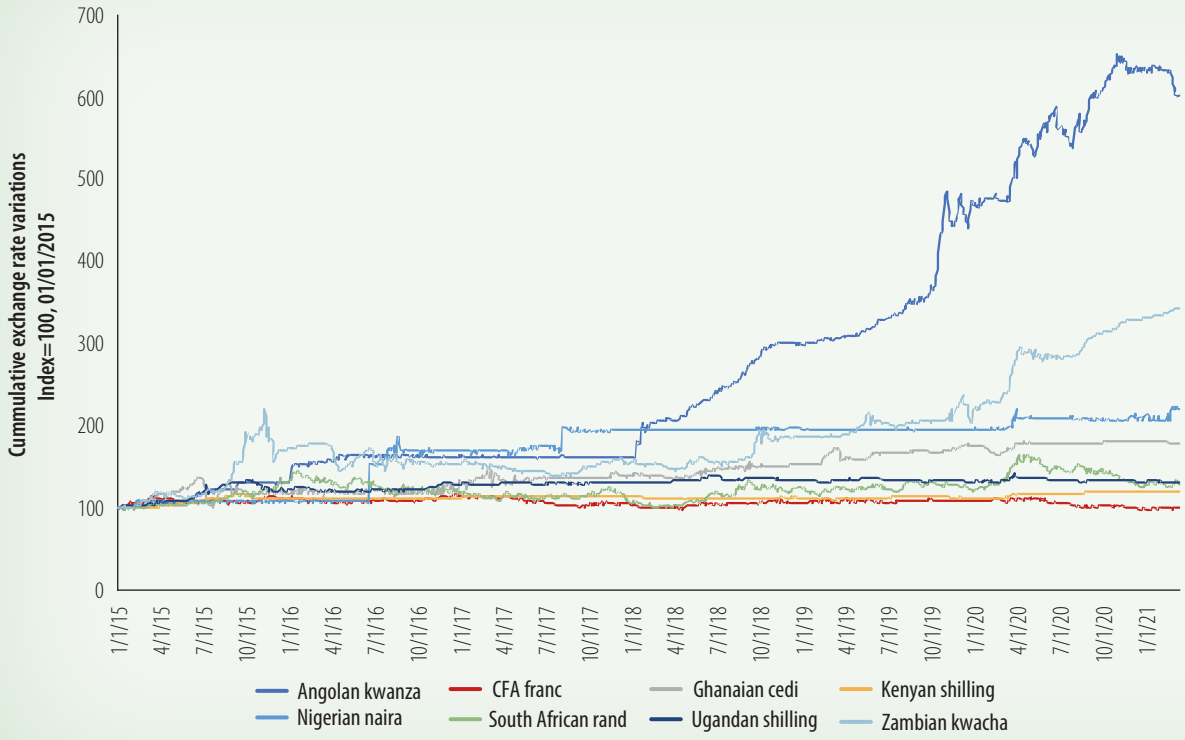


Source: Bloomberg.

Other sovereigns, including Nigeria, Ghana, and Kenya, may follow Côte d'Ivoire and Benin in issuing Eurobonds in 2021, as market conditions have eased. The global search for yield, triggered by the massive monetary easing in advanced economies, has helped bring down the cost of debt. Bond spreads narrowed significantly in many countries in 2020Q4 (figure 1.29). Côte d'Ivoire's Eurobond was priced at a record low yield of 5 percent and was still five times

oversubscribed. Continuing support from international financial institutions and improved access to international capital markets helped alleviate pressures on domestic currencies in the region, with the exception of Zambia, where the exchange rate has continued to depreciate against the U.S. dollar on concern about the country's debt servicing cost (figure 1.30). However, the recent increase in long-term interest rates on U.S. government bonds to their level prior to the pandemic has triggered a round of repricing across financial markets and caused a reversal of capital flows and higher currency volatility in EMDEs. Eurobond issuance in the region may remain lower than in previous years, in part due to enhanced official creditor financing.

FIGURE 1.30: Exchange Rate against the U.S. Dollar



Improved financing conditions and rising commodity prices helped ease pressure on domestic currencies.

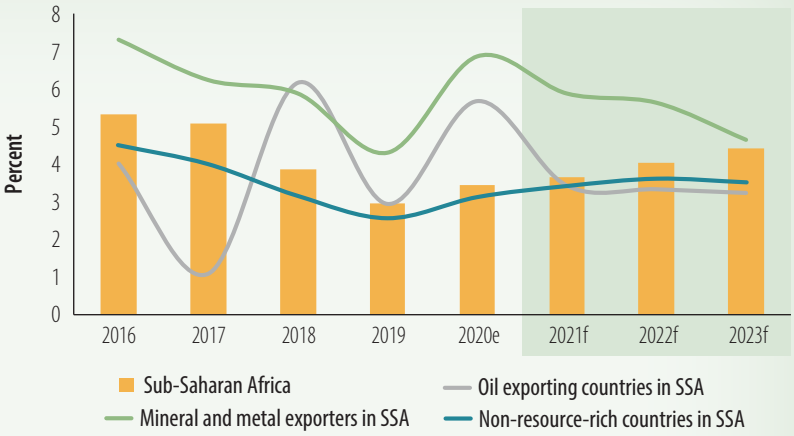
Source: Bloomberg.

Inflation is expected to edge up but remain low in most countries in the region.

The region's median inflation rate is projected to rise moderately to 3.7 percent in 2021, from an estimated 3.5 percent in 2020 (figure 1.31), in part due to high food prices and currency depreciation in some countries. Disruption to food supply chains has pushed food prices higher (figure 1.32), and fuel prices have rebounded, adding to inflationary pressures. However, the median figure masks considerable differences between countries across the region. Among oil exporters, the median inflation rate is expected to ease to 3.5 percent in 2021, from an estimated 5.8 percent in 2020, reflecting weak domestic demand. Nonetheless, inflation pressures are expected to remain particularly high in Angola and Nigeria—the region's two largest oil exporters. In Angola, after rising to 25.1 percent year-on-year in December, the inflation rate

Inflation will remain relatively low in the region, but it will edge higher and remain elevated in some countries due to higher food prices and currency depreciation.

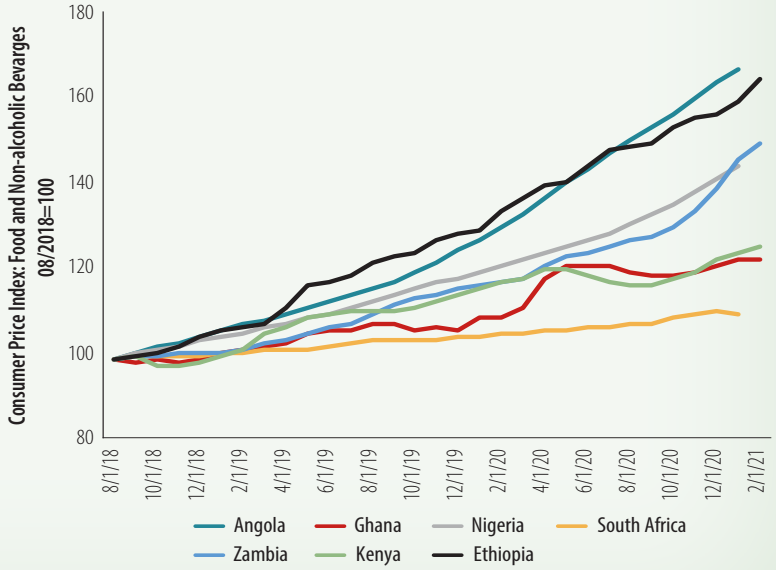
FIGURE 1.31: Sub-Saharan Africa: Inflation Rate (%)



Source: World Bank staff projections.

Disruptions to the food supply caused by the pandemic and security problems are driving food prices higher in some countries, along with rising import costs due to currency depreciation.

FIGURE 1.32: Food and Non-Alcoholic Beverages Price Index, Selected Countries in Sub-Saharan Africa



Source: Haver Analytics.

eased to 24.4 percent in January 2021, before edging up to 24.8 percent in February, probably reflecting a reduced pace of currency depreciation as higher oil prices helped ease pressures on the balance of payments. In Nigeria, after rising throughout 2020, inflation accelerated from 15.7 percent year-on-year in December to 17.3 percent in February 2021—its highest level since April 2017. The surge in food prices persisted as the pandemic and security problems continued to disrupt the food supply chain, while currency weaknesses and foreign exchange restrictions added upward pressures on imported food prices. The continued rise in food prices was compounded by an increase in transportation inflation as fuel prices rose following the reduction in fuel subsidies.

For metals exporters, the median inflation rate is projected to slow from an estimated 7.0 percent in 2020 to 6.0 percent in 2021. Inflation is expected to remain elevated in several metals exporters, including Zambia, Sierra Leone, and the Democratic Republic of Congo. In Zambia, inflation increased from 21.5 percent year-on-year in January to 22.1 percent in February, driven by higher food prices and as continued currency depreciation raised the cost of imports. In South Africa, after easing to 3.3 percent in 2020, inflation is projected at 4.3 percent in 2021, below the midpoint of the central bank's inflation target range of 3-6 percent. In non-resource-rich countries, the median inflation rate is projected to rise to 3.5 percent in 2021, from 3.2 percent in 2020. A stable peg with the euro will continue to keep inflation low among WAEMU and CEMAC countries. In contrast, inflation is expected to remain high in Ethiopia, Sudan, and Zimbabwe. In Ethiopia, inflation reached 20.6 percent year-on-year in February, up from 19.6

percent in January, due to high and rising food prices, amid mounting COVID-19 infection rates, political instability, and locust infestation in some parts of the country. Across the region, inflation could be higher than expected if domestic currencies depreciate further due to rising yields in the United States. Higher oil prices could raise inflation in net oil importers, such as Kenya, relative to oil exporters.

A few central banks hiked interest rates at the start of the year to contain inflation pressures.

Many countries in the region cut interest rates during 2020 in response to the threat to economic activity from COVID-19. To date, the monetary policy stance has remained unchanged in these countries, as inflation has stayed relatively low and stable in most cases. However, some countries—Mozambique, Zambia, and Zimbabwe—tightened monetary policy at the start of the year to contain rising inflationary pressures from continued exchange rate depreciation and anchor inflation expectations. In January, Mozambique's central bank raised its key policy rate by 300 basis points to 13.25 percent. In February, the Bank of Zambia raised its policy rate by 50 basis points to 8.5 percent, and the Reserve Bank of Zimbabwe raised its policy rate by 500 basis points to 40 percent. Meanwhile, monetary policy in advanced economies is expected to remain highly accommodative in 2021, despite large-scale fiscal stimulus and an expected economic recovery later this year. Against a backdrop of recovering global demand and ample liquidity, the region's currencies may stabilize or strengthen this year.

The COVID-19 pandemic is expected to continue to pose a severe challenge to public finances in countries across the region.

The fall in revenue due to the output contraction, along with emergency spending, pushed fiscal deficits and government debts in Sub-Saharan Africa to their highest levels since the global financial crisis. The median overall fiscal deficit is estimated to have risen by 3.0 percentage points to 5.4 percent of GDP, and the median public debt increased by 6.5 percentage points to 63.2 percent of GDP at end-2020. Average revenues fell across the region, while expenditures rose, as governments provided additional fiscal support for health services, financial help to companies, and social assistance to vulnerable households.

The East and Southern Africa subregion recorded the largest increases in deficits and debt in 2020. The average overall fiscal deficit in East and Southern Africa is estimated to have increased by nearly 4 percentage points, from 4.8 percent of GDP in 2019 to 8.3 percent in 2020, and the average government debt is estimated to have reached about 74 percent of GDP, up from 64.6 percent of GDP in 2019. These results reflected a deterioration of public finances stemming mainly from large revenue losses caused by lower economic activity along with currency depreciation among Southern African countries, including Angola, South Africa, Mozambique, and the Seychelles.

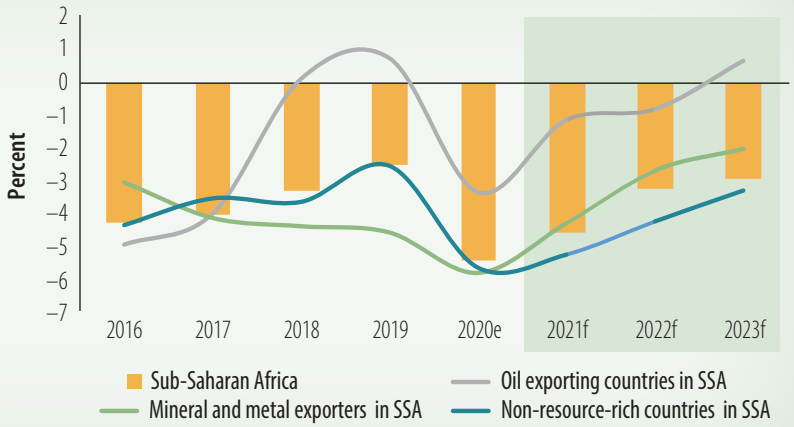
In West and Central Africa, the average overall fiscal deficit is estimated to have increased from 3.9 percent of GDP in 2019 to 6.3 percent in 2020, and the average government debt is estimated to have risen by 7 percentage points to 41.7 percent of GDP at end-2020. Oil exporters experienced a significant deterioration in their fiscal positions. The average fiscal deficit for oil exporters, excluding Nigeria, is estimated to have increased by nearly 4 percentage points to 7

percent of GDP in 2020, while the average government debt is estimated to have risen from 52.2 percent of GDP in 2019 to 58.7 percent of GDP in 2020. The large fiscal deficits reflect a deterioration of fiscal balances among the CEMAC oil-producing countries as low oil prices and falling output volumes led to a sharp decline in government revenues.

In 2021, the median fiscal deficit in the region is projected to fall by a percentage point to 4.5 percent of GDP (figure 1.33). As economies recover, revenue collection is projected to rise, while pandemic-related expenditures are projected to decline. Fiscal deficits are expected to fall significantly among oil and metals exporters, as higher commodity prices help boost government revenue; but they are expected to decline more slowly among non-resource-intensive countries. However, improvements in the fiscal balance will vary between countries.

In 2021, the median fiscal deficit is projected to narrow as economies recover, especially among oil and metals exporters as rising commodity prices help boost government revenues.

FIGURE 1.33: Sub-Saharan Africa: Fiscal Balance (% of GDP)



Source: World Bank staff projections.

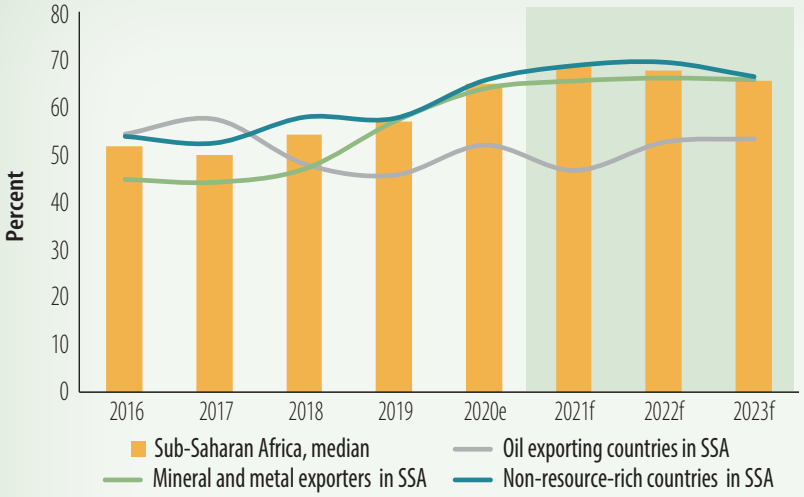
Among oil exporters, the fiscal deficit is expected to remain elevated and widen in some countries, as revenue-to-GDP ratios only partially recover, while spending and debt service costs are rising. Among metals exporters, the fiscal deficit is projected to ease moderately in Zambia to 8.1 percent of GDP in 2021, from an estimated 10.1 percent of GDP in 2020, as weak economic recovery weighs on domestic revenue. In South Africa, the medium-term budget policy statement envisages a deeper fiscal consolidation based on wage restraint. The fiscal deficit is projected to narrow to 9.6 percent of GDP in 2021, from an estimated 14.0 percent of GDP in 2020. Still, South Africa's budget deficit will remain large, and public debt will continue to rise, albeit at a slower pace. Among non-resource-intensive countries, the fiscal deficit widened sharply in Ghana in 2020 and is expected to remain large in 2021. The fiscal deficit is projected to narrow to 12.1 percent of GDP in 2021, down from 16.1 percent of GDP in 2020, as revenue gradually rebounds. The fiscal deficit is also expected to remain elevated in the Seychelles and widen in Lesotho, Malawi, and Uganda, as the disruption to economic activity caused by the pandemic continues to hit revenue collection.

Debt vulnerabilities are high and rising in many countries in the region. The median debt level is projected to peak in 2021, at 69 percent of GDP, up from an estimated 65 percent of GDP in 2020 (figure 1.34). Debt service relative to tax revenues is projected to exceed 20 percent in some countries, including Ghana, Kenya, Nigeria, and Zambia. Debt levels are expected to remain on an upward trajectory in several countries, including Nigeria, Burkina Faso, Burundi, Ghana, Madagascar, Malawi, Rwanda, and Uganda. In 2020, 53 percent of the region's low-income countries were assessed to be "at high risk" of or in external debt distress, according to

the International Monetary Fund (IMF)–World Bank Debt Sustainability Assessments; in early 2021, this percentage had risen to 55 percent (figure 1.35).

Financing large deficits remains challenging for most countries in the region, especially for low-income countries, due to limited market access and constrained ability to increase revenues in the near term. Grants, concessional loans, and debt relief were provided in 2020 to help address the rise in public debt of low-income countries, including the countries assessed to be at high risk of or in external debt distress in the region. Fiscal adjustments in some countries and debt restructuring in others are expected to contribute to debt reduction. As of end-December 2020, 30 countries, or more than 80 percent of eligible countries in the region, had formally requested to join or extend the Debt Service Suspension Initiative.

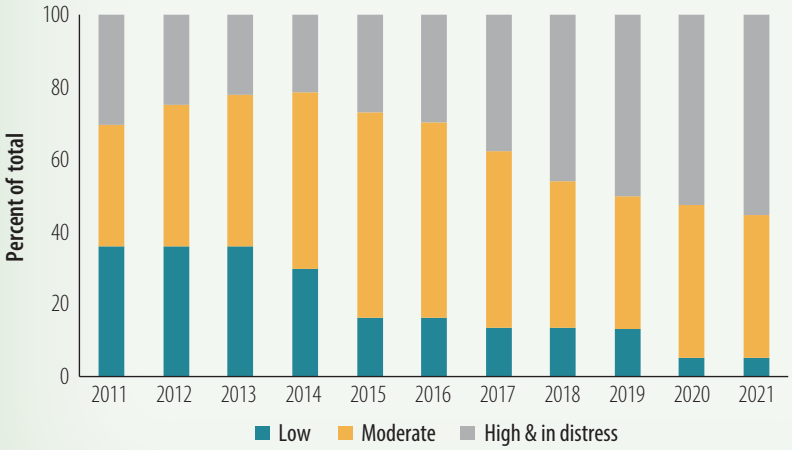
FIGURE 1.34: Sub-Saharan Africa: Government Debt (% of GDP)



Source: World Bank staff projections.

The median government debt level is projected to peak in 2021, with debt levels remaining on an upward trajectory in several countries.

FIGURE 1.35: Sub-Saharan Africa: Countries at Risk of External Debt Distress (% of total)



Source: World Bank/International Monetary Fund low-income countries database.

Note: Covers board-approved disclosed and un-disclosed risk rating of Sub-Saharan African countries. At Feburary-2021, 38 Sub-Saharan African countries included.

Debt vulnerabilities are high and rising in many countries in the region.

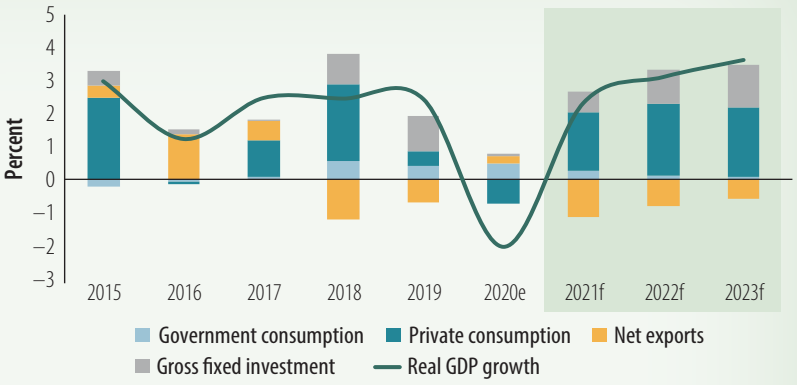
1.4 OUTLOOK

The region's growth prospects are gradually improving with some variation across countries.

After an estimated 2.0 percent contraction in 2020, real GDP in Sub-Saharan Africa is projected to rebound to growth of 2.3 percent in 2021 and 3.1 percent in 2022. The 2021 growth forecast is revised up 0.2 percentage point relative to the October 2020 *Africa's Pulse* projection. Higher commodity prices due to rising global demand for commodities, along with continued agriculture sector growth, will help support a rebound in private consumption (figure 1.36) and industry and services (figure 1.37). However, the resurgence of the COVID-19 pandemic, fueled by highly transmissible variants, and delayed access to vaccines would temper the recovery.

Growth in Sub-Saharan Africa is projected to rebound to 2.3 percent in 2021, supported on the production side by a rebound in services and industry as global demand gradually improves.

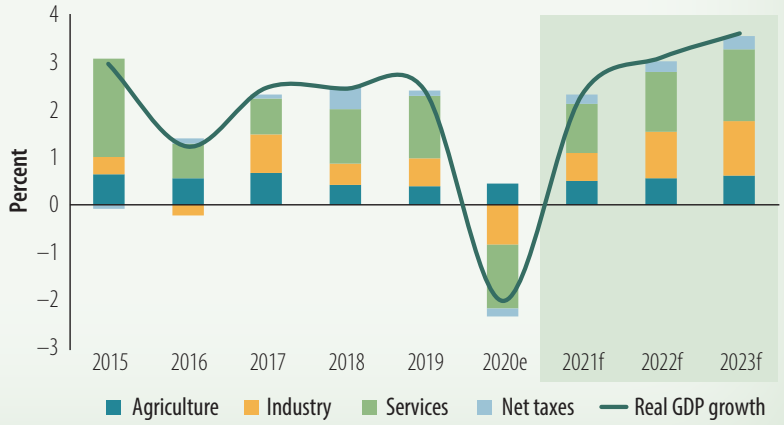
FIGURE 1.36: Sub-Saharan Africa: GDP Growth Forecast, Demand Side



Source: World Bank staff projections.
Note: Change in inventories and statistical discrepancy are not displayed.

The rebound of growth in the region in 2021 is expected to be supported on the demand side by a rebound in private consumption, reflecting the relaxation of COVID-19 restrictions in some countries.

FIGURE 1.37: Sub-Saharan Africa: GDP Growth Forecast, Supply Side



Source: World Bank staff projections.

While governments in the region are not expected to reimpose stringent lockdown and containment measures like those in the first half of 2020, the likelihood of restrictions to stem the resurgence of COVID-19 infections before vaccines become widely available is likely to weigh on private consumption and business investment spending. The outlook is predicated on the assumption that vaccine coverage would not be sufficient to enable a significant reduction in the domestic economic disruption due to COVID-19 restrictions and self-isolation behaviors in most countries until the second half of 2022. Some countries will be more successful than

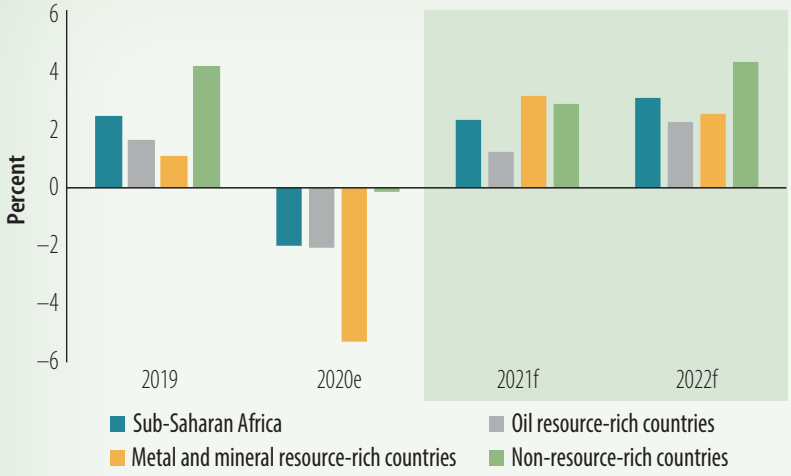
others in accessing vaccines and distributing these to their citizens, but most people in the region are unlikely to be inoculated before 2022, which will delay the removal of COVID-19 restrictions. Growth is expected to rise to 3.1 percent in 2022, broadly unchanged from the October 2020 forecast, as the pace of vaccine deployment accelerates across the region, providing a stronger boost to consumer and business confidence.

The strength of the recovery will vary across countries and subregions.

Heterogeneity in near-term prospects is expected to persist, between countries (figure 1.38) and between the two subregions (figure 1.39). The strength of the projected recovery will vary across countries, depending on whether they experienced a severe health crisis, the extent of disruptions to domestic economic activity, the importance of contact-intensive sectors in the domestic economy, cross-border spillovers, and the effectiveness of policy support.

*West and Central Africa***.** After a 1.1 percent contraction in 2020, real GDP in West and Central Africa is projected to grow 2.1 percent in 2021 and 3.0 percent in 2022 (figure 1.40). The 2021 growth forecast is 0.7 percentage point higher than was projected in the October 2020 *Africa's Pulse*, partly reflecting the positive effects of the global recovery. These average growth figures mask considerable differences in prospects between countries, however. Nigeria's muted growth prospects and slow vaccine rollout will weigh on the subregional

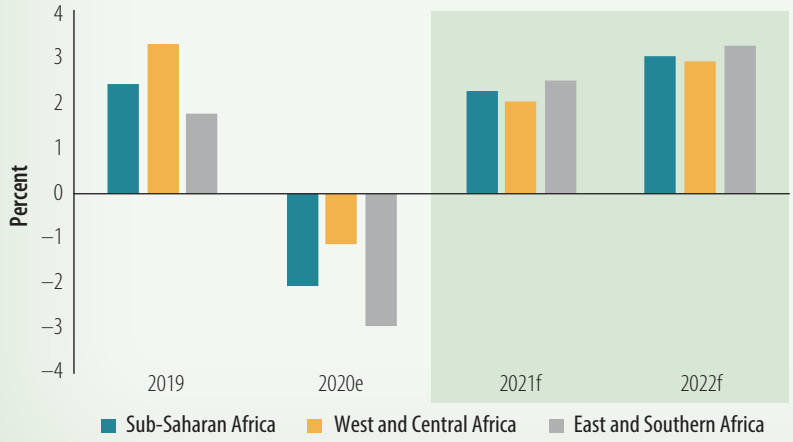
FIGURE 1.38: Sub-Saharan Africa: GDP Growth Forecast, by Country Group



Source: World Bank staff projections.

The strength of the projected recovery will vary between countries (figure 1.38) and between regions (figure 1.39), depending in part on the extent of disruption to economic activity and the effectiveness of policy support.

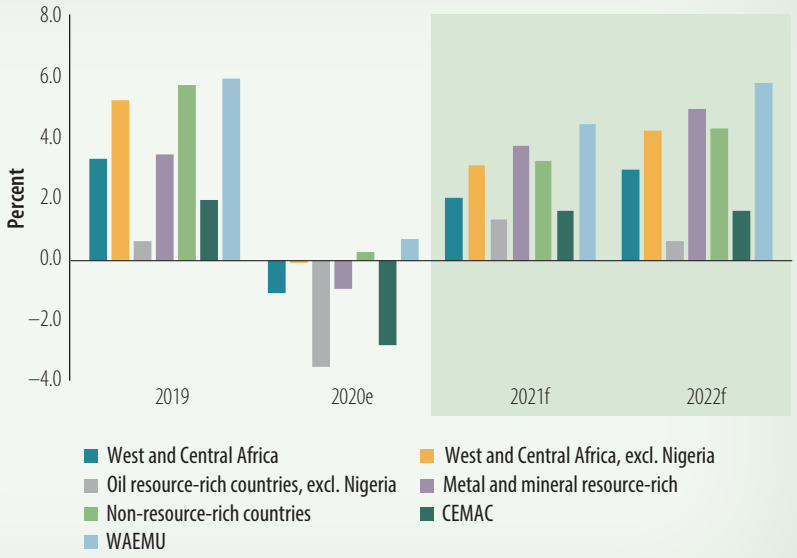
FIGURE 1.39: Sub-Saharan Africa: GDP Growth Forecast, by Subregion



Source: World Bank staff projections.

In the West and Central Africa subregion, the economic rebound will be driven by metals exporters and non-resource-rich countries, led by WAEMU countries.

FIGURE 1.40: Growth Forecasts for West and Central Africa



Source: World Bank staff projections.

outlook. Despite higher oil prices, Nigeria and other oil exporters are expected to face a slower recovery compared with the rest of the subregion, where activity is projected to strengthen.

- Nigeria's real GDP is projected to rebound from a 1.8 percent contraction in 2020 to moderate growth of 1.4 percent in 2021, driven by telecommunications services, trade due to the gradual opening of borders, agriculture due to an additional influx of labor, and construction, in a context of higher oil prices and fewer mobility restrictions. However, consumer spending and business investment are likely to remain subdued in 2021 as double-digit inflation, high unemployment, and the slow rollout of the COVID-19 vaccine weigh on households' real income and business confidence. Limited fiscal space will also constrain the recovery. Growth is projected to pick up to 2.1 percent in 2022 as rising oil output bolsters exports, and the rollout of the COVID-19 vaccine gathers pace, helping to boost private consumption and fixed investment. Progress on the liberalization of the exchange rate regime could boost private sector activity and support stronger economic growth.

- In the rest of the subregion, economic activity is expected to expand at a more robust pace. Excluding Nigeria, growth in the subregion is projected to rebound to 3.1 percent in 2021, following a modest contraction in 2020, and strengthen to 4.3 percent in 2022. Metals exporters and non-resource-rich countries are expected to drive the recovery. After falling by an estimated 0.9 percent in 2020, real GDP growth among metals exporters is forecast to rebound to 3.8 percent in 2021 and strengthen to 5.0 percent in 2022. Mining production is expected to rise across metals exporters, as mines reopen in some countries and production picks up in others, on the back of higher external demand as the global economy strengthens and vaccine coverage expands. Guinea and Niger are expected to experience a solid recovery.

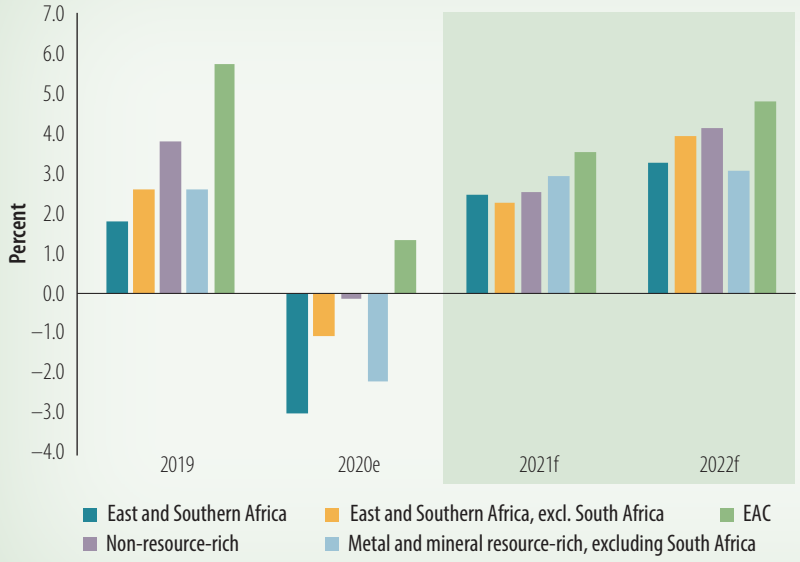
Among non-resource-intensive countries, growth is projected to rise to 3.2 percent in 2021 and 4.3 percent in 2022, reflecting a robust recovery in the WAEMU area, as a rebound in private consumption and private investment following the relaxation of COVID-19 restrictions boosts growth.

- In contrast, the recovery among oil exporters will be slower. Excluding Nigeria, growth among oil exporters is expected to remain sluggish in 2021, projected at 1.3 percent, reflecting a weaker rebound among CEMAC countries. After an estimated contraction of 2.9 percent in 2020, partly due to low demand and OPEC+ cuts, real GDP growth in the CEMAC region is projected to rebound to 1.6 percent in 2021 and remain unchanged in 2022. Continuing low oil production due to maturing oil fields in many countries is expected to hold back the recovery in the CEMAC area.

East and Southern Africa. Following a 3.0 percent contraction in 2020, economic activity in East and Southern Africa is projected to expand by 2.5 percent in 2021 and 3.3 percent in 2022 (figure 1.41). Delayed vaccine rollout and modest growth prospects in South Africa and Angola—East and Southern Africa's two largest economies—owing to persisting structural constraints, will weigh on the subregion's recovery.

- Growth in South Africa is expected to resume in 2021, driven by a rebound in global activity, including higher demand for South Africa's commodity exports. However, restrictions imposed to curb a second wave of COVID-19, fiscal tightening, high unemployment, along with power cuts will prevent a stronger recovery. South Africa's real GDP is expected to rebound from an estimated 7.0 percent contraction in 2020 to growth of 3.0 percent in 2021, slightly up from 2.6 percent in the October forecast. Growth is projected to moderate to 1.9 percent in 2022, as preexisting structural constraints, such as electricity shortages, persist.

FIGURE 1.41: GDP Growth Forecasts for East and Southern Africa



Source: World Bank staff projections.

In the East and Southern Africa subregion, metals exporters excluding South Africa and non-resource-intensive countries are expected to drive the economic rebound. East African Community countries are expected to see solid growth in 2021.

- Angola's recovery remained weak at the start of the year, as oil production continued to fall due to low investment in the sector. Crude oil production fell to 1.13 million barrels per day in January 2021, after reaching a record low of 1.18 million barrels per day in 2020Q4. The recent surge in oil prices is expected to boost export earnings and ease pressures on the balance of payments. Meanwhile, despite a recent slowdown, inflation remains high and will continue to weigh on consumer spending. And the government's heavy debt burden will weigh on business confidence. Against this backdrop, growth is projected to rebound in 2021 but remain subdued at 0.9 percent. In 2022, growth is projected to strengthen to 3.5 percent on expectation of a rebound in oil production and an acceleration in the pace of vaccination.
- Excluding Angola and South Africa, economic activity in the East and Southern Africa subregion is projected to expand by 2.6 percent in 2021 and 4.0 percent in 2022, reflecting a rebound in metals exporters and non-resource-intensive countries, including tourism-dependent economies. However, the rebound will be uneven. The rise in metals prices is expected to reduce balance sheet pressures in metals exporters and underpin their recoveries. Botswana is projected to return to robust growth in 2021, supported by a recovery in diamond demand. However, tourism-dependent economies, such as Mauritius and the Seychelles, are expected to experience a moderate recovery, as international travel gradually picks up. Elsewhere in the subregion, Kenya is projected to see solid growth in 2021, as exports of agricultural products benefit from a pick-up in global demand and the reduced threat from locusts. In contrast, growth in Ethiopia is expected to moderate to 2.3 percent in FY2021, reflecting a slowdown in domestic demand amid heightened political uncertainty.

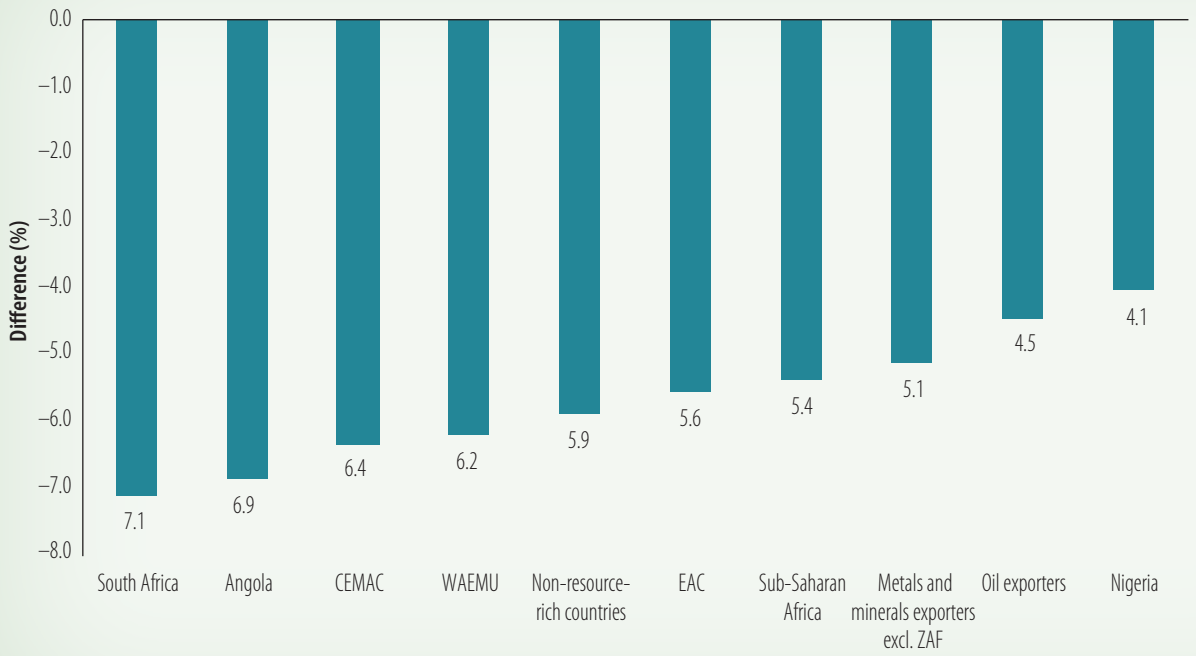
The risks of long-lasting costs from the pandemic remain high.

The modest economic growth projected for the region in 2021 and 2022 indicates that lasting costs from the pandemic, in terms of output loss, are likely to remain high. For most countries, the level of regional GDP is expected to remain well below—more than 5 percent on average—the pre-COVID-19 projections in the October 2019 *Africa's Pulse* at the end of 2021 (figure 1.42).

With the region's population growing annually at 2.7 percent on average, real per capita GDP will remain negative in 2021 before turning positive in 2022. As noted in the October 2020 *Africa's Pulse*, the pandemic will reverse the progress made in poverty reduction in the region over the past two decades. Up to 40 million people are likely to fall below the extreme poverty threshold during 2020–21. In South Africa, the unemployment rate reached 32.5 percent of the population

in 2020. The COVID-19 crisis has severely impacted workers with less education, women, youth, those in contact-intensive sectors, and those informally employed, most of whom have suffered disproportionate livelihood and income losses. Labor market adjustments to the pandemic will vary depending on country-specific circumstances, leading to different degrees of scarring. Economies where contact-intensive industries play a significant role, commodity exporters, and those where school closures or health system disruption (fewer immunizations) have inflicted large setbacks to human capital accumulation are particularly exposed to persistent damages to potential growth.

FIGURE 1.42: Sub-Saharan Africa: GDP in 2021 Relative to October 2019 Projection (% difference)



Source: World Bank staff estimates.

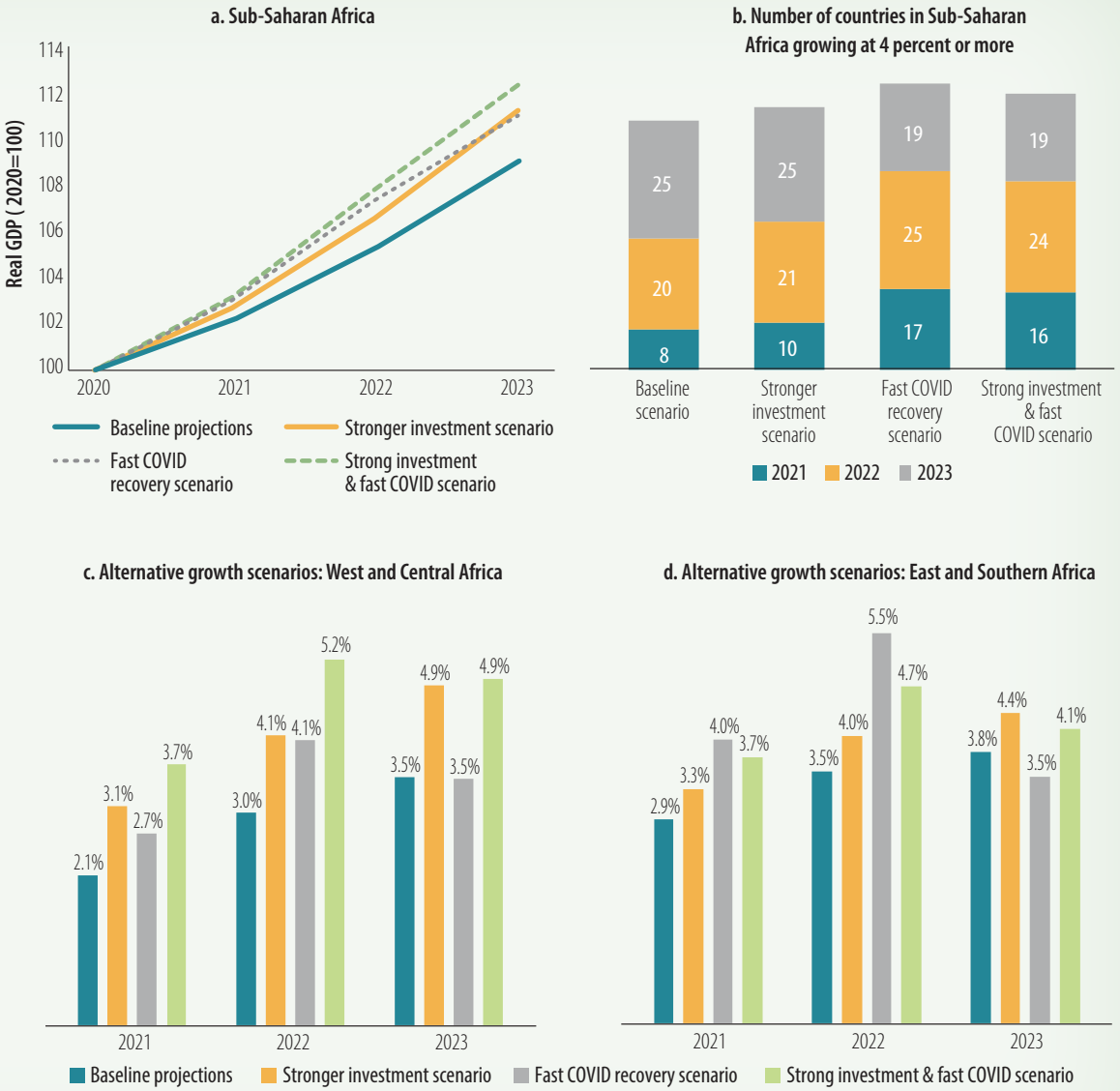
For most countries in the region, the level of activity is forecast to remain well below the pre-COVID-19 projections, indicating that the risk of long-lasting impact from the pandemic remains high.

1.5 ALTERNATIVE GROWTH SCENARIOS

Under which conditions would the recovery in Sub-Saharan Africa be stronger than projected in the baseline? The scenarios set out below illustrate the economic effects that could result from faster vaccine deployment across the region and credible policy reforms to stimulate investment. The analysis contains three scenarios that examine successively the impact of a steady increase in investment over the forecast horizon, a faster relaxation of COVID-19 restrictions, and a combination of these two scenarios. Estimates of the effects of these alternative scenarios on activity in the region are presented in figure 1.43.

Faster progress on vaccine deployment along with credible policies to stimulate private investment would accelerate growth to 3.4 percent in 2021 and 4.5 percent in 2022 in Sub-Saharan Africa. The number of countries with growth exceeding 4 percent in 2021 could more than double, from 8 to 17.

FIGURE 1.43: Alternative Growth Scenarios



Source: World Bank staff projections.

Note: The baseline scenario corresponds to the central forecast of the Macro-Poverty Outlook of April 2021. The alternative scenarios were generated using the World Bank's Macro-Fiscal Model, MFMod. The numbers are generated based on specific assumptions about the inherently uncertain progress of COVID-19 and the policy responses to it. As such, they should be interpreted as illustrative rather than predictive.

Stronger Investment Scenario

This scenario considers the effects on activity of higher investments induced by credible policy reforms. The liberalization of the foreign exchange market that allows the exchange rate to reflect market forces would enhance the country's competitiveness and encourage private investments. Alleviating the debt burden would release resources for public investment including in areas such as health, education and infrastructure, that would support businesses. Reforms that deliver reliable electricity would power the manufacturing sector and the digital economy. And reforms that address digital infrastructure gaps and make the digital economy more inclusive would improve connectivity and accelerate digital technology adoption. In response to these reforms, investment is assumed to increase annually by 0.5 percentage point of GDP compared to the baseline over the forecasting period.

- 2021: 0.5 percent of baseline GDP increase in investment as compared with baseline scenario.
- 2022: 1.0 percent of baseline GDP increase in investment as compared with baseline scenario.
- 2023: 1.5 percent of baseline GDP increase in investment as compared with baseline scenario.

In this scenario, real GDP growth in the region would be raised by 0.6 and 0.7 percentage points in 2021 and 2022, respectively compared to the baseline, bringing it to 2.9 percent and 3.8 percent on average. Ten countries would post growth of 4 percent or more in 2021. As the reforms raise opportunities and increase economic dynamism, more than half of the countries in the region would grow by more than 4 percent by 2022, well above population growth in some cases. In the West and Central Africa subregion, the investment efforts would raise real GDP by 1.0 and 1.1 percentage points in 2021 and 2022, respectively, compared with the baseline, bringing growth to 3.1 percent in 2021 and 4.1 percent in 2022. In the East and Southern Africa subregion, real GDP would increase by 0.4 and 0.5 percentage points, respectively, compared with the baseline, boosting growth to 3.3 percent in 2021 and 3.5 percent in 2022.

Faster COVID-19 Recovery Scenario

The baseline forecast assumes that vaccine delivery and coverage would enable a significant reduction in domestic economic disruption due to COVID-19 restrictions and self-isolation behaviors beginning in 2022Q3. The more rapid recovery from the economic effects of COVID-19 is predicated on a faster dissemination of vaccines in the Sub-Saharan Africa region than assumed in the baseline forecasts. As a result, the avoidance behavior that has dampened demand for domestic services begins to ease as early as the fourth quarter of 2021—faster than in the baseline scenario. This would boost consumer and business confidence.

- In such a scenario, real GDP growth in the region would be raised by 0.8 and 1.3 percentage points in 2021 and 2022, respectively, compared with the baseline, bringing growth to 3.1 and 4.4 percent, respectively, as spending accelerates. In 2021, 17 countries would grow at 4 percent or more. In 2022, about 60 percent of the countries in the region would experience growth of at least 4 percent.

- In the West and Central Africa subregion, growth would be raised by 0.6 and 1.1 percentage points in 2021 and 2022, respectively, compared with the baseline, bring it to 2.7 percent and 4.1 percent, respectively.
- In the East and Southern Africa subregion, where the pandemic has spread more rapidly, the rebound in activity would be stronger. Following the relaxation of COVID-19 restrictions, growth would be raised by 1.1 and 2.0 percentage points in 2021 and 2022, respectively, compared with the baseline, increasing it to 4.0 percent in 2021 and 5.5 percent in 2022.

Stronger Investment and Faster COVID Recovery Scenario

This scenario combines the assumptions of stronger investment response to credible policy reforms and faster vaccine deployment of the first two scenarios.

- In this scenario, growth in the region would be raised by 1.1 percentage points in 2021 and 1.4 percentage points in 2022, compared with the baseline, increasing it to 3.4 and 4.5 percent, respectively. The pace of the recovery would pick up across the region, with 16 countries in 2021 and 24 countries in 2022 growing by at least 4 percent.
- In the West and Central Africa subregion, growth would be raised by 1.6 percentage points to 3.7 percent in 2021 and by 2.2 percentage points to 5.2 percent in 2022, compared to the baseline.
- In the East and Southern Africa subregion, growth would be raised by 0.8 percentage point to 3.7 percent in 2021 and by 1.2 percentage points to 4.7 percent in 2022, compared to the baseline.

1.6 POLICIES TO SUPPORT A STRONGER RECOVERY

Policies in the region should be geared toward providing effective support until vaccines become widely available.

Policy challenges. Most countries in the region responded swiftly to the pandemic in 2020 with public health measures to prevent infections from spreading. Governments implemented a range of fiscal, monetary, and financial sector policies to cushion the adverse effects of the outbreak on vulnerable social groups, ensure that otherwise solvent firms do not go bankrupt, and support businesses in sectors that are particularly exposed to a sharp downturn. With the region experiencing a resurgence of COVID-19 cases, policies are needed to provide support until vaccines become widely available and to avoid long-term economic damage from the deep recession of the previous year.

As countries in Sub-Saharan Africa embark on the road to recovery from the Covid-19 pandemic, ensuring growth beyond 4 percent from 2022 and onward will be critical. Governments in the region need to implement a policy package that supports sustained private investments. It includes actionable policies that strengthen the macroeconomic policy framework, improve debt sustainability, enhance productivity and increase connectivity. On the macroeconomic front, policies that allow the exchange rate to better reflect market forces are critical to enhance the competitiveness of the traded sector. Addressing debt overhang problems might release resources for public investment. Additionally, countries need to continue deepening their structural reforms—especially in the areas of energy, the digital economy, human capital, and trade. Reforms to ensure a reliable and affordable supply of electricity, including those improving the performance of state public utilities, are crucial to power the manufacturing sector and the digital economy. Policies to build human capital and foster trade (say, leveraging the African Continental Free Trade Area) can help enhance productivity and boost the continent's competitiveness. Finally, reforms addressing digital infrastructure gaps, affordability (of devices and services), and digital literacy play a role in expanding access to digital technologies and closing the digital divide across gender, firm size, and urban-rural areas. A regulatory framework that provides the right incentives for innovation and competition among mobile operators is also required.

Against this backdrop:

Public health interventions to safeguard lives and livelihoods should remain a priority. A key priority for countries in the region should be to accelerate the deployment of vaccines. Countries that have already received vaccine supplies should ensure that these are fully used to inoculate their populations. More broadly, countries in the region should do everything that is necessary to develop the capacity needed for fast and effective implementation of their vaccination plans, as this would help to accelerate the economic recovery and mitigate the long-lasting costs from the pandemic.

Given the dependence of countries in the region on the COVAX initiative for access to vaccines, national efforts would need to be complemented with greater global cooperation to ensure that the initiative is adequately funded to increase the availability of affordable vaccines to the poorest countries. Massive vaccination campaigns that can cover most people in low-income countries, including in Sub-Saharan Africa, would help prevent the emergence of new and more threatening variants of the virus.

Countries in the region should also continue to allocate adequate resources to health care to ensure that health care systems can deal effectively with a resurgence of infections without disrupting standard health services (e.g. immunizations, maternal health care). Systems for testing, tracking, and tracing should work effectively to limit sharp rises in infection numbers and contain the spread of the virus before vaccines are widely available, thereby limiting the overall economic and social costs of the pandemic. Social protection programs and education are equally important to protect current and future livelihoods.

Debt initiatives from the international community should address liquidity and sustainability issues. The COVID-19 pandemic has exacerbated debt vulnerabilities in many countries in the world—and is leading to unsustainable debt in several Sub-Saharan African countries. Even before the onset of the COVID-19 pandemic, some African countries had already accumulated large amounts of debt. Debt is a recurrent problem in Sub-Saharan Africa that hinders growth and development. Consequently, working with the international community to tackle unsustainable debt burdens, ensure sustainable economic growth, and eradicate poverty is a priority for many Sub-Saharan African countries. What kind of policies can help African countries cope with the pandemic and alleviate their debt burden? A sensible policy is the injection of liquidity to improve a fiscal space so that countries use these resources to fight the pandemic. This section discusses five instruments, implemented and proposed by the international community: the Debt Service Suspension Initiative (DSSI), and Common Framework for Treatments beyond the DSSI, the Sustainable Development Finance Policy (SDFP), and the (issuance and use of) Special Drawing Rights (SDRs). The first two policies specifically address debt standstills and relief in response to the COVID-19 shock. The latter two options are designed to enhance debt sustainability and debt relief. The debt situation in Africa requires an all hands on deck approach. No options should be taken off the table.

The DSSI is aimed at increasing fiscal space to finance policies to mitigate the impact of the pandemic. It was launched by the World Bank and the International Monetary Fund along with the Group of Twenty (G20) countries on May 1, 2020. The DSSI framework suspends debt service payments to bilateral official creditors for eligible countries during a certain period. This initiative potentially benefits 73 eligible low-income and lower-middle-income countries, including 37 eligible countries[12] in Sub-Saharan Africa. As of February 2021, 30 countries in the region are participating in this initiative. Therefore, the DSSI intends to safeguard the lives and livelihoods of the 709 million people who live in these participating Sub-Saharan African countries in 2020 (62.4 percent of the total population in the region). According to the World Bank, DSSI-eligible

12 Half of the eligible countries are located in Sub-Saharan Africa (36 eligible countries from International Development Agency, IDA, plus Angola). In 2020, more than half of IDA countries in Sub-Saharan Africa are at high risk or in external debt distress (55.6 percent). As of March 16, 2021, 30 countries in the region have requested participation in the DSSI. Almost half of the population in these DSSI-participating countries (about 45 percent) are poor —while the poverty rate in the entire Sub-Saharan Africa region is 41.6 percent. In absolute terms, these countries house 318.3 million of poor people.

countries in Sub-Saharan Africa would save up to US$ 5.1 billion during the period of May-December 2020 and US$ 4.0 billion during the period of January-June 2021. In terms of their 2019 GDP[13], this amount accounts for 0.57 and 0.49 percent, respectively. For example, Angola could have saved up to US$ 1.7 billion during May-December 2020 (1.9 percent of the 2019 GDP)—see table 1.1. Credit rating agencies argued that sovereign rating downgrades are not supposed to follow the temporary suspension of debt payments from official bilateral creditors. Requesting private sector participation on G20-comparable terms could, on the contrary, lead to a downgrade or temporary downgrading.[14]

TABLE 1.1: Top Potential DSSI Savings for Eligible Countries in Sub-Saharan Africa

	May-Dec 2020	Jan-Jun 2021		May-Dec 2020	Jan-Jun 2021
	% of 2019 GDP			*US$ millions*	
Angola	1.9	1.4	Angola	1,734.9	1292.8
Mozambique	1.9	1.6	Kenya	630.8	620.3
Congo, Rep.	1.4	1.5	Ethiopia	472.9	359.6
Mauritania	1.2	1.3	Cameroon	337.3	271.9
Cameroon	0.9	0.7	Mozambique	292.6	250.2
Cabo Verde	0.9	0.8	Côte d'Ivoire	224.0	67.7
Kenya	0.7	0.7	Congo, Rep.	181.8	190.5
Zambia	0.7	0.8	Zambia	165.4	184
Gambia, The	0.6	0.4	Congo, Dem. Rep.	156.3	105.9
Senegal	0.6	0.4	Senegal	139.2	97.7
Chad	0.6	0.4	Tanzania	138.6	109.6
Ethiopia	0.5	0.4	Uganda	91.1	107
Guinea	0.5	0.2	Mauritania	90.8	102.5
Mali	0.5	0.3	Mali	82.5	46.3
Togo	0.5	0.4	Guinea	70.6	29.2

Source: The World Bank.

Note: The potential DSSI savings during May-December 2020 for the listed countries calculated as of March 16, 2021. DSSI=Debt Service Suspension Initiative' GDP=gross domestic product

The *"Common Framework for Debt Treatments beyond the DSSI"* is intended to help countries with either liquidity or solvency problems, including debt restructuring.[15] Consequently, this framework helps enlarge the fiscal space. International Development Association (IDA)-eligible countries' public and publicly guaranteed debts with an original maturity of more than one year are eligible.[16] This framework seeks comparable treatment from all official bilateral creditors (Paris Club and non-Paris Club) and private creditors. Three African countries are seeking debt relief

13 To have an idea of the scale of these economies, the GDP of the 30 DSSI-participating countries was US$ 701 billion in 2020 (that is, 42.1 percent of GDP in the entire region).

14 Eligible countries that are not participating in the DSSI have argued that they would continue repaying their obligations because they: (1) fear the prospects of downgrades in their sovereign rating, and (2) prefer to keep their access to global financial markets.

15 The Common Framework addresses solvency issues by restructuring the envelope based on the IMF-World Bank Debt Sustainability Analysis (DSA) and the participating official creditors' collective assessment. This has to be consistent with the parameters of an upper credit tranche IMF-supported program.

16 This framework, therefore, takes into account the cut-off date in the 2020 DSSI term sheet that protects new financing provided after March 24, 2020. Those agreements are on a country-by-country basis.

under the Common Framework (Chad, Ethiopia, and Zambia). The resolution of their cases will likely shape debt restructurings going forward. Still, the Common Framework faces a series of challenges: (1) the reluctance of (official and private) creditors to grant major substantial debt relief quickly, (2) uncertainty about the willingness or ability of borrowing countries to commit to credible multi-year action plans, and (3) the emergence of a complex and diverse group of creditors that may impede a coordinated response.[17]

Debt standstills may not affect sovereign credit ratings in frictionless environments while seeking debt restructuring may lead to downgrades—as it signals future debt sustainability problems (Yue 2010). In this context, countries seeking debt relief could face a downgrade in their credit rating (Ethiopia).[18] On the other hand, debt relief or debt haircuts lower expected deadweight losses from defaults—thus benefiting debtors and creating gains for creditors—as opposed to debt suspensions that benefit debtors but render losses to creditors.[19] Adding haircuts to standstills can improve the welfare of the public sectors and lower creditors' losses (Hatchondo, Martínez, and Sosa-Padilla 2020).[20] For instance, model simulations show that a one-year standstill along with a 21 percent haircut would yield welfare gains of 0.8 percent for sovereigns and avoid creditors' losses. Consequently, an economy will be better off in the long-run despite the painful debt restructuring process in the short term.

The Sustainable Development Finance Policy (SDFP) enhances fiscal space by strengthening debt sustainability, debt transparency and debt management while coordinating between IDA and other creditors. This initiative has replaced the Non-Concessional Borrowing Policy by the World Bank from July 1, 2020. The SDFP is consistent with two programs: one, a debt sustainability enhancement program, and another, a program of creditor outreach.[21] The first pillar is constituted by four steps: debt vulnerability screenings, defining performance and policy actions (PPAs), implementing PPAs, and performance-based IDA allocations. Meanwhile, three steps comprise the second pillar. First, a dialogue among a broader range of development partners promotes transparency and sustainable financing. Second, coordination at the country level among different creditors fosters sound economic policies, prudent debt management and sustainable lending practices. Finally, transparency and communications on sustainable financing offer opportunities for information sharing and dialogue on the SDFP. This policy instrument aims at addressing debt transparency and management rather than structural fiscal sustainability issues.

Increasing the issuance of SDRs will inject international liquidity through central banks and, hence, will boost countries' fiscal space.[22] The SDRs are international monetary assets issued by the IMF. This resource provides a country's central bank with additional foreign exchange reserves. The lending capacity is limited to IMF quotas, and hence only a fraction of the allocated SDRs is distributed to emerging and developing countries, which receive under two-fifths of the

17 See Reinhart and Pazarbasioglu (2021).

18 In models without frictions, a net present value neutral debt relief (such as the DSSI) does not affect spreads; however, debt restructuring could imply future debt sustainability problems—and, thus, would lead to higher sovereign spreads (Yue 2010).

19 In the case of a shock that increases sovereign spreads by 1000 basis points, a one-year debt suspension increases the welfare of the sovereign by 0.3 percent. At the same time, it renders capital losses of 21 percent for the creditors. This finding suggests that creditors would be reluctant to participate in a standstill (Hatchondo, Martínez, and Sosa-Padilla 2020).

20 The authors evaluate quantitatively the impact of COVID-19 debt suspension with a standard default model of private creditors calibrated to a typical emerging economy à la Eaton and Gersovitz (1981), and applied to sovereign debt crises by Aguiar and Gopinath (2006) and Arellano (2008).

21 The SDFP includes a shift to a "set aside" model to incentivize performance and policy actions (PPAs) that could pose challenges for IDA countries if the crisis period is longer and deeper. Performance criteria may not be advisable when rapid disbursements are needed to fight the pandemic (Morris 2020).

22 Gallagher, Ocampo, and Volz (2020) have advocated for an SDR allocation of US$500 billion as part of the global response to the crisis generated by the pandemic. The IMF continues exploring with the membership the proposal for a new SDR allocation—in the same spirit as the SDR issuance of US$ 250 billion in April 2009.

resource. Under a new agreement, the new SDRs would be allocated to emerging and developing countries. This new mechanism allows countries, which do not use their SDRs, to lend these resources to the IMF to improve its lending capacity. For the global recovery to fight against the COVID-19 pandemic, IMF and other counterparts are considering adding a new SDR allocation of US$650 billion. This is still under discussion. If this is materialized, then a new allocation of SDRs will improve liquidity directly without increasing a country's debt burdens. This liquidity would also widen the fiscal space to support vaccination programs and other urgent relief programs and measures. These new SDRs complement the other IMF packages.

Structural reforms are needed to catalyze the digital technology adoption and job creation. The pandemic has spurred the most significant social experiment of the future of work in action, with social distancing and work from home changing the way people work and interact. It is also accelerating the insertion of digital tools and solutions into different tasks and sectors of economic activity. The rising adoption of digital technologies and greater connectivity has led to the emergence of new activities and new modalities for conducting existing work. Section 2 discusses the relation between digital technology adoption and jobs during COVID-19 in Sub-Saharan Africa.

Volume 22 of *Africa's Pulse* (October 2020) discussed extensively how digital technologies percolated through the three interrelated transformations associated with the *economic transformation for jobs* framework (technological, sectoral, and spatial) and supported its foundations (investments in skills, infrastructure, and institutions supporting inclusive productivity growth). It highlighted the policies needed for the digital economy to create the conditions for job creation. For instance, a regulatory framework that fosters innovation and competition and creates trust and protects users (consumer protection, competition policy and data regulation) is critical for the *technological transformation*. Reforms that promote market contestability, foreign trade (including global value chain participation), and attract foreign direct investment are crucial for the *sectoral transformation*. Policies that boost agricultural productivity (including food security) facilitate job creation through the *spatial transformation*. Across the supporting pillars, digital technologies facilitate the learning of new skills (and connect them with job opportunities) and strengthen the efficacy of macroeconomic policies by boosting transparency and accountability. Specifically, digital tools can help improve tax administration,[23] raise the efficacy of social spending,[24] and improve debt transparency.[25] Digital technologies can also empower citizens by diversifying information flows and opening digital bridges to marginalized segments of the population.[26] Many African governments perceive the power and agency of social media around the world as a threat that needs to be contained. The internet could disrupt traditional forms of government political control—notably, control of the production and dissemination of information, which has been an important tool for many African governments.

23 Digital tools can improve the identification of taxpayers and tax administration —thus, reducing tax evasion and fraud . The Ministry of Lands and Natural Resources in Ghana, in partnership with IBM, implemented a blockchain-based land registry in 2018. It was aimed at changing the inefficient paper-based central land records system to an immutable and secure decentralized ledger of land records (Eder 2019).

24 Social protection programs are strengthened by leveraging digital technologies. Countries have used different approaches to deliver scaled-up payments, including mobile money accounts in Togo's "Novissi Program" and e-wallets in Namibia, among others.

25 Digitalized financial recording systems can improve debt transparency, thus reducing corruption and illegal debt practices. In turn, policies that boost transparency can reduce external borrowing costs (Kubota and Zeufack 2000).

26 See Mäkinen (2006).

Section 2 examines the role of digital technology adoption in creating new jobs and boosting the productivity of existing ones in Sub-Saharan Africa—including the development and adoption of low-skill-biased technologies that enable low-skilled workers to learn and upgrade their skills on the job. Recent evidence shows large employment increases in African countries with better employment opportunities for low- and high-skilled workers.[27] Prior to COVID-19, the region was already facing the increasing need to create jobs to meet the young and growing population entering the labor market. Policies that close the region's gap in digital infrastructure, foster digital skills, and ensure fast, affordable, and reliable connectivity may provide a key to the way forward—and, as countries embark on the road to recovery from the pandemic, jobs will need to be at the center of policy action and private sector response.

Harnessing the full potential of digital technologies would require African governments, development partners, and the private sector to prioritize a series of investments. First, African countries need to close the digital infrastructure gap and provide high-quality, affordable, and reliable services. Complementary to this effort, it is crucial to put in place a regulatory framework that fosters competition and innovation in telecommunications. Investments in infrastructure that ensure the reliable provision of electricity are also important to power the digital economy. Second, investments in tertiary education—and, particularly, in science, technology, engineering, and mathematics (STEM) skills—are critical for designing technologies that create the conditions for jobs. Quality STEM graduates and professionals will join the ranks of inventors and entrepreneurs in the region that can develop and/or adapt digital technologies to enhance the productivity of low-skilled workers. Third, actionable policies to boost the productivity of the informal sector and upgrade the skills of workers, especially women, are more likely to unlock the potential of the informal economy—and facilitate their transition into the formal sector in the future.[28]

In Africa, employment is higher across firms with greater use of digital technologies. Section 2 shows that employment is higher among firms using digital technologies for transactions and management compared with nonusers. For instance, employment in firms using digital management solutions is about 60 percent higher than that of nonusers. However, the uptake of digital technologies has been low among firms. For instance, 7 percent of informal businesses surveyed prior to the pandemic use the internet for business purposes among Sub-Saharan African countries. This might be attributed to the firms' lack of internet-enabled devices (notably, computers); high prices of internet services, smartphones, and mobile data; as well as lack of awareness and skills to use digital technologies.

The COVID-19 pandemic has severely affected employment and sales across Sub-Saharan African firms, and they face prolonged uncertainty as new variants of the virus spread throughout the continent. Firms in the region were more prone to reduce work hours, grant leave of absence, and reduce wages. Still, one-fifth of firms in the region were likely to fire workers—especially in countries with greater reduction in sales and among larger firms. On average, sales declined by 49 percent in the region, and this contraction was even larger in countries with stricter lockdowns, contact-intensive activities, and micro and small firms (Davies et al. 2021).

27 See Hjort and Poulsen (2019), Cirera and Sabetti (2016), and Parschau and Hauge (2020).

28 This should include agricultural workers who may not be developing technologies but who are essential for creating a market for these services.

Sub-Saharan African firms expanded the use of digital technologies in response to the pandemic. Business Pulse Surveys conducted in 18 countries in the region show that 22 percent of firms reported either starting or increasing use of the internet, social media, and digital platforms. The intensity in the use of digital technologies was higher in financial and information and communications technology services, as well as among larger and formal firms. Over time, a greater percentage of Kenyan firms adopted digital technologies in response to the pandemic (from 47 percent in June-August 2020 to 71 percent in September-October 2020), especially among manufacturing firms and small firms (World Bank 2021). Additional evidence shows that firms with higher technological levels prior to COVID-19 were more likely to increase digitalization in response to the pandemic and have greater sales and employment.[29]

Technological transformation in agriculture is a priority for sustained development in Sub-Saharan Africa. The ample information needs of farmers (accurate local weather forecasts, relevant advice on agricultural practices and input use, real-time price information, and market logistics) remain largely unmet across the continent. To the extent that rural regions are sparsely populated with limited infrastructure and dispersed markets, the use of innovative digital technologies overcomes some of these information asymmetries and connects farmers to opportunities. Harnessing the rapid growth of digital technologies holds hope for transformative agricultural development. Still, the massive growth of digital innovations in agriculture raises a crucial question as to why some of these innovations fail to scale up and achieve wider acceptance. Market fragmentation and the lack of financially sustainable models may play a role.[30] Finally, the private sector needs to be engaged more comprehensively in overcoming the challenges of being able to identify and foster innovation with the kind of transformative impact that farmers seek. Going forward, these technologies have the potential to provide services that were not necessarily available to rural populations earlier.

29 Complementary to firms' digital responses, government policies need to support firms to avoid the scarring effect on long-term economic activity and reduce the de-skilling of workers. The success of these policies depends on adequately targeting firms that would have the capacity to jumpstart activity upon returning from the pandemic and households that are directly and indirectly affected by the pandemic.

30 More specifically, the government can work with the private sector to overcome data constraints by, for example, digitizing extension services or providing access to digital farmer registries.

Section 2: Digital Technologies and Jobs during COVID-19 in Africa

The changing nature of work has been shaped by the tension between automation in traditional sectors that leads to job destruction, and innovation in new sectors that creates jobs producing new goods and services. Industries, firms, and jobs are being transformed by new technologies—robotics, big data, the internet of things, cloud computing, 3D printing, blockchain, and emerging platforms. In the long term, the implementation of these new technologies is expected to reduce the demand for low- and medium-skilled workers in traditional sectors, while innovation is expected to raise the demand for high-skilled workers in new sectors of economic activity. Building technical skills and forming a critical mass of high-skilled individuals in the region are required to continue innovating and adapting new technologies to local standards and needs (World Bank 2019).[1]

In Sub-Saharan Africa, the future of work is playing out rather differently from the experience in advanced economies. New technologies are likely to create new jobs and boost the productivity of existing ones. Within the realm of technology, this section focuses on digital technologies due to their potential for rapid future generation and adoption across the world—including the generation and adoption of low-skill-biased technologies that enable low-skilled workers to learn and upgrade their skills on the job.[2] Recent evidence points to large positive employment effects and no displacement of low-skill jobs in selected Sub-Saharan African countries after the arrival of fast internet connectivity.[3] Digital technologies affect employment through a series of distinct channels, including changes in firm entry, productivity changes among incumbent firms, and changes in exporting.

While the particular focus is on digital technologies, there are other types of technical upgrading that are helping firms retain jobs and skills. Amid the pandemic, the global demand for apparel sharply contracted while Sub-Saharan Africa had a largely unmet demand for personal protective equipment (PPE). In the face of global export bans on COVID-19 essentials, governments supported the repurposing of local manufacturing firms into the production of PPE—thus ensuring that skills were being retained for sustainable production in Africa. This is the case of garment companies in the Hawassa Industrial Park and Transgreen in Ethiopia (Africa CDC 2020). Box 2.1 illustrates some of the digital and non-digital transformations that are ensuring the business continuity of firms in Sub-Saharan Africa.

The COVID-19 pandemic has sharply affected economic activity, including employment in Sub-Saharan Africa. The digital economy has been of paramount importance in ensuring the continuity of activities across governments, businesses, and society in the region during times of social distancing and containment measures. Many countries in the region have seized

1 The direction of the impact of digital technologies on jobs is not trivial. It is shaped, among others, by the following factors: (1) workers are more likely to gain if their skills are complemented (or not significantly substituted) by automation; (2) wage effects depend on the responsiveness of labor supply to the degree of complementarity (or substitutability) between labor and automation; and (3) the income elasticity of demand influences the degree to which productivity gains associated with automation translate into additional demand for goods and employment opportunities in certain sectors (Autor 2015). Further, policies could tilt the direction of technology change toward new labor-augmenting rather than labor-replacing tasks (Acemoglu and Restrepo 2020).

2 With its focus on digital technologies, this section draws extensively on the analytical framework, initial findings, and selected main messages of the forthcoming "Digital Inclusive Africa" report (Begazo-Gomez, Blimpo, and Dutz 2021).

3 Although the internet is found to be a skill-based technology across countries in the region, better employment opportunities for less skilled workers have been attributed to the emergence of new occupations and sectors that are complementary to jobs for more skilled workers or have increased demand in other sectors. See Hjort and Poulsen (2019), Cirera and Sabetti (2016), and Parschau and Hauge (2020).

this opportunity. Recent evidence shows that 22 percent of the firms in Sub-Saharan Africa have started or increased the use of digital platforms in response to COVID-19.[4] Governments have partnered with the private sector to deliver services online—for example, public health information campaigns, e-learning, and the use of digital payments, among others.

Digital technologies not only provide tools to enable governments and businesses to continue functioning amid social distancing; they also provide opportunities to boost productivity, create jobs, and build back in a more resilient fashion. In volume 22 of *Africa's Pulse,* it was argued that the course for a steady recovery in the post-pandemic period requires an agenda to foster sustained productivity-driven growth that creates more, better, and inclusive jobs—especially for lower-income, lower-skilled people. Prior to the COVID-19 shock, the pace of job creation failed to meet the rising demand from the young and growing population in the region. In this context, digital technologies play a critical role in the creation of more and better quality jobs within the *economic transformation for jobs* framework (World Bank 2020a). Volume 22 of *Africa's Pulse* extensively discusses how digital technologies percolate not only through the three types of economic transformation associated with this framework, but also play a critical role in strengthening its foundations (for example, through reforms and investments in skills, infrastructure, and institutions that support inclusive productivity growth).

This issue of *Africa's Pulse* focuses on the relationship between digital technology adoption and job creation in Sub-Saharan Africa. Is the adoption of digital technologies conducive to more and better jobs? If so, what is the digital uptake across firms in the region? How has the pandemic affected firm productivity and employment? Has COVID-19 led to increases in digitalization across firms in the region? What are the policies needed to strengthen the digital transformation in Sub-Saharan Africa? These are some of the questions that this section aims to discuss using recent firm-level evidence on the relationship between digital technology adoption and growth prior to and at the onset of the COVID-19 pandemic.

Prior to COVID-19, the evidence shows that firms in Sub-Saharan Africa—formal and informal—that adopted digital technologies tended to have greater levels of productivity, output, profits, employment, and wages.[5] More specifically, it was found that employment and labor productivity were higher in firms using smartphones, digital transaction technologies (such as mobile money to pay suppliers and receive customer payments), and digital management solutions (accounting and inventory control/point-of-sale (POS) software). In Senegal, the level of employment among informal firms using inventory control/POS software was 1.6 times that of nonusers, while employment in firms using digital tools to recruit workers was more than twice that of nonusers (2.3 times).[6] Additionally, the average wage of firms using digital transaction technologies was 1.5 to 2.4 times that of nonusers. Despite these benefits, the uptake of digital technologies is low among African firms. For instance, 7 percent of informal businesses surveyed prior to the pandemic used the internet for business purposes in Sub-Saharan African countries. Among those firms with access to the internet, nearly 25 percent looked for suppliers

4 See Davies et al. (2021).

5 Evidence from 82 developing countries (including 27 in Sub-Saharan African) shows that firms adopting digital solutions (use of email and a website) have higher levels of employment and productivity (Cusolito, Lederman, and Peña 2020). For instance, the level of employment is 21 percent higher among firms that have adopted email or a website—an impact that is comparable to the increase in employment across firms having access to external markets (30 percent). Additionally, the authors find that productivity can be labor augmenting in sectors like garments and fabricated metals.

6 These differences control for a wide array of drivers of employment, including firm characteristics (Atiyas and Dutz 2021).

online, while 10 percent used e-commerce solutions. This low uptake is attributed to the lack of internet-enabled devices (notably, computers); high prices of internet services, smartphones, and mobile data; as well as lack of awareness and skills to use digital technologies.

Firm sales and employment in Sub-Saharan Africa have been severely affected by the COVID-19 pandemic. On average, sales declined by 49 percent in the region, and this contraction was even larger in countries with stricter lockdowns, contact-intensive activities, and micro and small firms. Amid the drop in sales, firms in the region were more likely to reduce work hours, grant leave of absence, and reduce wages. Still, one-fifth of firms in the region were likely to lay off workers—especially large firms and those with a sharper reduction in sales. In response to the pandemic, Sub-Saharan African firms were more likely to expand the use of digital technologies. Specifically, 22 percent of firms in the region reported that they had started or increased use of the internet, social media, and digital platforms—with the use of digital technologies being more widespread among financial and information and communications technology (ICT) services, as well as among larger and formal firms. Additional evidence shows that firms with higher technological levels prior to COVID-19 were more likely to increase digitalization in response to the pandemic and have greater sales and employment.[7]

The pandemic may have accelerated the adoption of digital technologies across firms in the region—as reflected by increased demand for good quality virtual methods of communication and resilient broadband infrastructure, and greater use of online digital services and products (say, e-commerce, fintech platforms, and online work platforms).[8] Recent evidence shows that digitalization of firms increased as the pandemic continued (World Bank 2021). For instance, the percentage of Kenyan firms that adopted digital technologies in response to the pandemic increased to 71 percent in September-October 2020, up from 47 percent in June-August 2020. The largest increase in the proportion of firms using digital solutions was experienced by manufacturing firms (from 47 to 80 percent) and small firms (from 37 to 64 percent).

Digital technologies have the potential to transform and modernize agriculture. They can help farmers meet their ample information needs (weather forecasts, extension services, market information, and logistics). These technologies are already changing the way farmers work. For instance, comprehensive agronomic advice and market services are provided via multilingual voice, text, video, and spatial maps in Ghana. Mobile phones are used to transform the distribution of seeds and fertilizers in remote areas through e-vouchers in Nigeria. Satellite information services are improving herd management among pastoralists in Mali and Burkina Faso. Agritech solutions connecting farmers directly to consumers and digitalizing those market linkages are becoming the new normal (Twiga Foods in Kenya in partnership with Jumia).

Reaping the benefits associated with digital technologies requires that African countries undertake much-needed investments in digital technologies (infrastructure, skills, and platforms) as well as provide the enabling environment to speed up the process of economic transformation and job creation. In this context, effective regulation is needed to expand digital infrastructure and make connectivity affordable, reliable, and universal. This entails using

7 See Cirera, Comin, Cruz, Lee, and Torres (2021) for evidence on selected developing countries, including Senegal.

8 Digital infrastructure, as measured by the penetration of mobile broadband–capable connections, continued to expand in Sub-Saharan Africa during 2020. For instance, the number of 3G connections per thousand people increased from 372 in 2019Q4 to 422 in 2020Q4. In the case of 4G connections, the rate of penetration increased from 73 per thousand people in 2019Q4 to 100 per thousand people in 2020Q4.

regulatory instruments and government interventions to eliminate barriers to entry (such as restrictive licensing and exclusivity rights) and promote competition on a level playing field (such as asymmetric regulation of dominant operators, infrastructure sharing, spectrum policy, and antitrust enforcement).[9]

Finally, many African governments are increasingly levying sector-specific taxes on consumers of mobile services and devices and on mobile operators.[10] If these taxes are not adequately designed, they can hamper the growth of services among citizens, limiting the social and economic benefits associated with digital technologies. Recently, governments are aiming to tax digital service providers or over-the-top services. Taxes on users of certain services or internet subscribers are being considered or levied in some countries, including Zambia, Benin, Uganda, and Niger. Taxation has started to cover other sectors connected to the digital economy, such as income and value-added taxes on goods and services supplied in the digital marketplace (Kenya) and taxes on mobile payments (Kenya, Tanzania, Uganda, the Democratic Republic of Congo, and Zimbabwe). In January 2021, Kenya enacted a 1.5 percent tax on all digital services regardless of where the company is based. Although the tax is intended to cover global players (say, Uber and Netflix), it does not distinguish taxing foreign companies from domestic ones. Additionally, the tax is being imposed while businesses are still ailing from the pandemic-related downturn in economic activity. These levies may undermine the affordability of and access to digital services.

BOX 2.1: Role of Technology in the COVID-19 Policy Response

To control the spread of the coronavirus pandemic, some African governments rapidly developed and/or adopted technology-based solutions—some of these included digital innovations to support their fragile health systems. Other efforts involved technical upgrading thanks to policies that repurpose existing manufacturing firms to meet the large demand for personal protective equipment (PPE).

Digital Technology Responses in Health

According to the World Health Organization (WHO), the pandemic has spurred the development of more than 120 health technology innovations that have been tested or adopted in Africa—this amounts to 12.8 percent of the innovations designed across the world to target different areas of policy response to the pandemic. These areas include surveillance, contact tracing, community engagement, treatment, laboratory systems, prevention, and control.

Multiple technological solutions were implemented in the region to narrow the gap in health system infrastructure across countries. More than 50 percent of the digital technology innovations in health were information and communications technology (ICT)–based applications (57.8 percent), 25 percent involved 3D printing, and about 10 percent were robotics. The ICT-based innovations included WhatsApp Chatbots (South Africa), self-diagnostic tools (Angola), contact tracing apps (Ghana), and mobile health information tools (Nigeria).

9 The Democratic Republic of Congo is about to publish a telecommunications law that would help reduce costs and increase penetration in the country.

10 For instance, numbering fees are widely used in Sub-Saharan African countries (for example, Ghana, the Democratic Republic of Congo, and Nigeria), and the average fee in 2018 was €0.26 per assigned/booked phone number (Rota-Graziosi and Sawadogo 2020). Additionally, Ghana imposes a 5 percent communications service tax on charges payable to users of an electronic service, which includes placing and receiving voice calls, SMS/text messages, and internet/data services. Mobile communications internet services are subject to an excise duty in Cameroon, Uganda, Madagascar, and The Gambia, among others. In the Democratic Republic of Congo, cell phone users have to pay, through their telephone operator, a fee of US$1 for 2G mobile devices or US$7 for 3G, 4G and higher mobile devices, for their certification by the ARPTC. This new fee was introduced by Decree 20/005, March 9, 2020 (Nielsen and Begazo 2021).

BOX 2.1
Continued

Robots were introduced to support medical staff at COVID-19 treatment centers in Kigali (Rwanda). Their tasks include temperature screening, reading vitals, disinfecting, playing pandemic awareness videos, and delivering food and medications to patients. The robots have sped up case screenings and reduced the workload of frontline health workers. Robots were also put at the Kigali International Airport to speed up mass screenings of passengers for fever as they land. Finally, 3D printing companies in Kenya are manufacturing PPE and a wide array of parts for medical devices to alleviate shortages in hospitals. For instance, Ultra Red Technologies has designed a 3D-printed prototype for a ventilator adaptor that would enable medical staff to treat two to four patients simultaneously.

Repurposing Manufacturing in Sub-Saharan Africa

At the onset of the COVID-19 pandemic, the demand for essential medical equipment for health care workers across countries in the region was largely unmet. Governments in the region called on local manufacturers to furnish the demand for personal protective equipment (PPE), sanitizers, and testing kits. They introduced a series of incentives to repurpose existing manufacturing establishments—thus gaining control over the supply and reducing the costs and delays related to importing. These efforts also supported local economies in retaining or creating employment.

In Ghana, the government rapidly gathered local garment establishments to repurpose their production lines for manufacturing PPE. The goal was to produce a combined 280,000 masks per day for the local market and other West African countries—including Nigeria and Liberia. By the end of June 2020, local manufacturers had produced about 6.2 million (cloth) face masks. To meet the growing demand for PPE, small and medium-size enterprises were granted loans with favorable terms.

The garment industry in Ethiopia installed capacity and repurposed manufacturing to produce surgical masks, coveralls, and sanitizers. To help them stay afloat amid the pandemic, the government supported local manufacturers through a series of policies—including temporary licenses for local production, procurement of raw materials, technical advice, and employee training. Manufacturers of COVID-19 essential products were given priority access to foreign exchange to import raw materials that were not locally produced.

The Government of Kenya supported local manufacturing by issuing licenses to several companies to produce masks and sanitizers. For instance, Bedi Investments, a garment and textile manufacturer that exported to the U.S. and U.K. markets prior to the pandemic, reconfigured its production lines to manufacture face masks and surgical gowns, using locally-sourced materials. The company is currently selling 80 percent of its products in the local market. Furthermore, Hela industries has acquired machinery to produce more sophisticated N95 respirator masks in its operations in Kenya. The shift to producing PPE has helped Hela to keep its 15,000 employees across its eight factories in Kenya, Ethiopia, and Sri Lanka.

Sources: Anderson (2020), IFC (2020), Mamo (2020), WHO (2020).

2.1 DIGITAL TECHNOLOGY ADOPTION AND JOBS IN AFRICA

The insertion of digital and complementary productive technologies into economic activity is transforming industries and changing the nature of work across all regions of the world. Concerns about the potential large-scale job displacement in manufacturing and services as a result of automation and other digital innovations are being called into question by recent evidence.[11] In developing countries with large shares of informal employment, it is feared that automation will likely hinder the industrial pathway to economic transformation through low-wage factory employment. In this context, it is useful to ask what the future of work in Africa will be.

The future landscape of jobs in Sub-Saharan Africa is likely to be positive going forward. Entrepreneurs and workers in the region can potentially benefit from the adoption of digital technologies in several ways. Compared with other regions, the size of the manufacturing sector in Sub-Saharan Africa—in value added and employment—is relatively low. This implies that labor-replacing technologies automating tasks in manufacturing sectors are not likely to displace many workers over the coming years. Most workers in the region are underemployed in the informal sector, largely in agriculture and services. The relatively low cost of many (low-education) workers in the region may render investment in automation decisions too expensive. There is a window of opportunity for African firms, especially in global value chain (GVC) participation, as long as the adoption of digital technologies in other countries does not set back local job opportunities.

There is relatively low demand for mass consumption products in the region (such as processed foods, tourism, retail, and hospitality services)—as opposed to saturated demand for these goods and services in higher-income economies. Hence, price reductions driven by productivity increases associated with the adoption of digital and complementary technologies are likely to lift the demand for a variety of under-consumed products at a greater pace than in higher-income countries (that is, the demand for these goods in Sub-Saharan Africa is more elastic). This demand and output expansion should command a greater demand for labor and, hence, generate a large number of jobs for a wide array of workers—as long as production units operate competitively in the region.

The low levels of human capital provide an ample scope for developing worker-enhancing digital technologies that can be adopted by formal and informal businesses across Sub-Saharan African countries. Many digital technologies that are accessible through the internet are particularly well-suited for the types of less educated, less skilled workers who are more prevalent in Sub-Saharan Africa than in other, higher-income regions—for instance, digital financial services for low-income entrepreneurs and the unbanked, voice and video-based e-extension services for informal farms and firms, and Uber-like platforms that do not require reading and numeracy skills. Further, there is a need to enable local entrepreneurs to adapt general technological solutions to local conditions and target low-skilled employment.

11 See World Bank (2019) and the applications and lessons for Africa in Choi, Dutz, and Usman (2020).

Harnessing the full potential of digital technologies would require African governments, development partners, and the private sector to prioritize a series of investments. First, African countries need to close the digital infrastructure gap in the region (vis-à-vis structural and aspirational benchmarks) and provide affordable and reliable services. Additionally, it is critical to put in place a regulatory framework that fosters competition and innovation in the telecommunications sectors. Second, improving the quantity and quality of human capital is critical to expand the participation of all segments of the population in the digital economy. This is crucial for the formation of investors and entrepreneurs in the region that can develop and/or adopt digital technologies to enhance the productivity of low-skilled workers. Third, governments need to support a business environment that boosts productivity and upgrades the skills of businesses and workers in the informal sector—thus taking advantage of worker-enhancing digital tools/solutions for low-skilled workers.

The Future of Work in Africa: The Role of Digital Technologies[12]

Sub-Saharan African countries can still seize the opportunities from globalization and engage in manufacturing-led growth. To do so, countries in the region need increased integration with global markets to raise output and create jobs in the manufacturing sector. In this context, policies should foster the participation of local firms in GVCs and promote foreign investment. These policies need to be complemented with improvements in the business environment—infrastructure investments (electricity, transport, and logistics) and supportive trade policies.

It is critical for the region to build strong foundational and digital skills to unlock the opportunities provided by the digital economy.[13] An increase in the availability of and access to high-quality educational institutions and programs plays a key role. Adopting digital technologies that create new demand for low-skilled workers will generate more direct and indirect technology-enabled jobs. In turn, a large number of grassroots investors and entrepreneurs are needed to create these digital technology–enabled job opportunities. Additionally, policy interventions that boost productivity and upgrade the skills of informal, small-scale firms and farms, as well as unskilled workers are critical to address the informality problem in the region. Using digital technologies to increase productivity, create jobs, and enhance financial inclusion in the informal sector may provide a gradual pathway to formalization over time.

Fostering GVC Integration and Non-Resource-Seeking Foreign Investment

Automation in advanced economies may not hold back traditional industrialization-led growth in Sub-Saharan Africa. For instance, automation of "traditional" manufacturing sectors in the region is very limited because investments in automation are still not cost-efficient. There is room to exploit the opportunities from globalization to enhance productivity and create jobs in the manufacturing sector. Firms in the region need to adopt new, worker-enhancing technologies, reduce production costs, and increase demand and jobs across all economic

12 This section draws heavily on *The Future of Work in Africa* (Choi, Dutz, and Usman 2020).

13 Digital technologies can play a role in accelerating the acquisition of human capital and upgrading skills.

sectors. In this context, African policy makers need to design policies to foster the integration of firms into global markets through participation in GVCs and attract foreign direct investment (FDI)—thus enhancing the transfer of technology.[14] Still, these policies must complement measures that enhance digital connectivity and strengthen linkages between manufacturing and services.

Participation in GVCs can help create jobs by: (1) raising firm productivity through the technological, sectoral, and spatial transformations of the economy, and (2) generating spillovers from backward and forward linkages within the value chain. Recent evidence shows that Ethiopian manufacturing firms participating in GVCs tend to be more productive and, hence, employ more workers and pay higher wages than other firms.[15] Still, the GVC participation of Sub-Saharan African countries is rather limited. For instance, the share in world trade of Sub-Saharan African firms is very low in sectors like apparel (2.5 percent of final exports and 0.5 percent of intermediate apparel and footwear exports) and automobiles (1.3 percent of final exports and 1.0 percent of intermediate exports). For low-income countries in the region, participation in GVCs is driven by sectors like textiles and apparel (Ethiopia and Lesotho) and agribusiness and horticulture (East Africa).

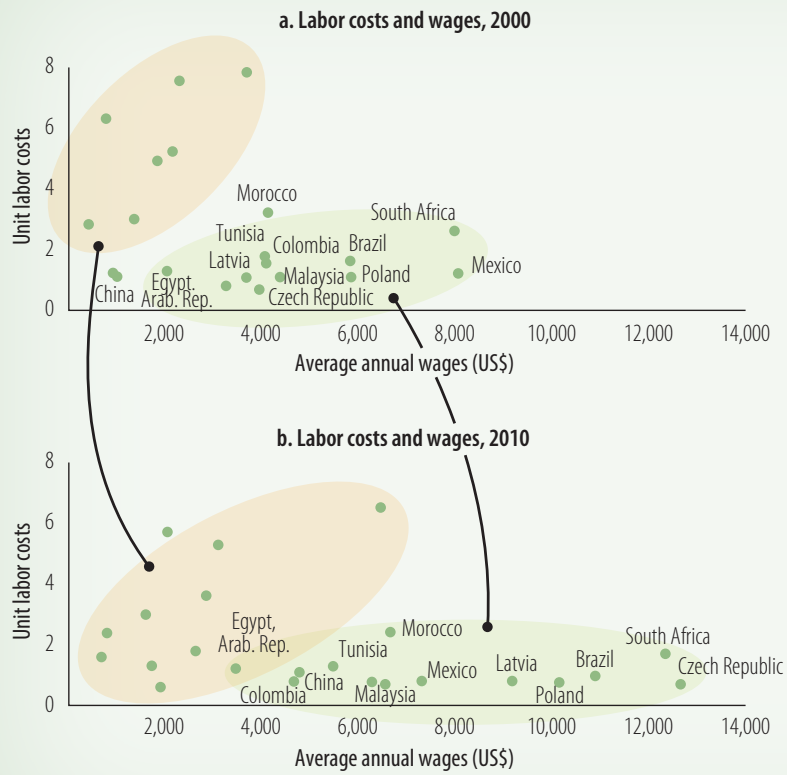
Developing countries have engineered sustained growth through GVC participation thanks to actions that ensure low unit labor costs rather than low wages (see figure 2.1).[16] This may present a challenge to lower-income countries in Africa that do not have a comparative advantage in (labor- and/or capital-intensive) traded goods compared with developing countries in other regions. For example, some Sub-Saharan African countries have higher labor and capital costs relative to some Asian countries. Gelb et al. (2017) document that capital costs in Kenya are more than nine times those in Bangladesh. Yet, manufacturing job growth in countries like Ethiopia and Côte d'Ivoire has been fueled by ample labor supply at relatively low wages. Job creation came with rising profits per worker for these firms. Their higher profits were associated with increased average labor productivity amid relatively low wages (Abreha et al. 2019). As the period of cheap manufacturing labor comes to an end, wage increases in the region need to be supported by higher productivity. Manufacturing job growth along with increased productivity can be attained by lifting market distortions that lead to resource misallocation (World Bank 2020b). Seizing the opportunity to participate in GVCs requires a series of complementary policy actions in areas like standards, internet and physical infrastructure connectivity, education, and skills.[17]

FDI can foster economic growth and help countries integrate into GVCs.[18] It can also help raise wages and employment.[19] Most FDI into Sub-Saharan Africa is concentrated in natural resources, with low impact on employment and technology transfer.[20] Improving the business

14 Firms will choose to automate or move out of the region if the unit costs of labor exceed productivity levels (Choi, Dutz, and Usman 2020).
15 See Choi, Fukase, and Zeufack (2019).
16 See Ahmad and Primi (2017) and Golub et al. (2018).
17 See Farole and Winkler (2014) and Kummritz, Taglioni, and Winkler (2017).
18 See Agrawal (2015), Alfaro et al. (2004), and Lall (2000).
19 Blalock and Gertler (2008).
20 See Abate and Engel (2020).

environment (say, judicial independence and labor market flexibility) will attract FDI into the secondary and tertiary sectors (Walsh and Yu 2010). Evidence for African countries points to infrastructure, trade openness, and lower (economic, political, and financial) risks as factors that boost FDI flows into the region (Kariuki 2015). Corruption, taxes, and access to finance are also critical (Abate and Engel 2020). Overall, maximizing the benefits of digital technology adoption, GVC participation, and FDI involves ensuring an adequate business environment and raising the low levels of human capital across the region.

FIGURE 2.1: Unit Labor Costs in Countries Participating in GVCs



Unit labor costs tend to be higher across lower-income countries in Africa.

Source: Ahmad and Primi 2017.
Note: GVCs = global value chains.

Human Capital: Skill Upgrading for Job Creation

The quality and composition of human capital play an important role in the future of work. Sub-Saharan Africa has the fastest growing labor force relative to other regions. It also has the lowest levels of human capital and the largest stock of ill-equipped adults (Blimpo and Owusu 2020). The education system is in crisis, with 50 million children out of school and poor learning outcomes—for example, a large share of second graders cannot read a single word of connected text.[21] Investment in human capital remains a priority to provide the labor force with the skills to seize the opportunities that digital technologies can unlock in the region.

Tertiary education is a key driver of innovation and competitiveness; however, investments in this level of education are inadequate in the region. Greater emphasis among higher education institutions should be put on research and entrepreneurship. The region has low gross enrollment rates in tertiary education (10 percent), and even lower enrollment of students

21 See Arias, Evans, and Santos (2019).

in science, technology, engineering, and mathematics (STEM) fields. An average of nearly one in five tertiary education students is enrolled in a STEM-related program.[22] Investing in quality education, especially in STEM fields, is critical to design technologies that create the conditions for jobs.[23] Currently, all the countries in the region except South Africa have low scores on the quality of tertiary education, innovation performance, and knowledge production.[24]

To increase the production of quality STEM graduates and professionals over the medium and long term, the region is building poles of excellence to promote regional collaboration among universities and best-practice partners. For instance, the African Center of Excellence (ACE) initiative was launched by the World Bank and West and Central African countries in 2014. The ACE initiative invests in *Centers of Excellence* at well-performing universities, in disciplines related to STEM, agriculture, and health. It aims at establishing high-quality, specialized, well-resourced centers in selected universities training students in STEM-related fields like applied mathematics in Benin; ICT in Cameroon; statistics in Côte d'Ivoire; and mathematics, informatics, and ICT in Senegal.[25] Graduates and professionals are expected to then increase knowledge production that should create knowledge-based competitive advantages.[26]

Digital technologies can foster the creation of new formal private sector jobs that are adapted to the current skill supply. This requires a critical mass of digital entrepreneurs and addressing financial constraints for startups at early stages. Innovation in digital technologies has typically been based on a complex platform that enables millions to earn a living by knowing only how to drive a car and follow instructions on the screen or how to accept a booking request online and then open their doors to host guests for a fee (for example, Uber, Airbnb, and similar platforms). For instance, Uber has created thousands of jobs and served about 1.8 million riders in Sub-Saharan Africa. E-commerce leader Jumia employs about 3,000 workers across the region and an additional 100,000 workers who help customers place orders (Ng'weno and Porteus 2018). Despite the short-term nature of some of these jobs, digital technologies help create jobs for a significant share of low-skilled workers in the region, helping them to save and later use those savings to start their own firms—mostly formal firms. For instance, the introduction of credit transfer technology by MTN Ghana enabled people to buy SIM cards, load them with money (credit), and sell the credits in smaller units to customers. Many of these credit sellers saved and transformed their businesses into larger, formal telecommunication support businesses.

Digital technologies can also increase the productivity of low-skill workers in their current occupation. Some workers may require complementary training (that is, adult literacy and digital literacy) that can be delivered through digital technologies. It is of paramount importance to develop adequate and relevant context-specific solutions. For instance, several companies have

22 See Arias, Evans, and Santos (2019) for detailed statistics on tertiary education enrollment, including STEM, across Sub-Saharan African countries.

23 Having a critical mass of high-skilled people adapting digital technologies to local capabilities and needs would help low-skilled workers in the region to upgrade their skills.

24 South Africa was granted 124,581 patents between 1990 and 2017—about 93.3 percent of the total in the region. South Africa spends more on research and development (R&D) compared with other countries in the region, despite R&D outlays representing less than 1 percent of GDP (Blimpo and Owusu 2020).

25 By 2018, about 8,100 students had been enrolled under the ACE project; of those students, 2,025 were female, 6,500 were master's students, and 1,600 were PhD students. The Association of African Universities has been very effective in coordinating and checking the quality of the various ACEs.

26 For other initiatives, like the Partnership for Skills in Applied Sciences, Engineering and Technology, see Blimpo and Owusu (2020).

leveraged digital technologies to boost the productivity of farmers by improving their access to information, inputs, and resources. Farmerline provides an online platform that connects and communicates (in their native language) with 200,000 farmers across 11 countries on best agricultural practices (weather, market prices, and inputs).[27] The skill level required for some of the digital solutions might be low, but the potential benefits of using them could drive their adoption and diffusion.

Innovation and technological development in Sub-Saharan Africa have mostly relied on governments providing the enabling business environment, investing in research and development (R&D), and supplying the analog complements—for example, electricity and the regulatory framework (top-down model). However, adaptive innovations and inventions can be implemented by the private sector operating in an entrepreneurial model and often sponsored by development partners (bottom-up model). Risk and failure are integral and accepted parts of the model. Countries in the region should embrace rather than neglect bottom-up models to unlock the power of technological entrepreneurship.

As Africa's connectivity accelerates, the ability of the region's digitalization to create the conditions for new jobs is being tested. A series of interventions will be needed to create these conditions: (1) a pragmatic and coherent national ICT strategy, (2) infrastructure that adequately supports the digital economy, and (3) a critical mass of digital entrepreneurs and high-skilled youth with a strong ICT skills base. Given the initial conditions of countries in the region, it will take a massive effort and investment to create a workforce of qualified, high-end skilled professionals in science, technology, and business. Improving the quantity and quality of math, science, and business education as well as growing enrollment in these fields at the tertiary level are critical to develop such workforce (Manyika et al. 2013).

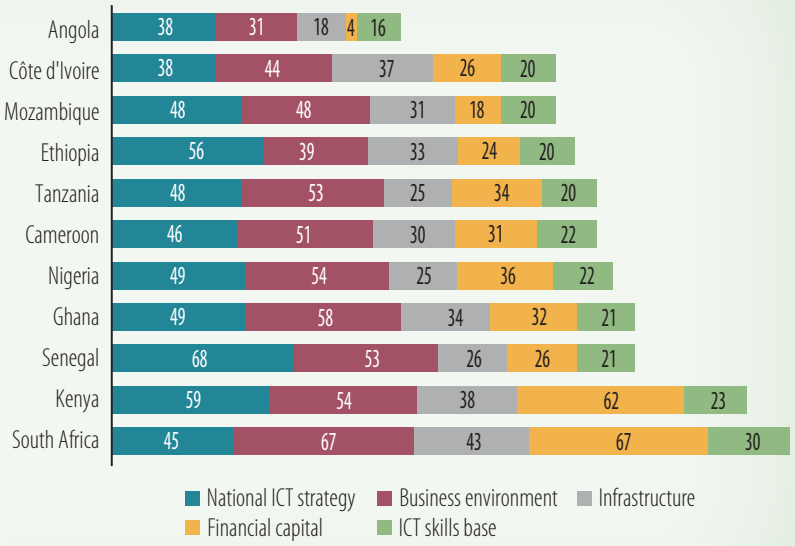
Are countries in the region ready to seize the opportunities offered by the internet? Empirical studies assess internet readiness along five dimensions: (1) national ICT strategy, (2) business environment, (3) infrastructure, (4) financial capital, and (5) ICT skills base.[28] The evidence shows that all the countries in the region, except South Africa, have low scores on their ICT skills base readiness to leverage internet opportunities (a score below 30 points). Furthermore, the ICT skills base is the dimension with the poorest performance across countries in the region (see figure 2.2). The International Telecommunication Union's ICT Development Index corroborates this finding: most Sub-Saharan African countries are at the bottom of the global ICT skills base distribution worldwide—specifically, 23 of the 24 lowest scores (in a worldwide sample of 176 countries) are registered by countries in the region. Among the factors explaining these low scores are the poor quality and quantity of math and science education, low tertiary enrollment, and insufficient availability of scientists and engineers (Blimpo and Owusu 2020).

27 Other illustrations of digital solutions in agriculture can be found in Deichmann, Goyal, and Mishra (2016); Fabregas, Kremer, and Schilbach (2019); Choi, Dutz, and Usman (2020); and in volumes 22 and 23 of *Africa's Pulse*.

28 For more details, see Manyika et al. (2013).

Seizing the opportunities provided by the internet would require significant progress in the formation of the ICT skills base.

FIGURE 2.2: ICT Readiness in Selected Sub-Saharan African Countries, by Dimension



Source: World Bank calculations based on data from Manyika et al. 2013.
Note: Each variable is a composite index scored between 0 and 100. ICT = information and communications technology.

Recent empirical evidence suggests that there is a positive and significant relationship between expenditures on R&D, skills (enrollment in higher education), knowledge production (patents), employment, and job creation. Greater knowledge production (by residents of countries in Sub-Saharan Africa) is associated with larger R&D investments and higher skill levels. Knowledge production is also associated with higher rates of job creation (in services and mining, utilities, and construction) as well as higher employment (in services, manufacturing, mining, utilities, and construction). From these findings, it can be argued that investment in high-end skills can potentially produce the knowledge (technology) to create the conditions for new jobs in Sub-Saharan Africa.[29]

Raising Informal Sector Productivity

The large informal sector in Sub-Saharan Africa poses several challenges.[30] It consists of a large number of people with often inadequate skills for modern, formal jobs. Farms, firms, and workers in the informal sector—compared with those in the formal sector—have poor access to information on inputs, knowledge, and output markets. They also have limited revenues and lower productivity. Employment opportunities in the formal sector are limited in most countries in the region—the share of wage employment in total employment does not exceed 20 percent in Burkina Faso, Cameroon, Ethiopia, Madagascar, Tanzania, and Zambia.[31] Working in the informal sector is probably the only pathway to generate income for the majority of the labor force. Therefore, policy actions to improve workers' welfare in the short term should account for the persistence of informality and focus on skill formation strategies and adoption of digital technologies to enhance their productivity. Agriculture and non-traded services exhibit the highest rates of job creation—and these activities are mostly informal and with low productivity. Non-traded services are characterized by high informality, low-paid jobs, and low-skill and low-productivity tasks that have increased rapidly. These activities have absorbed the labor

29 See Choi, Dutz, and Usman (2020).

30 Sub-Saharan Africa has (1) most of its poor people living in rural areas and earning their living primarily in farming (82 percent), and (2) the largest informal labor market (89 percent of total employment) and share of informal enterprises (about 90 percent of all businesses).

31 See Adams, Johansson de Silva, and Razmara (2013); Benjamin and Mbaye (2012); Böhme and Thiele (2012); Cassim et al. (2016); McKenzie and Sakho (2010).

released from agriculture at the expense of manufacturing and traded services. Adopting digital technologies to boost the productivity of the workforce absorbed in these sectors is critical.[32]

Digital technologies alleviate the asymmetric information problems of businesses and workers in the region, including those in the informal sector, by connecting them to markets (consumers, input providers, and so forth). In low-income environments, low-skill-biased digital technologies (for example, instructional videos, voice-activated tactile screens, and simple-to-use applications) can empower low-skilled informal workers to perform higher-skill tasks and learn on the job. Such technologies can help workers to accumulate small savings, access credit and insurance products based on their savings and purchase habits, and move to better jobs over time. Digital tools enable the smallest informal entrepreneurial firms and farms to access larger networks and markets. For instance, women in Kenya can obtain mobile credit, buy food products from a wider network of farmers to resell in local markets, and thus invest and save more. Social media platforms (such as Instagram, Twitter, and WhatsApp) are being used to advertise goods and services to a larger group of customers and at lower costs. Despite the benefits from digital technologies, there is still low uptake by informal firms.[33] The next section presents more recent evidence on the uptake of digital technologies among informal businesses in selected Sub-Saharan African countries (Mothobi, Gillwald, and Aguera 2020)—with an emphasis on the relationship between digital technologies and job creation among micro firms in Senegal (Atiyas and Dutz 2021).

Digital financial services can facilitate the formalization of informal firms. Informal sector businesses use retail electronic payment systems, virtual savings, and virtual credit supply platforms. Digital solutions to payment and market access problems could allow informal businesses in Sub-Saharan Africa to transition into an environment of formal transactions.[34] Additionally, to the extent that formalization is related to skill acquisition, enhanced access to multipurpose technologies will provide more information and resources as well as easy-to-use applications that can thus help reduce informality. However, more research is needed to show that digital financial services can effectively increase compliance with formal business requirements (Berkmen et al. 2019). Therefore, a more realistic pathway to formality requires boosting the productivity of informal businesses across the sectors of economic activity—as firms may not formalize unless they grow. The adoption of digital technologies can play a role in boosting their productivity by alleviating information constraints through social media, reaching more clients, and reducing financial frictions by adopting mobile money and other digital financial services (Nguimkeu and Okou 2020).[35] Reaping the benefits of increased digital technology adoption by informal businesses requires a series of analog complements. Adequate digital infrastructure is needed as well other types of infrastructure (electricity, transport, and logistics), human capital (including digital skills and literacy levels), and a supporting business environment.

32 Financial, insurance, and real estate are the business services with the lowest rate of annual job creation. Absorption of labor by these sectors is restricted by their skill content and capital intensity.

33 Evidence from Kenya, Rwanda, Tanzania, and Uganda shows that mobile phones are the most commonly used ICT device among informal businesses. Still, an important share of informal businesses argue that they do not need to use a mobile phone. This is the case of subsistence activities, which are very limited in scope (say, street vendors), or activities where owners lack awareness of the services and potential benefits (Deen-Swarray, Moyo, and Stork 2013).

34 Inconsistent taxation of digital services and over-the-top regulations may reduce access, which is deleterious for the formalization process.

35 Adopting digital IDs can facilitate formalization; however, many countries have low-quality internet connectivity and inadequate telecom infrastructure. In the Democratic Republic of Congo, conflict and fragile development led to infrastructure challenges such as the lack of national ID documents and legal procedures that endorse traditional collateral. These challenges have restricted the development of the financial sector.

Digital Technology Adoption, Employment, and Productivity across Sub-Saharan African Firms

The relationship between technology adoption and employment is being widely investigated in advanced economies and developing countries. However, the challenges posed by the emergence of advanced labor-saving technologies and the solutions implemented differ between advanced and developing economies—at least in the short to medium term. Prior to the COVID-19 shock, Africa was already facing an increasing need to generate jobs to meet the demands of a young and growing population. The pandemic has increased awareness of the importance of digital technologies and many African countries are seizing this opportunity to create the conditions for jobs.

Uptake of Digital Technologies among Micro Firms in Sub-Saharan Africa

The informal economy is a major source of income and job creation for most people in Sub-Saharan Africa. A recent survey of informal businesses in nine Sub-Saharan African countries[36] finds that the majority of these businesses are in wholesale and retail trade,[37] and they are also owned/headed by women (54 percent)—especially in Nigeria (59 percent), Ghana (58 percent), and Mozambique (50 percent). Self-employment is one of the major reasons why informal entrepreneurs started their own business (about 40 percent in all the surveyed countries).[38] The ability of informal businesses to grow and create more jobs is restricted by lack of financing. For most of these businesses, self-financing is the most common source of funding: around 83 percent of these firms use their own savings, 11 percent receive funding from family and friends, and 2 percent borrow from microfinance institutions. The percentage of informal firms that have access to finance in the formal banking sector is negligible (0.2 percent).[39] Financial technologies, such as mobile money and online crowdfunding, can potentially enhance financial inclusion by reducing transaction costs and information asymmetries (via alternative methods to assess creditworthiness).[40]

The adoption of digital technologies can lead to better jobs for more people—as firms' sales and productivity increase. For instance, the use of e-mail to connect with suppliers or clients, or a business website to have/increase online presence can boost the firm's productivity. On the one hand, these digital solutions expand the group of clients of the firm or increase the number of online transactions of existing clients. On the other hand, businesses with an e-mail account to connect with suppliers expand their potential group of input providers and boost production efficiency. Finally, greater firm profitability might, in turn, allow firms to invest in innovation, including managerial upgrading, or other types of technology adoption. The empirical evidence points to important benefits from digital technology adoption for firms in Sub-Saharan Africa.[41] Still, the use of the internet for business purposes is also very low in Africa: only 7 percent of the

36 The 2017 After Access Informal Business Survey was conducted in Ghana, Kenya, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, and Uganda. It examines the potential of the informal sector to create employment and its readiness to reap the benefits from the digital dividends arising from the use of digital technologies (Mothobi, Gillwald, and Aguera 2020).

37 About 40 percent of the firms surveyed are in services such as tailoring, welding and fitting, laundry, shoe repair, and mobile money services, among others. Informal agricultural businesses constitute 7 percent of the surveyed firms.

38 In 2017, more than half of Ghanaian businesses surveyed were created to make additional income. Enterprise income is not separated from family income in the majority of informal businesses in Rwanda, Mozambique, and Nigeria.

39 Restricted access to formal financial services by informal businesses in Sub-Saharan Africa is attributed to a series of factors, including inadequate (or inexistent) collateral, lack of credit history or bad credit history on the part of the firm's owner, poor business model, or lack of financial records, among others.

40 The survey shows that fintech applications have managed to provide opportunities to the unbanked entrepreneurs in the region. For instance, 71 percent of informal businesses in Kenya have access to financial services through mobile money services (68 percent) or banking services (28 percent). More than one-third of informal businesses use mobile money services in Rwanda, Ghana, Uganda, and Senegal.

41 See volume 22 of *Africa's Pulse* and the references therein.

informal businesses surveyed prior to the pandemic in nine Sub-Saharan African countries. The penetration of the internet among informal firms is greater than the average for the region in South Africa (24 percent) and Mozambique (20 percent).

The low uptake of the internet among informal businesses in the region is attributed to several factors. First, the surveyed firms do not have internet-enabled devices. For instance, more than nine in 10 informal businesses did not have a working computer in Ghana, Kenya, Mozambique, Nigeria, Tanzania, Uganda, and Rwanda. Computer ownership among informal businesses is high only in South Africa (20 percent). Second, business owners are not aware of the potential impact of the internet on business, or they consider it expensive. For instance, the majority of informal businesses claimed that access to the internet was too costly in Rwanda, Kenya, and Senegal.

The penetration of computers might be low among informal entrepreneurs, but the use of mobile phones is quite high—with penetration rates of more than 80 percent in Kenya, Senegal, and South Africa. Yet very few of the entrepreneurs use a mobile phone for business purposes only. For instance, 8 percent of informal firms in South Africa have a mobile phone to conduct business only, and that proportion is lower than 5 percent in all the other surveyed countries. Rwanda has the lowest adoption rate of mobile phones among informal firms (about 20 percent); however, more than half of these firms use the mobile phone for their business. Senegal has the highest share of informal businesses using a mobile phone for business and personal purposes (35 percent).[42]

The use of digital platforms to match buyers and sellers, and increase the visibility of informal entrepreneurs is not widespread. E-commerce solutions (for online sale of goods and services) are used by only 10 percent of the informal businesses with access to the internet, while nearly one in four informal entrepreneurs uses the internet to search for suppliers online. More than half of informal businesses using the internet have an e-mail address in Rwanda, Mozambique, South Africa, and Uganda; the proportion is less than one in four among Tanzanian informal entrepreneurs. Additionally, 30 percent of Ghanaian informal microenterprises sell their products and services online—and that proportion is less than one in four among informal firms with internet use in the other countries. Informal businesses that use e-commerce platforms for online sales of goods and services receive about 16 online orders per month.

Finally, informal microenterprises use the internet to host their websites and access a series of platforms that will help them scale and widen their geographical reach of customers and supplier networks. For instance, about 78 percent of the surveyed informal businesses in the region used the internet to develop new ideas on service improvement. The internet helped 64 percent of the informal microenterprises to connect with their customers and evaluate their consumer needs. The use of the internet has also helped increase the sales of 65 percent of these informal microenterprises, and it has expanded the geographical reach of consumer and supplier networks for almost half of these firms.[43]

42 Most informal businesses that use the internet in their production processes have access via mobile broadband services (71 percent), followed by public Wi-Fi (23 percent) and fixed broadband services (6 percent). About half of the informal businesses with access to the internet use it to send/receive e-mails, and one-third make voice calls over the internet (Mothobi, Gillwald, and Aguera 2020).

43 Informal businesses also fear the downside risks of using the internet. Exposure to online business fraud is a concern for one in four of these firms. Reputational challenges to business operation are reported by 8 percent of all the surveyed informal microenterprises (Mothobi, Gillwald, and Aguera 2020).

Digital Technologies and Job Creation of Informal Microenterprises: The Case of Senegal[44]

Adoption and use of digital technologies are associated with better firm performance in Sub-Saharan Africa. This can be illustrated by recent research among micro-size enterprises in Senegal that examines the relationship between different types of digital technologies and performance—including employment, labor productivity, and sales, among others.[45] Digital technologies include access technologies (use of smartphones), external-to-firm transaction technologies (that is, firms' external transactions with upstream and downstream product providers and consumers, financial intermediaries, labor markets, and the government), and internal-to-firm management technologies (say, accounting and inventory control/POS software, as well as payment of workers).[46] Performance is measured using jobs outcomes (for example, employment, average wages, and entrepreneurs' profits) and general business outcomes (for example, labor productivity, sales, and the ability to export goods and services).

*Adoption and use of digital technologies by Senegalese micro firms***.** More than 90 percent of the firms that were surveyed in 2017–18 were not fully formal. The firms are classified as not fully formal if they do not meet any of the formal sector requirements: registration with local governments, registration with the national revenue authority, payment of local or municipal taxes (tax stamps), and registration for national value-added tax or sales tax. Hence, 56 percent of the surveyed firms were fully informal (that is, they did not meet any of the requirements for being classified as formal), 37 percent were semi-formal (they met one to three of these conditions), and 7 percent were formal.[47] Most of the surveyed firms in Senegal operated in retail or wholesale trade (57 percent), with the proportion in the trade sector being greater among businesses with older owners and men-owned micro enterprises (73 and 66 percent, respectively).[48] In contrast, about 13 percent of the surveyed firms were in agriculture, with activities in this sector being more likely to be conducted by businesses with older owners and women-owned firms (76 and 56 percent, respectively).

Micro enterprises in Senegal use a variety of digital tools (access, external-to-firm, and internal-to-firm technologies) in their operation processes, with differences in adoption and use across the age and gender of the business owners (see table 2.1). For access technologies, about 90 percent of the informal businesses use a mobile phone (regardless of the generation of mobile network technology). Higher rates of mobile phone penetration are observed among young business owners vis-à-vis old business owners (92 and 89 percent, respectively) as well as among men owners vis-à-vis women owners (93 and 84 percent, respectively). However, smartphone penetration is sharply lower among informal businesses (18 percent). Young business owners are almost twice as likely to use a smartphone relative to old business owners (27 and 14 percent, respectively). Young women are as likely to use a smartphone as young men (about 27 percent). Fewer micro enterprises use a computer or have a website (9 and 5 percent, respectively).

44 The Senegal case study draws heavily on Atiyas and Dutz (2021).

45 The analysis of the adoption and use of digital technologies is conducted for a sample of 517 informal micro businesses in Senegal in 2017–18. For details on the sampling, see Atiyas and Doğanoğlu (2020).

46 External-to-firm digital technologies include the use of mobile money to pay suppliers and receive customer payments, use of the internet to look for suppliers, digital tools to recruit workers, marketing, interacting with government organizations, using e-commerce to sell goods and services online, and using online banking.

47 The distribution of informal micro firms by their extent of informality is similar across the nine Sub-Saharan African countries surveyed in Mothobi, Gillwald, and Aguera (2020).

48 Youth-owned enterprises are defined as those whose owners are age 30 years or younger.

TABLE 2.1: Use of Digital Technologies among Senegalese Micro Firms, by Age and Gender of Owner (%)

Digital tecnologies	All firms	Youth-owned	Older-owned	Women-owned	Men-owned	Younger women	Older women	Younger men	Older men
1. Access Technologies									
Use any mobile	89.4	92.1	88.6	83.5	92.6	88.0	82.1	94.4	91.9
Use smartphone	18.3	27.1	14.1	15.5	19.8	27.4	10.1	26.9	16.2
Use computer	9.0	12.0	7.9	8.3	9.4	13.1	6.2	11.4	8.7
Have website	4.6	7.9	3.2	3.6	5.1	7.0	2.0	8.3	3.8
2. External-to-Firm Transactions									
Look for suppliers	5.8	10.4	3.9	5.6	5.9	9.6	3.8	10.9	3.9
Pay suppliers	25.0	27.7	23.8	19.9	28.7	25.7	14.7	28.8	28.5
Marketing	12.8	22.2	8.2	11.9	13.3	23.7	6.4	21.4	9.1
E-commerce	8.1	11.6	6.7	6.6	8.9	9.1	5.6	13.0	7.3
Receive payments	25.9	30.6	22.9	20.3	29.0	25.0	16.9	33.8	26.0
Use online banking	4.1	9.0	1.9	3.8	4.2	6.7	2.4	10.3	1.6
Recruit workers	2.2	3.1	1.3	2.2	2.2	3.9	1.5	2.6	1.2
Interact w/ government	1.7	2.2	1.5	2.0	1.6	3.0	1.5	1.7	1.5
Pay taxes	4.2	5.4	3.8	3.8	4.5	3.7	4.0	6.4	3.7
3. Internal-to-Firm Management									
Accounting software	6.8	10.9	5.0	7.1	6.6	13.1	4.4	9.6	5.4
Inventory control/POS	5.3	7.5	4.4	6.4	4.7	12.4	3.7	4.6	4.8
Pay workers	6.1	8.8	5.1	3.6	7.5	4.2	3.4	11.4	5.9

Source: Atiyas and Dutz 2021.

Note: All responses are the percentage of firms based on weighted data. Use any mobile responds to "Does the business manager have a mobile?" irrespective of whether it is for private or business use or both. Smartphone users answered "yes" to "How does the business access the internet: Mobile broadband (3G/4G, wireless)?" Use computer is a non-zero response to "How many computers does your business have?" Website is in response to "Does your business have a website?" Reported answers to "What do you use the internet for?" include "looking for suppliers online," "e-commerce (selling products and services online)," "internet/online banking," "recruitment," and "interacting with government organizations." Reported answers to "Does the business use mobile money for…" include "paying suppliers," "receiving payments from customers," "paying taxes," and "paying employees." Marketing (understanding customers) is an "agree" (as opposed to "not sure" or "disagree") response to the question "Regarding the internet/social media use, it helps to understand our customers better." The management-related questions are "Does your company use accounting software?" and "Does your company make use of inventory control/point of sale (POS) software?" (both asked in the computer section of the questionnaire).

Micro firms in Senegal use a series of external-to-firm technologies for product-related transactions with upstream supplier businesses and end-use customers. The use of mobile money to pay suppliers and receive customer payments is the most commonly adopted technology—with 25 and 26 percent of micro owners using them, respectively.[49] Young business owners are more likely than old ones to use mobile money for payments—31 percent of businesses owned by young entrepreneurs and 23 percent of those owned by old entrepreneurs use mobile money to receive payments. Among internet-enabled solutions, marketing tools are the most frequently used (13 percent). Businesses with young owners are

49 These transactions do not necessarily need an internet-enabled smartphone.

more than twice as likely to use digital marketing tools than old owners (22 and 8 percent, respectively), and this age divide holds across gender. The adoption of digital technologies for finance is also low. Only 4 percent of Senegalese microenterprises use online banking. Young business owners are more than four times as likely to use online banking than older owners (9 and 1.9 percent, respectively). A small proportion of firms use the internet to recruit workers (2.2 percent)—with businesses owned by young women being the group that is more likely to use digital tools for worker recruitment (3.9 percent).[50]

Finally, accounting and inventory control/POS software are the most common digital tools used for business management (6.8 and 5.3 percent, respectively)—especially among young entrepreneurs. For instance, youth-owned businesses are more than twice as likely to use accounting software than businesses with older owners (10.9 and 5.0 percent, respectively). Younger women business owners are the most likely to use management software (13.1 percent use accounting software and 12.4 percent use inventory/POS software). Using mobile money to pay workers is not as common as other uses of mobile money: only 6.1 percent of informal businesses, and that proportion is higher among young men business owners (11.4 percent).

Relationship between digital technologies, firm employment, and output performance. The relationship between the different uses of digital technologies (access, external-to-firm transactions, and internal-to-firm management technologies) and firm performance (jobs and general business outcomes) among Senegalese microenterprises is summarized in table 2.2. The table shows the correlation between a series of different digital technologies and performance indicators—such as employment, wages, labor productivity, and sales, among others.[51]

Jobs outcomes. Adopting digital technologies can potentially have an impact on jobs. Table 2.2 shows the conditional correlation between the different digital technologies and two dimensions of jobs outcomes: first, *jobs for more people* (or employment as measured by the number of full-time employees and owners, a proxy of firm size) and second, *better jobs* (as measured by average wages and profits per owner-entrepreneur). Can digital technologies deliver more and higher-quality jobs? Employment is higher in firms that use digital solutions to recruit workers and interact with the government as well as in those with improved management functions—that is, firms that use inventory control/POS software tend to have more workers (fourth column in table 2.2). Overall, the evidence suggests that employment, productivity, and sales are higher in firms that have adopted digital solutions for management.

The quality of jobs is also related to the adoption of digital technologies. For instance, average wages are higher among firms that use external-to-firm solutions, such as the internet to find suppliers and mobile money to pay suppliers.[52] The average wage of firms using those digital transaction technologies is between 1.5 and 2.4 times that of nonuser firms. Use of improved business management practices (say, using inventory control/POS software) is associated with

50 This finding is not surprising since online recruiting will be used only by firms that are not self-employed with no full-time employees, have access to the internet, and do not rely on informal local contacts, including family members and friends (Atiyas and Dutz 2021).

51 The regression analysis in table 2.2 also controls for firm characteristics, including whether the firm had a loan, had access to electricity, was fully informal, had an owner with vocational training, and had a self-reported transformational entrepreneur. Some of the empirical regularities observed in the regression analysis for the non-digital control variables are (1) access to finance ("having a loan") is positively associated with labor productivity, total sales, exporting status, job creation, and entrepreneur profits, and (2) access to electricity ("having electricity") is directly related to labor productivity, total sales, firm size, and the rate of profits per owner (see table 2.2).

52 Average wages are defined as salary and wages in a typical month divided by the total number of full-time employees.

TABLE 2.2: Use of Digital Technologies and Firm Performance in Senegal: A Scorecard

Control Variables	General business outcomes			Jobs outcomes		
	Labor productivity	Total sales	Exporting	Firm size (more jobs)	Average wages (better jobs)	Entrepreneur profits (better jobs)
1. Digital Technologies						
1.1 Access						
Use smartphone	[+]	[+]	[+]	[0]	[0]	[+]
1.2 External-to-firm transaction						
Look for suppliers	[0]	[0]	[+]	[0]	[+]	[0]
Pay suppliers	[+]	[+]	[0]	[0]	[+]	[0]
Marketing	[0]	[0]	[+]	[0]	[0]	[0]
Use e-commerce	[+]	[0]	[+]	[0]	[0]	[0]
Customer payments	[+]	[+]	[+]	[0]	[0]	[+]
Use online banking	[0]	[0]	[+]	[0]	[0]	[+]
Recruit workers	[0]	[0]	[+]	[+]	[0]	[+]
Government	[0]	[0]	[+]	[+]	[0]	[+]
1.3 Internal-to-firm management						
Accounting s/w	[0]	[+]	[0]	[0]	[0]	[0]
Inventory control/POS	[+]	[+]	[0]	[+]	[0]	[+]
Pay workers	[0]	[0]	[+]	[0]	[0]	[0]
2. Select Control Variables						
Having a loan	12 [+]	12 [+]	12 [+]	12 [+]	[0]	12 [+]
Having electricity	12 [+]	12 [+]	[0]	11 [+]	[0]	12 [+]

Source: Atiyas and Dutz 2021.

Note: [+] indicates that the estimated coefficient of the variable of interest is positive and significant in the performance regression. [-] indicates that this coefficient is negative and significant in the performance regression. [0] denotes no significant statistical relationship. These estimated coefficients are obtained from least squares regressions with robust standard errors using weighted data. The regressions control for a series of drivers of performance (general business outcomes and jobs outcomes) including having a loan, having electricity, sectors of economic activity, firm size, type of activity, and schooling of owners, among others.

greater employment rather than higher average wages (fifth column in table 2.2). Finally, firm profits per owner are higher among firms that use a smartphone, use digital solutions to pay suppliers and receive customer payments, and adopt inventory control/POS software (sixth column in table 2.2). The estimates suggest that income per owner is higher for firms using smartphones (2.7-fold) and inventory control/POS software (4.8-fold), compared with firms not using these digital solutions.

General business outcomes. Microenterprises using smartphones tend to exhibit greater labor productivity than those without digital access devices (or 2G mobile phones). On average, firm sales and (labor) productivity are higher among business owners using smartphones (vis-à-vis those without a digital access device or 2G mobile phone), mobile money to pay suppliers

and receive customer payments, as well as digital business management solutions such as accounting and inventory control/POS software (first and second columns in table 2.2).[53] Interestingly, management technologies are more useful for local sales than for exporting—as the use of inventory control/POS software has no significant association with the likelihood of exporting. By contrast, the adoption of external-to-firm transaction technologies is associated with a greater probability to export—especially the use of the internet to look for suppliers online and for marketing purposes. Using e-commerce to sell goods and services online and using mobile money to receive customer payments are associated with a greater probability of exporting (third column in table 2.2).

Digital technologies and performance: evidence for larger firms in Senegal. The evidence on the relationship between employment and adoption of new technologies for micro enterprises is complemented by evidence for larger businesses from the Firm-level Adoption of Technology (FAT) survey that was implemented in Senegal (Cirera, Comin, Cruz, and Lee 2021). The survey consisted of a nationally representative sample of 1,800 firms with five or more employees, formal and informal, across all sectors of economic activity (agriculture, industry, and services). It provides information on the use of technology by firms at a granular level. The technologies used by firms are identified by their different business functions, and they can be classified as follows: (1) general business functions (GBFs), which are common tasks that apply to all firms, and (2) sector-specific business functions (SSBFs),[54] which differ across sectors and are linked to core production functions (Cirera, Comin, and Cruz 2020).[55] The FAT survey collected information on more than 300 technologies associated with almost 50 business functions—and this information is converted into a technology index for GBFs and SSBFs, where higher values indicate a greater level of technological sophistication.[56] Specifically, two technology indexes are calculated to assess: (1) whether the firm adopts a technology to perform a given task (extensive margin), and (2) the most used technology to perform such a task (intensive margin).

What are the employment effects from technology adoption? Does it lead to job displacement? Most of the surveyed firms in Senegal do not seem to make any significant change in their labor force. When adopting new technologies (say, new machinery and equipment or software), most firms do not change the number of workers (78 percent) and more than one in four firms offer some training to current workers. Only 2 percent of the firms that were surveyed reported job reduction, while 3.8 percent reported increasing the number of workers (with similar skills) and 6.1 percent reported hiring more qualified workers. After controlling for a series of firm-specific factors, the conditional relationship between adoption of technology and employment growth is positive and significant.[57] In other words, employment growth among Senegalese firms is higher among firms with better technologies—regardless of the measures of technology (GBFs and SSBFs) and their different margins (extensive and intensive). This finding is consistent with evidence that firms with better technologies tend to be more productive and benefit from opportunities to expand—thus leading to increased employment.

53 See Bloom et al. (2014) and the references therein.

54 The FAT survey covers the following GBFs and their associated technologies: business administration, production planning, sourcing and procurement, marketing and customer information, sales, methods of payment, and quality control. These technologies range from basic to the most sophisticated ones.

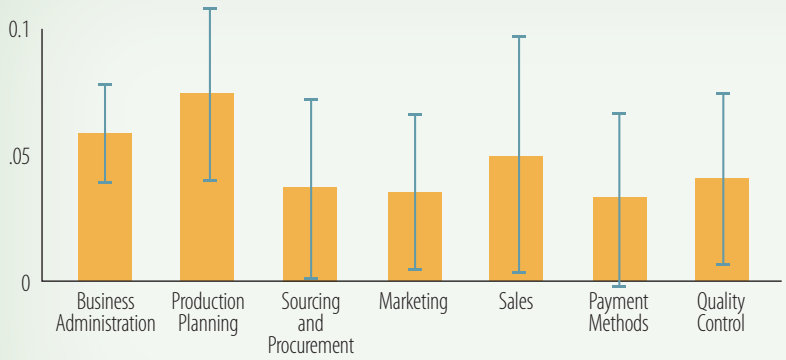
55 The sectors included for the SSBFs are (1) agriculture (crops, fruits, and vegetables), (2) livestock, (3) food processing, (4) wearing apparel, (5) retail and wholesale, (6) land transportation, (7) finance, and (8) health.

56 The index takes values between 1 and 5, with 1 denoting the most basic level of technology used and 5 capturing the most sophisticated level available globally.

57 Firm-specific controls include the size, age, sector, region, foreign ownership, and exporting status. Employment growth is computed between 2016 and 2018. The results do not infer causality (Cirera, Comin, Cruz, and Lee 2021).

The relationship between employment growth and the level of technology adoption is greater and more statistically significant at the intensive margin rather than at the extensive one—specifically when it involves GBFs. This relationship is stronger (and more statistically significant) when firms intensively use more advanced internal-to-firm digital technologies applied to business administration and production planning—say, specialized software and enterprise resource planning systems (see figure 2.3). The adoption of more sophisticated technologies affects not only the magnitude of jobs, but also their skill composition. The evidence shows a negative association between changes in skill intensity (from 2016 to 2018) and the level of technology—after controlling for the initial size as well as other firm characteristics.[58] Although this estimated relationship does not infer causality, it implies that, on average, firms with higher levels of technology tend to have more jobs and an increased share of lower-skilled workers (Cirera, Comin, Cruz, Lee, and Torres 2021).

FIGURE 2.3: General Business Functions and Employment Growth



Source: Cirera, Comin, Cruz, and Lee 2021.

Note: The figure provides the coefficient estimates of the GBF technologies and 95 percent confidence intervals from the employment growth regressions. That is, employment growth is regressed for each specific GBF at the intensive margin while controlling for firm size, sector, and region. GBF = general business function.

Employment growth is higher among firms with better technologies—especially firms using digital technologies for business administration and production planning.

58 High skill intensity is measured by the share of high-skilled workers (chief executive officers and managers, professionals, and technicians) in total workers, including low-skilled labor (clerks, production, and service workers).

2.2 COVID-19, DIGITAL UPTAKE, AND EMPLOYMENT IN AFRICAN FIRMS: EVIDENCE FROM THE BUSINESS PULSE SURVEYS[59]

The pandemic shock has had a pronounced adverse effect on Sub-Saharan African firms. It has disrupted their business continuity and the livelihoods of many entrepreneurs and workers. Business operations have been restricted by supply chain disruptions, limited access to finance, lower customer demand (due to income drops associated with the pandemic), and several public health measures (including non-pharmaceutical interventions such as school closures and lockdowns). Overall, firms face prolonged uncertainty as new variants of the virus that are spreading throughout the continent and the rest of the world may have a lingering effect on business activity.

This issue of *Africa's Pulse* presents new firm-level evidence on the impact of COVID-19 on employment and sales, the likely firm responses to the shock (with emphasis on the use of digital solutions), and firms' access to public support. It uses the *Business Pulse Surveys (BPS)*, a novel data set collected by the World Bank Group and several partner institutions in 51 countries (of which 18 are in Sub-Saharan Africa), covering more than 100,000 businesses—see Apedo-Amah et al. (2020) and Cirera, Cruz, et al. (2021). In the case of Sub-Saharan Africa, the BPS interviewed a total of 15,819 firms across 18 countries (Davies et al. 2021).[60] The BPS uses a globally harmonized questionnaire to evaluate the impact of COVID-19 on firms' operating status, sales, labor adjustments, and responses to the shock (focusing on the use of digital technologies), among others.

Relationship between COVID-19, Firm Employment, and Sales in Sub-Saharan Africa

Amid the COVID-19 pandemic, firms in the region shut down or downsized operations, experienced sharp declines in sales, and adjusted employment by altering the number of jobs or the number of hours worked.

Employment. Amid the drop in sales during the COVID-19 pandemic, the levels of employment across Sub-Saharan Africa were affected by changes in the number of workers or changes in the number of hours worked (see figure 2.4). Despite the sharp decline in sales, firms in the region predominantly reduced hours and wages (adjustment in the intensive margin) rather than laid off workers (extensive margin). Specifically, African entrepreneurs were most likely to reduce work hours (39 percent), grant leave of absence (38 percent), and cut wages (31 percent). They were less likely to fire workers in the face of the COVID-19 shock (21 percent); however, their firing rates were higher than those in other developing countries (17 percent).[61] Instead, Sub-Saharan African firms were more likely to reduce the work hours of employees than other developing countries (27 percent) and high-income countries (17 percent).

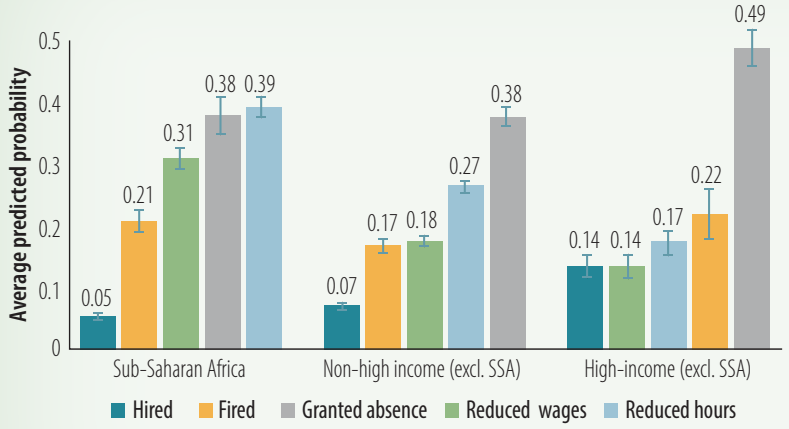
59 This section draws heavily on and benefits from the novel data collected and research conducted by Apedo-Amah et al. (2020); Cirera, Comin, Cruz, and Lee (2021); Cirera, Comin, Cruz, Lee, and Torres (2021); Cirera, Cruz, et al. (2021); and Davies et al. (2021).

60 Most of the surveys were conducted between April and July 2020, when most countries started relaxing the initial lockdown restrictions. To the extent possible, firms are sampled from representative firm listings, based on business censuses, firm registers, and other listings. Data from more countries are currently being collected, and second waves are planned or have been implemented for the existing countries in the sample. In many of these countries, the data are collected in partnership with statistical agencies, business associations, and/or government agencies.

61 The Business Pulse Survey was conducted in the first months of the crisis. As the crisis prolongs and demand continues to decline, firms may increase the number of layoffs (Davies et al. 2021).

Across countries in the region, the (conditional) probability of firing workers varied widely. It was highest in countries with more stringent lockdown measures and sales declines. This was the case of South Africa (52 percent of firms), Zambia (48 percent), and Zimbabwe (35 percent). Large firms were more likely to fire workers compared with micro firms (26 and 13 percent, respectively), even if the former were more likely to remain open and experienced a smaller decline in sales. In selected countries (Ghana and Senegal), formal and informal firms were as likely to lay off workers although that probability was low.

FIGURE 2.4: Average Adjusted Probability of Employment Adjustments in Sub-Saharan Africa, Other Developing Countries, and High-Income Countries



Source: Davies et al. 2021.

Note: The values are average adjusted probabilities from probit regressions that controlled for region, size, sector, and the timing of the survey. The regions in the regression are Sub-Saharan Africa (SSA), non-high-income countries excluding SSA, and high-income countries. The bars represent 95 percent confidence intervals.

African firms were more likely to reduce the number of work hours than to fire workers.

Operating status of the business.[62] In response to the pandemic, governments imposed a series of measures that restricted people's mobility (school closures, travel bans, and restrictions on public gatherings, among others). Despite these measures, most businesses remained open or partially open.[63] About 76 percent of businesses were likely to have remained fully or partially open, a proportion that was lower than that in other developing countries (83 percent) and high-income countries (93 percent).[64] The percentage of firms that remained open in East and Southern Africa was relatively similar to that in West and Central Africa (77 and 74 percent, respectively). Across countries in the region, nearly nine in 10 businesses in Gabon, Senegal, and Ghana were likely to remain (fully or partially) open. Firms in Zambia had a COVID-19 survival rate that was comparable to the regional average, while the likelihood of firms staying in business was the lowest in South Africa and Guinea (see figure 2.5).

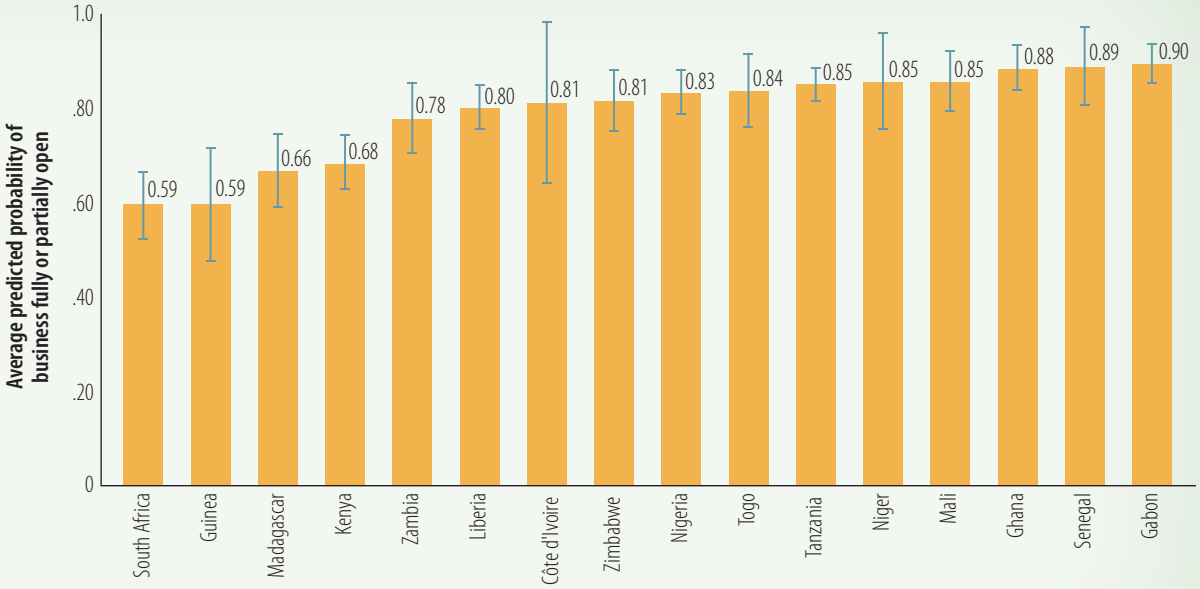
62 The operating status refers to whether the business is open or temporarily closed at the moment of the interview. Sales and employment correspond to their changes 30 days before the interview vis-à-vis the same period in 2019 (Apedo-Amah et al. 2020).

63 The probability of businesses in the region remaining open or partially open is computed after controlling for firm size and sector as well as the timing of the survey (Apedo-Amah et al. 2020; Davies et al. 2021).

64 The estimated conditional likelihood might be a lower-bound estimate as it is only for the businesses that responded to the interview. Some of the businesses that were not reached may have closed (Davies et al. 2021).

Nearly three-quarters of the businesses in the region have remained fully or partially open.

FIGURE 2.5: Conditional Average Probability of Firms Being Full or Partially Open



Source: Davies et al. 2021.

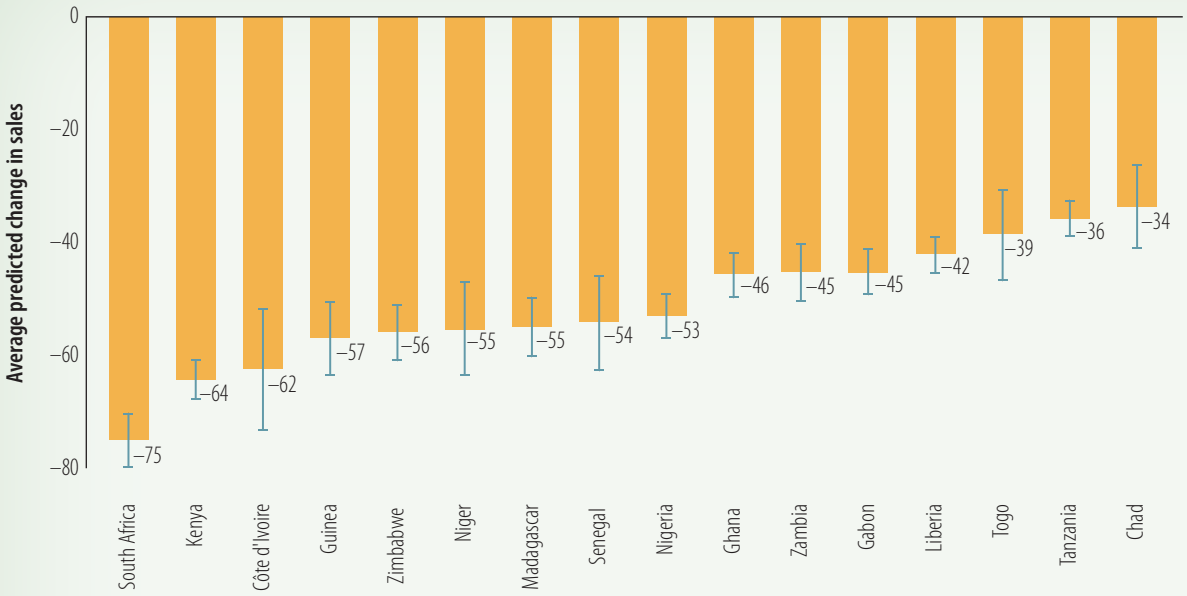
Note: The figure reports the average probability of being fully/partially open after controlling for firm size and sector, as well as the timing of the survey. The bars represent 95 percent confidence intervals.

Firm sales. On average, sales dropped by 49 percent across firms in Sub-Saharan Africa—a decline comparable to that in other low- and middle-income countries (48 percent) but greater than the decline experienced by high-income-country businesses (32 percent). The drop in sales in the face of COVID-19 varied widely across countries, sectors of economic activity, and firm size. At the country level, the conditional average drop in sales volume was sharpest in countries with strict lockdowns. Firm sales volume dropped by 75 percent in South Africa and by more than 60 percent in Kenya and Côte d'Ivoire. In Senegal, Nigeria, and Ghana, the decline in sales was comparable to the regional average. By contrast, Chad, Tanzania, and Togo registered the lowest drops in sales volume. Still, the percentage decline in their sales was significant—between 34 and 39 percent (see figure 2.6).

Across sectors of economic activity, the largest declines in sales were reported by businesses that were more intensive in face-to-face interactions and involved tasks that could not be performed from home. For instance, firms in accommodation and food services experienced a 74 percent decline in sales, followed by those in food preparation (63 percent) and transportation and storage services (56 percent). The decline in sales in the manufacturing sector and ICT was comparable to that for the average sector in the region. Although agricultural and mining firms were the least affected, their sales still dropped by 38 percent (see figure 2.7).

FIGURE 2.6: Average Change in Firms' Sales (%)

Firms' sales dropped by almost half in Sub-Saharan Africa.

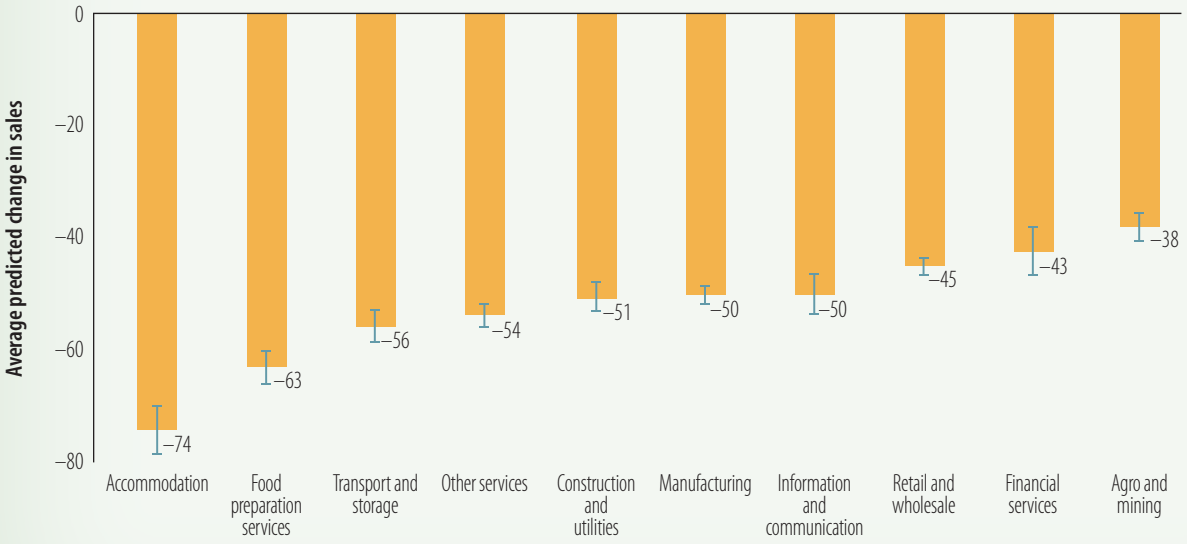


Source: Davies et al. 2021.

Note: The conditional average change in sales was computed after controlling for firm size, sector, and the timing of the survey. The bars represent 95 percent confidence intervals. For temporarily closed firms, the change in sales equals minus 100 percent; closed firms were excluded.

FIGURE 2.7: Average Change in Firms' Sales, by Sector of Economic Activity (%)

The largest drop in sales was among businesses that were more intensive in face-to-face interactions and involved tasks that could not be performed from home.



Source: Davies et al. 2021.

Note: The conditional average change in sales was computed after controlling for firm size, sector, and the timing of the survey. The regressions were computed for Sub-Saharan African firms only. The bars represent 95 percent confidence intervals. For temporarily closed firms, the change in sales equals minus 100 percent; closed firms were excluded.

Finally, the impact of COVID-19 on firm sales varied across firm size. There is an inverse relationship between the (conditional) average drop in sales and the size of the firm. For example, micro firms (that is, those with fewer than five employees) registered a decline in sales of 55 percent. Small firms (with five to nine employees) had a drop in sales that was comparable to the average across all firms in the region, while large firms (more than 100 employees) had the smallest decline in sales, at 39 percent. Evidence for selected African countries (Ghana, Senegal, and South Africa) shows that there are no significant differences in the extent of decreased sales among the firms that remained (fully or partially) open in the formal and informal sectors. For instance, the (conditional average) drop in sales among Senegalese formal firms was about 48 percent, while that of informal firms was 52 percent (Davies et al. 2021).

Use of Digital Technologies in Response to the COVID-19 Shock

Digital infrastructure and digitally-enabled services and applications have been essential to fight the spread of COVID-19, cope with uncertainty, and ensure business continuity of governments and the private sector in times of social distancing. COVID-19 has demanded good quality virtual methods of communication, resilient broadband infrastructure, and greater use of online digital services and products.[65] Digital solutions to manage supply and logistics chains have proven important in the face of the initial disruptions of GVCs. E-commerce platforms have enabled firms to maintain access to required intermediate inputs and distribution networks for their products. Analogously, online fintech platforms have facilitated mobile payments. Furthermore, online work platforms have expanded opportunities for the remote delivery of computer programming and other back-office professional services, such as data entry, translation, and marketing (Baldwin 2019). Box 2.2 summarizes some of the public and private responses in digital infrastructure and services to the COVID-19 pandemic.

BOX 2.2: Digital Sector Responses to COVID-19 in Sub-Saharan Africa

In times of social distancing and lockdowns, the internet has been a safeguard for connectivity. As such, governments, businesses, and communities focused on implementing a series of digital policies and responses as the pandemic unfolded. The set of policies that were pursued included finding more affordable ways to increase digital infrastructure and deliver digital services. These two combined can help the continuation of business functions and the delivery of education, health, social protection, civic education, and other services. Thus far, at a global level, national governments have committed more than US$1.5 trillion to digital response measures, surpassing 3 percent of gross domestic product in the Republic of Korea, China, and the European Union.[a]

First-response government interventions and actions by mobile operators focused on enhancing connectivity, strengthening core data infrastructure, and accelerating digitalization of the economy. Many of these actions included reducing prices, avoiding disconnections for lack of payment, and increasing bandwidth. In a similar manner, other measures included the facilitation of network expansions and congestion reduction, such as the adoption of new technologies and temporary release of additional spectrum.

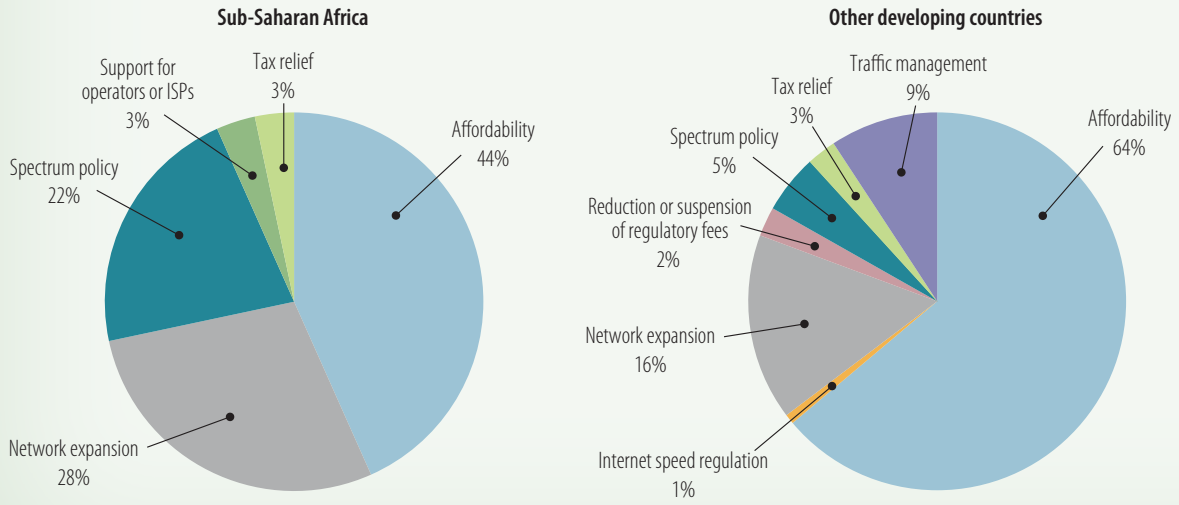
65 Digital technologies for health have played a role in containing the spread of the coronavirus. For instance, digital services and applications are used with data analytics techniques to facilitate public policy decision making (for instance, mobility indicators), assist health professionals (for example, Mobihealth in Nigeria), and support broader health systems. Digital services and applications are facilitating the remote work of the public and private sectors, along with Edutech solutions. Further, digital services and applications such as mobile payments, food delivery, online shopping, social media, and instant messaging have enabled citizens to remain connected and economically active (World Bank 2020a).

BOX 2.2
Continued

These public policies have allowed governments to expand public health access and establish guidelines to continue helping small and medium-size enterprises boost their outreach. Government and private entities have found ways to work together to deliver online services, such as health information and e-learning, and the use of digital payments. Figure B2.2.1 shows the composition of the digital infrastructure policy responses in Sub-Saharan Africa (60 policies) vis-à-vis developing countries outside the region (119 policies). For the region as a whole, most of the digital infrastructure responses were implemented in the areas of affordability (44 percent) and network expansion (28 percent). Among other developing countries, the policy responses were also concentrated in those two dimensions—with a greater emphasis on affordability measures (64 percent). Within the region, South Africa implemented the largest number of measures (four for affordability and five for spectrum policy), followed by Ghana (one for affordability, one for network expansion, two for spectrum policy, and two for tax relief).

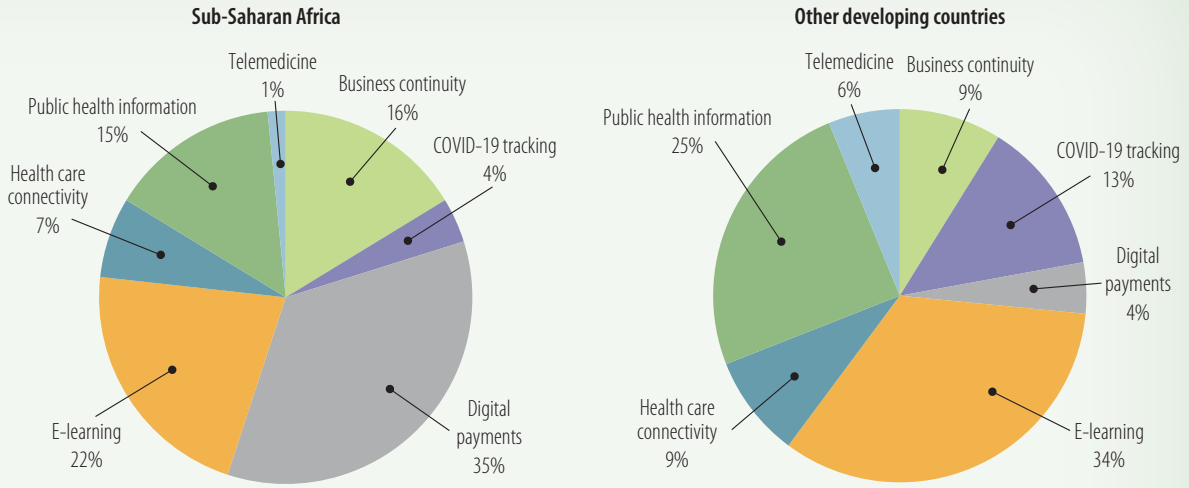
Figure B2.2.2 shows the digital services responses in Sub-Saharan Africa and developing countries outside the region. The Sub-Saharan Africa region implemented 129 measures, while the other developing countries implemented 113 measures. In Sub-Saharan Africa, the responses in digital services were mostly concentrated on *digital payments* (35 percent) and *e-learning* (22 percent). In the other developing countries, the two most frequent responses were *e-learning* (34 percent) and *public health information* (25 percent). Digital payments represented only 4 percent of the services responses. Within Sub-Saharan Africa, Kenya implemented the largest number of policies (22), followed by Uganda (15). Among the other developing countries, Latin America and the Caribbean implemented the largest number of digital services responses (31), followed by the Middle East and North Africa (30) and East Asia and the Pacific (28).

FIGURE B2.2.1: Digital Infrastructure Responses to COVID-19



BOX 2.2
Continued

FIGURE B2.2.2: Digital Services Responses to COVID-19



Source: World Bank Global Digital Development Policy Response Database, 2021.

Note: The database is non-exhaustive, based on measures reported in news and specialized publications. The figures reported use information from the database accessed on February 15. Sub-Saharan Africa includes Angola, Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, the Central African Republic, the Democratic Republic of Congo, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Somalia, South Africa, Sudan, Tanzania, The Gambia, Togo, Uganda, Zambia, and Zimbabwe. Developing countries outside the region comprise 46 countries in East Asia and the Pacific (9), Europe and Central Asia (9), Latin America and the Caribbean (12), the Middle East and North Africa (11), and South Asia (5).

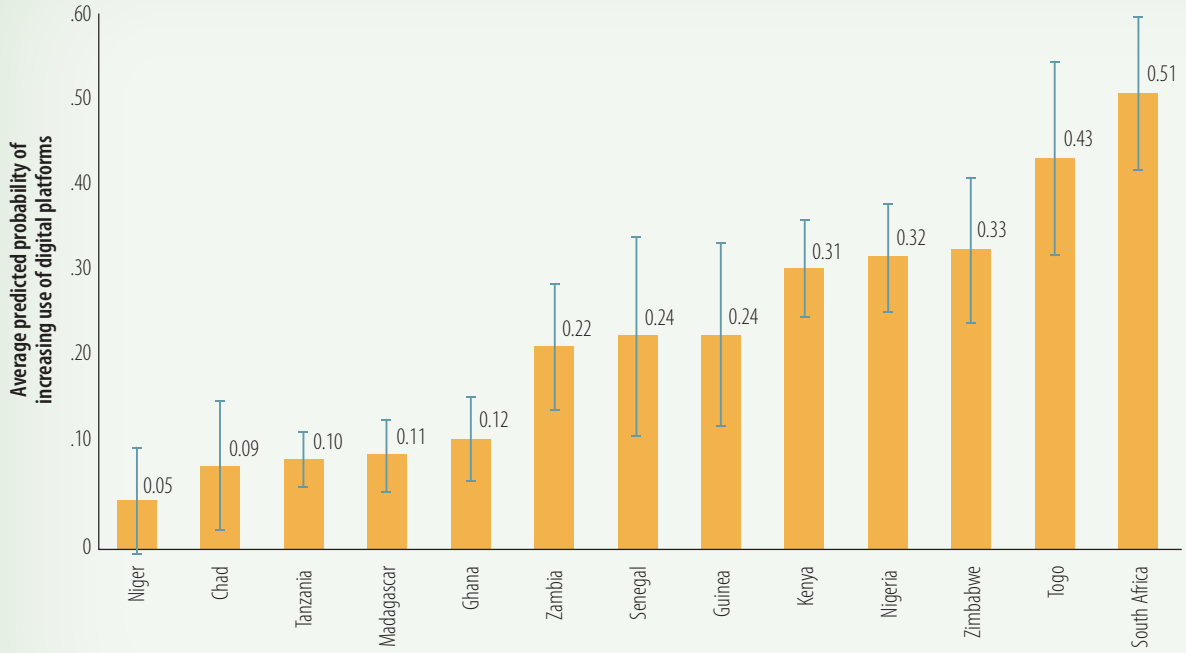
Sources: Lakner et al. 2021; Tang and Begazo 2020.

a. See Tang and Begazo (2020).

A broader look at the behavior of firms in developing countries in the face of the pandemic shock reveals that expanding the use of digital technology was the most common response; however, there was a great deal of variation across countries, sectors, and firms. More than one-third of the firms surveyed in developing countries reported that they had increased or started using the internet, social media, and digital platforms. Seventeen percent of the firms invested in new equipment, software, or digital solutions in response to the pandemic. The pandemic shock has not only highlighted the role of the digital economy in times of social distancing, but also accelerated digital adoption that could boost productivity and create jobs in the future (Apedo-Amah et al. 2020).

In the case of the Sub-Saharan Africa region, more than one in five firms started or expanded their use of digital technology in response to the COVID-19 shock. On average, firms in East and Southern Africa were more likely than those in West and Central Africa to have started or expanded their use of digital platforms (27 and 20 percent, respectively). Still, the propensity to use digital platforms in the region is smaller than that of firms in other developing countries (32 percent). Across countries in the region, there was a great deal of variation in firms' digital response to the pandemic (see figure 2.8). The (conditional) likelihood of having initiated or expanded the use of digital platforms did not exceed 10 percent among firms in Niger, Chad, and Tanzania. Firms in Zambia, Senegal, and Guinea had a likelihood of using digital platforms that was comparable to that of the region. The likelihood in Kenya (31 percent) was comparable to the average of developing countries outside Africa. At the high end, the use of digital platforms was the highest in Togo (43 percent) and South Africa (51 percent).

FIGURE 2.8: Average Adjusted Probability of Starting or Increasing the Use of Digital Technology in Sub-Saharan Africa



Using digital technologies was the most common response to the pandemic, especially in South Africa and Togo.

Source: Davies et al. 2021.

Note: The values are average adjusted probabilities of starting or increasing the use of digital technologies (increased use of the internet, online social media, specialized apps, or digital platforms), calculated from a probit regression that controlled for country, firm size, sector, and the timing of the survey. The computations used weights equal to the inverse of the number of observations per country and excluded countries where the fraction of missing values in the dependent variable exceeded 60 percent. The bars represent 95 percent confidence intervals.

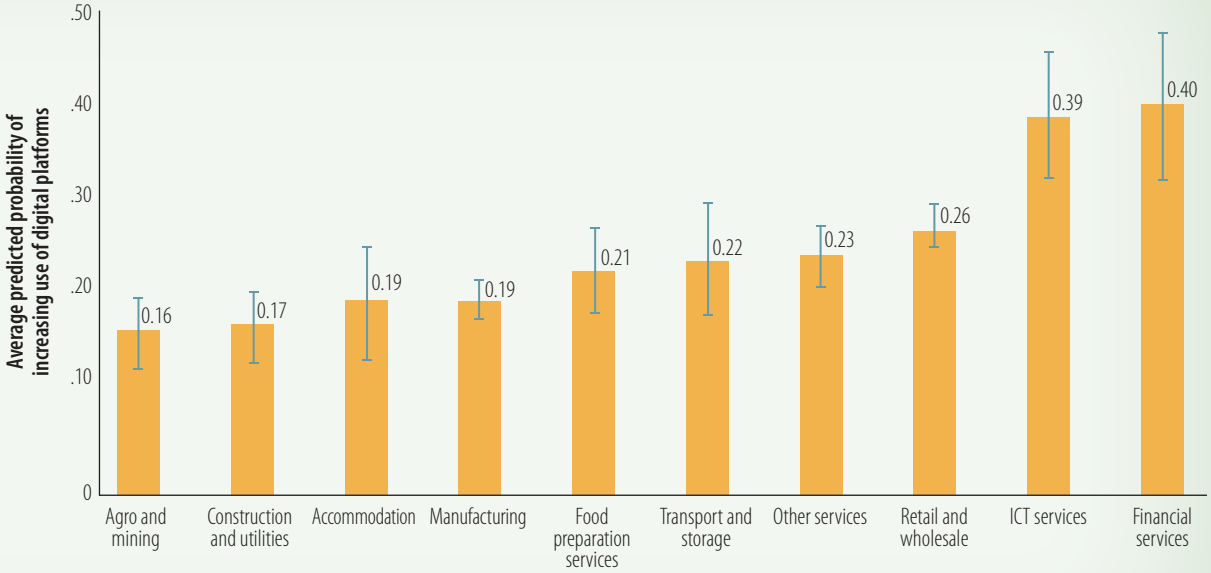
Across sectors of economic activity in Sub-Saharan African countries, firms in sectors with a greater share of tasks/jobs that can be performed from home were more likely to have increased their use of digital platforms in their businesses (see figure 2.9). For instance, Sub-Saharan African firms in financial and ICT services were the most likely to use digital platforms in response to the pandemic shock (40 and 39 percent, respectively). More than one-quarter of the firms in retail and wholesale trade started or increased their use of digital platforms. Finally, firms in agriculture, construction, accommodation services, and manufacturing were less prone to have expanded their use of digital platforms (less than 20 percent).

Larger firms were more likely to use digital technologies in response to the pandemic shock than smaller ones.[66] The (average conditional) likelihood of firms using digital platforms to respond to the shock ranged from 17 percent (micro firms) to 35 percent (large firms). Additionally, the uptake of digital platforms was more widespread among formal firms than informal ones. This was the case in selected countries in the region with available data—namely, Ghana, Senegal, and South Africa. Formal firms in South Africa were more likely to adopt/use digital platforms than informal ones (with probabilities of 53 and 38 percent, respectively). In the case of Senegal, the average likelihood of using digital platforms in response to the COVID-19 shock was 34 percent for formal firms and 19 percent for informal firms. These findings suggest that the lower

66 This finding is consistent with evidence that larger firms in developing countries tend to adopt or use more sophisticated technologies (Cirera, Comin, Cruz, and Lee 2020).

Firms in sectors with a greater share of tasks/jobs that can be performed from home were more likely to have increased their use of digital platforms.

FIGURE 2.9: Average Adjusted Probability of Starting or Increasing the Use of Digital Technology in Sub-Saharan Africa, by Sector of Economic Activity



Source: Davies et al. 2021.

Note: The values are average adjusted probabilities of starting or increasing the use of digital technologies (increased use of the internet, online social media, specialized apps, or digital platforms), calculated from a probit regression that controlled for country, firm size, sector, and the timing of the survey. The computations used weights equal to the inverse of the number of observations per country and excluded countries where the fraction of missing values in the dependent variable exceeded 60 percent. The bars represent 95 percent confidence intervals.

likelihood of informal and small firms adopting/using digital solutions as they changed their business model amid the pandemic shock might be attributed to the likely onerous fixed costs associated with investments in digital solutions.

Recent evidence that combines the BPS and the FAT survey for selected developing countries (Bangladesh, Brazil, Senegal, and Vietnam) led to several findings. First, firms with higher levels of technology prior to COVID-19 were more likely to increase their use of digital technologies, investments in digital solutions, and home-based work in response to the pandemic shock. Second, firms with better technology prior to COVID-19 were more likely to have higher levels of sales and employment. The greater uptake of technology in response to the pandemic shock was driven by GBFs rather than SSBFs. And, within GBFs, firms that adjusted their business models by increasing the uptake of technologies had greater use of digital tools in marketing and sales prior to the pandemic shock. Finally, firms with better technologies prior to COVID-19 tended to perform better in the face of the pandemic: they were more likely to remain (fully or partially) open and performed better in sales volumes (Cirera, Comin, Cruz, Lee, and Torres 2021).

2.3 DIGITAL TECHNOLOGIES AND JOBS IN A LONGER-TERM PERSPECTIVE

The COVID-19 pandemic has pushed firms and workers into the most significant social experiment on the future of work in action, with social distancing policies and work from home changing the way people work and interact. The pandemic is accelerating the insertion of digital tools and solutions into different tasks and sectors of economic activity. Having said this, the impact of digital technologies on work is deeper: it affects the types of work that are being conducted and how they are performed. Greater connectivity has led to the emergence of new activities and new modalities for conducting existing work. This social experiment continues in 2021, and there is a great need for Sub-Saharan Africa to be able to drive the future of work to meet its contextual needs.

Amid the Fourth Industrial Revolution, advanced digital production technologies are being used in manufacturing activities—including hardware (for example, industrial robots and cobots and 3D printers), software platforms (for example, big data analytics, artificial intelligence, and cloud computing), and connectivity (the internet of things).[67] The development and adoption of advanced digital production technologies in Africa's manufacturing sector has important implications for productivity growth and employment generation. Examining the likely effects of digitalization requires providing context to the employment and productivity environment in Sub-Saharan Africa—that is, low growth-employment elasticity, the predominance of jobs in the agriculture and informal sectors, as well as insufficient job opportunities for women and youth.[68] Broadly speaking, technological and organizational innovation can boost employment growth at the firm and farm level. In the case of manufacturing, the evidence shows that automation shapes the skill and task composition of developing country firms. However, it has no significant, direct effect on employment growth of firms in developing countries—at least in the short run.[69] Recent findings suggest that the overall impact of automation on unemployment is negligible in the apparel industry in South Africa. By contrast, increased automation might increase employment by improving firm-level productivity.[70]

Technological transformation in agriculture is a priority for sustained and inclusive growth in Sub-Saharan Africa. Across the continent, the vast information needs of farmers—accurate local weather forecasts, relevant advice on agricultural practices and input use, real-time price information, and market logistics—remain largely unmet. To the extent that rural regions are sparsely populated with limited infrastructure and dispersed markets, the use of innovative digital technologies overcomes some of these information asymmetries and connects farmers to opportunities that were not necessarily available to them earlier. Harnessing the rapid growth of digital technologies holds hope for transformative agricultural development.

Rigorous evidence on the impact of digital technology innovations on people's lives around the globe is steadily growing.[71] This evidence is helping discover what works, what does not, why, and more importantly, how some of the interventions can be improved and scaled up. Several

67 See UNIDO (2020).
68 See AfDB et al. (2018).
69 Cirera and Sabetti (2016) use a sample of more than 15,000 firms in Africa, South Asia, the Middle East and North Africa, and Eastern Europe and Central Asia.
70 See Parschau and Hauge (2020).
71 See Deichmann, Goyal, and Mishra (2016) and Fabregas, Kremer, and Schilbach (2019).

World Bank projects in Africa are building on this growing global evidence to empower farmers by creating comprehensive, national-level agricultural extension and market intelligence systems in partnership with governments, private technology companies, and local scientific communities. The national e-extension system being developed by the World Bank in collaboration with the Ministry of Agriculture of Ghana and local technology firm Prep-eez is the first of its kind in West Africa to enhance advisory services, technology transfer, and market price information for farmers throughout the country by way of voice and data services. In this program, smartphone-enabled field officers are directly connected with farmers on standard mobile phones to provide comprehensive agronomic advice and market services via multilingual voice, text, video, and spatial maps. This is in turn enabling greater market participation and technology adoption, building win-win financially sustainable business models using public-private partnership arrangements with national mobile operators AirTel and MTN for long-term impact.

The Government of Nigeria, in partnership with local mobile provider Cellulant Ltd, is using mobile phones to transform the distribution of seeds and fertilizers in remote areas through e-vouchers, reducing inefficiencies. Following the implementation of eWallet, 14.5 million Nigerian farmers were registered.[72] Similar models are being implemented to target farmers in Burkina Faso, Côte d'Ivoire, Liberia, and Senegal. In Uganda, the use of mobile phones has improved the reach and quality of agricultural extension services in partnership with the Grameen Foundation. Mobile-enabled citizen feedback platforms are also being leveraged to visualize the spread of infections, confirming epidemiology hot spots and disseminating disease treatment and control options to farmers. Digital agriculture has helped fuel sustainable wealth creation for smallholder farmers.

Digital Green works closely with Ethiopia's Ministry of Agriculture at the national, regional, woreda, and kebele levels. At the woreda level, the project builds the capacity of subject matter specialists to produce localized videos. At the kebele level, public extension officers are trained to screen those videos among their communities. Digital Green is building a knowledge exchange platform that links researchers, extension agents, and farmers across the country. By working across multiple media channels (including video, radio, and mobile) to which smallholder farmers have access, they provide greater depth of information on environmentally sustainable agronomic practices and nutrition behaviors.

Digital advisory solutions are also helping pastoralists address the challenges associated with herd management. These tools use satellite imagery and ground information on pasture quality and livestock concentration shared among pastoralists to offer users real-time information on the closest pasture and water resources. They help pastoralists optimize their movements, avert overgrazing, and lower the likelihood of conflict between pastoralist communities. In Mali and Burkina Faso, GARBAL (a satellite information service) provides advisory services through unstructured supplementary service data or targeted call center calls. In Kenya, Ethiopia, and Tanzania, AfriScout has developed an app that provides access to climatic information localized grazing maps, and peer-to-peer communication to crowdsource information from pastoralist communities and send alert messages in cases of diseases, conflicts, or other incidents.[73]

72 Phones are also being used to disseminate knowledge.

73 See Pietosi (2021).

Rwanda's agricultural and livestock markets are being facilitated using the communications platform e-Soko through low-cost digital tools and services linking farmers to wholesale markets and agribusinesses. E-soko is an online marketplace for agricultural commodities to link buyers and sellers of Rwandan tea, coffee, horticultural products, and emerging commodities value chain products.

Agritech solutions connecting farmers directly to consumers and digitalizing those market linkages are becoming the new normal. "Farm-to-fork" digital solutions increased dramatically during the pandemic due to higher demand from individual customers in lockdown.[74] Twiga Foods in Kenya signed a partnership agreement with Jumia, an online marketplace, to enable customers to buy fresh produce from smallholder farmers on Jumia's platform. These digital solutions for food commerce help optimize the connection between local farming communities and urban customers, thus improving local economies, food security, and resilience to volatility in global markets while boosting and securing farmers' incomes.

Massive growth of digital innovations in agriculture raises a crucial question as to why some of these innovations fail to scale up and achieve wider acceptance. One reason could be market fragmentation—by crop type, providers, platforms, operating systems, and frequency of information that is typical of less mature markets; and as the consolidation of the marketplace occurs over time, it is likely that growth prospects will be enhanced. Another reason is the lack of financially sustainable business models. The private sector needs to be engaged more comprehensively in overcoming the challenges of being able to identify and foster innovation with the kind of transformative impact that farmers seek. Going forward, these technologies have the potential to provide services that were not necessarily available to rural populations earlier, but there is the need to focus on a few lessons.

First, agriculture is becoming increasingly knowledge intensive and high-tech around the world. Investors and entrepreneurs behind some of the world's newest industries have started to put their money and tech talents into farming. Companies are creating technology to make farmland more productive and farming more efficient. Soil maps, remote sensing, and GPS guidance are becoming critical tools for modern farmers. Big data and methods of precision agriculture are helping to increase yields and efficiency in unprecedented ways.[75] There has also been an explosion of innovative ways in which illiterate and otherwise disadvantaged people are using digital technologies in the developing world—especially in the rural space where basic mobile phones are being used to serve different economic purposes in people's day-to-day lives. Access to information has empowered rural producers by increasing their participation in markets, improving their bargaining power and arbitrage opportunities with a reduction in losses and wastage. The use of low-cost voice technology, combined with videos and images in a variety of local languages, has tended to expand production and trade opportunities, overcoming the basic digital divide.

Second, the provision of basic price and market information systems has risen dramatically and has had a positive impact on improving efficiency and welfare. Although the evidence is strong, it is still limited to certain countries and contexts. And several recent studies have cast doubt on

74 See Mustafa (2020).
75 See Goyal and Nash (2017).

the overall novelty of the information provided to farmers and the degree of market competition. Low uptake of the fee-based price information services is of course one explanation for the weak effects. But even when farmers are seemingly better informed, they may not necessarily be able to act on that information because of the inaccessibility of alternative markets and complex interlinked relationships with buyers and sellers in poor developing economies that do not generate any real benefits. A much more nuanced understanding of the underlying institutional environment and constraints is warranted.[76] It cannot be taken for granted that a digital approach is necessarily going to be a better approach in terms of better outcomes or more cost-effective ways of doing things. It is important to continue building evidence around what works, what does not, why, and how some of these interventions can be improved.

Third, digital interventions are not a panacea in themselves—they need to be backed by complementary investments in physical infrastructure, electricity, literacy, and so on. The versatility and near-constant innovation that characterize digital technologies can sometimes be a distraction that can cause interventions to focus more on the technology than on the demands and priorities of the intended beneficiaries as well as the trade-offs imposed by resource-constrained environments.

Lastly, ICT policy and the broader regulatory environment in a country must be discussed jointly, with the policy dialogue geared toward solutions to go beyond the hype and build scalable and sustainable business models. Whereas the expansion of mobile phone access is now rapid and commercially self-sustaining—even very poor farmers can benefit from having a phone and find the money to buy one—the same is not true of the internet. In the long run, the internet would have an even greater impact on economic growth and much would depend on finding sustainable business models to encourage its spread in the poorest parts of the world.

76 See Fuglie et al. (2020).

Appendix: Country Classifications

TABLE A.1: Country Classification by Resource Abundance in Sub-Saharan Africa

Resource-rich countries		Non-resource-rich countries		
Oil	**Metals & minerals**			
Angola	Botswana	Benin	Gambia, The	São Tomé and Príncipe
Chad	Democratic Republic of Congo	Burkina Faso	Ghana	Senegal
Republic of Congo	Guinea	Burundi	Guinea-Bissau	Seychelles
Equatorial Guinea	Liberia	Cabo Verde	Kenya	Somalia
Gabon	Mauritania	Cameroon	Lesotho	Sudan
Nigeria	Namibia	Central African Republic	Madagascar	Tanzania
South Sudan	Niger	Comoros	Malawi	Togo
	South Africa	Côte d'Ivoire	Mali	Uganda
	Sierra Leone	Eritrea	Mauritius	Zimbabwe
	Zambia	Eswatini	Mozambique	
		Ethiopia	Rwanda	

Note: Resource-rich countries are those with rents from natural resources (excluding forests) that exceed 10 percent of gross domestic product.

TABLE A.2: West and Central Africa Country Classification

Resource-rich countries		Non-resource-rich countries	
Oil	**Metals & minerals**		
Chad	Guinea	Benin	Gambia, The
Equatorial Guinea	Liberia	Burkina Faso	Ghana
Gabon	Mauritania	Cabo Verde	Guinea-Bissau
Nigeria	Niger	Cameroon	Mali
Republic of Congo	Sierra Leone	Central African Republic	Senegal
		Côte d'Ivoire	Togo

Note: Since July 2020, for operational purposes, the World Bank Africa Region has been split into two subregions—West and Central Africa and East and Southern Africa. The analysis in this report reflects this setup.

TABLE A.3: East and Southern Africa Country Classification

Resource-rich countries		Non-resource-rich countries	
Oil	**Metals & minerals**		
Angola	Botswana	Burundi	Mozambique
South Sudan	Democratic Republic of Congo	Comoros	Rwanda
	Namibia	Eritrea	São Tomé and Príncipe
	South Africa	Eswatini	Seychelles
	Zambia	Ethiopia	Somalia
		Kenya	Sudan
		Lesotho	Tanzania
		Madagascar	Uganda
		Malawi	Zimbabwe
		Mauritius	

Note: Since July 2020, for operational purposes, the World Bank Africa Region has been split into two subregions—West and Central Africa and East and Southern Africa. The analysis in this report reflects this setup.

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