ADVANCE EDITION

The Future of Work in Africa

Harnessing the Potential of Digital Technologies for All

Jieun Choi, Mark Dutz, and Zainab Usman

WORLD BANK GROUP

A Companion to the World Development Report 2019 on the Changing Nature of Work

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ABBREVIATIONS AND ACRONYMS

ACE	African Center of Excellence
ACET	Africa Center for Economic Transformation
ADB	Asian Development Bank
AfCFTA	African Continental Free Trade Agreement
AfDB	African Development Bank
ALMPs	active labor market policies
AML	anti-money laundering
ASP	Adaptive Social Protection
ASPIRE	World Bank Atlas of Social Protection database
ATAF	African Tax Administration Forum
AUC	African Union Commission
CFT	combatting financing of terrorism
CSR	corporate social responsibility
DAC	Development Assistance Committee
DAT	disruptive agricultural technology
DFID	Department for International Development
DGE	dynamic general equilibrium
DHS	Demographic Health Surveys
DRM	domestic revenue mobilization
EBRD	European Bank for Reconstruction and Development
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EMDEs	emerging markets and developing economies
FDI	foreign direct investment
GDP	gross domestic product
GNI	gross national income
GVCs	global value chains
HCI	Human Capital Index
IADB	Inter-American Development Bank

ICBT	informal cross-border trade
ICLS	International Conference of Labour Statisticians
ICT	information and communications technology
IDE	Institute of Developing Economies
IFC	International Finance Organization
ILO	International Labour Organization
IMF	International Monetary Fund
IT	information technology
ITU	International Telecommunications Union
JETRO	Japan External Trade Organization
MDTF	Multi-Donor Trust Fund
MIMIC	multiple indicators multiple causes model
MTO	money transfer operator
NCEs	Networks of Centres of Excellence
NMIS	Network Management Information System
NTBs	non-tariff barriers
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PAD	Precision Agriculture for Development
PAM	Mathematics Adaptive Platform
PASET	Partnership for Skills in Applied Sciences, Engineering and Technology
PNBSF	National Family Scholarship Program
PPP	purchasing power parity
PWPs	public works programs
R&D	research and development
RSR	Rapid Social Response
SPL	social protection and labor
SSN	social safety net
STAR	Stolen Assets Recovery Initiative
STEM	science, technology, engineering, and mathematics

STEPS	Skills Towards Employability and Productivity
UBI	universal basic income
UIBE	University of International Business and Economics
UIL	UNESCO Institute for Lifelong Learning
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
VAT	value-added tax
VSLAs	village savings and loans associations
WAEMU	West African Economic and Monetary Union
WDI	World Development Indicators
WDR	World Development Report
WEF	World Economic Forum
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

EXECUTIVE SUMMARY

World Development Report 2019 highlights that the changing nature of work, at the global level, will be determined by the tension between job losses in "old" manufacturing sectors that are susceptible to automation, and job gains driven by product innovation in "new" sectors. Is this what the future of work looks like in Africa? The short answer is no. On the contrary, the region has an opportunity to forge a different path than the rest of the world, given where it is today. Digital technology adoption has the potential, if harnessed effectively, to transform the nature of work for all Africans.

Sub-Saharan Africa is unlike other regions in several ways, including lower levels of technology adoption. It has a much smaller manufacturing base, so automation is not likely to displace many workers in the coming years. Most African economies still have low levels of demand for products that are commonplace elsewhere, such as televisions and refrigerators, so the cost and price reductions from technology adoption are more likely to help firms grow, create more jobs for all, and produce more affordable products—to the extent that production takes place in Africa. Finally, most African workers have limited education and tend to do informal work, so usable technologies designed to meet their productive needs have the potential to help them learn more and earn more. In most African economies, there is no "old" or "new" sector—there is however enormous scope for innovation and growth across all sectors.

Why focus on digital technology adoption in Africa? Because digital technologies have the potential to help build skills not just for a privileged few, but for all workers—including those with low education and limited opportunities—and to boost productivity and create better jobs in all enterprises, including informal ones. A recent study has found that the arrival of faster internet in Africa increased jobs not only for workers that had gone to university, but also for those whose highest level of education was primary school.

Turning the promise of digital technology into reality depends on putting the right supportive policies in place—what this report and others refer to as "analog complements." These include ***c***ompetition, ***c***apital, and ***c***apacity—Africa's "three C's." Governments need to ensure that market competition is sufficient to spur and enable rival businesses to adopt new technologies and expand output at affordable prices, thereby generating demand for jobs of most skill types. Businesses need more than money to expand in existing markets and enter new markets. They need better entrepreneurial and worker human capital and better physical infrastructure capital—reliable electricity and transport as well as digital infrastructure. Finally, governments need stronger capacity to increase public investment in social protection. This will help to support greater risk-taking by entrepreneurs and workers and to support workers in their transitions between jobs. This is no small feat: the challenge of expansion of social protection is more daunting in Africa than elsewhere because of low initial coverage, huge needs, and limited fiscal resources.

How should African countries get started on their path toward digital transformation? They need to prioritize three E's. First, ***e***nable entrepreneurship: let good ideas flourish no matter where they come from—so that African entrepreneurs build apps that enable Africa's workers to build their skills as they work. Second, ***e***nhance the productivity of the informal sector: create a business environment that helps boost the productivity of informal businesses and workers—rather than focusing on trying to formalize them. Third, ***e***xtend social protection coverage: improve revenue collection, rebalance government spending, and more effectively coordinate development assistance.

The future of work in Africa could be bright. It is up to government policy makers and businesses to make bold choices and investments today that will pave the way for the next generation of African workers, inventors, and entrepreneurs to innovate and thrive.

OVERVIEW

Jieun Choi, Mark Dutz and Zainab Usman

In 2013, a hospital in Ogun state in southwest Nigeria asked a local startup company called Paga for help with its payment collection system. Instead of patients handing cash to administrative staff, they switched to a mobile payment system. Transactions were recorded immediately, avoiding any corruption regarding the quoted price or whether the payment was made. The hospital's revenues rose sixfold in two months. Today, Paga has almost 13 million customers, along with a nationwide network of more than 21,500 mobile payment agents. In the process of expanding, Paga has directly created these additional low-skill jobs at mom and pop stores, pharmacies, and grocery stores where people can get access to additional financial services. As Paga has grown, it continues training workers on the job, improving their skills for existing jobs, and preparing them for new jobs in more senior roles.[1]

Clementina Achieng, a fish monger in rural Kenya, used to walk a half day to visit the nearest local bank and transfer money to her husband, who buys fish in Lodwar, a small town near Lake Turkana. Since she started using M-PESA mobile money, she has been able to transfer money more frequently at much lower cost, enabling her husband to send more and fresher fish each day. This allowed her to expand her business. Clementina sends the remaining money by M-PESA to her children's school for their tuition. This kind of story is common in Kenya, as M-PESA is now used by at least one individual in over 95 percent of Kenyan households outside Nairobi, with over half the population now using the system at least once a month. Although rapid adoption of mobile payments such as M-PESA has led to the loss of roughly 6,000 bank jobs between 2014 and 2017 in Kenya, the number of mobile payment agents increased by almost 70,000, resulting in direct net positive job effects. In the process, more and better jobs have been created indirectly not only for hospital workers and fish mongers, but also at other informal and formal farms and firms—through access to credit for the previously unbanked, investments, cost reductions, and output increases that the digital financial services enable. Although M-PESA contributes to the reduced poverty and increased per capita consumption levels of Kenyan households, its impacts appear to be larger for female-headed households. M-PESA has enabled more than 185,000 women like Clementina to move out of subsistence farming and into business or sales occupations.

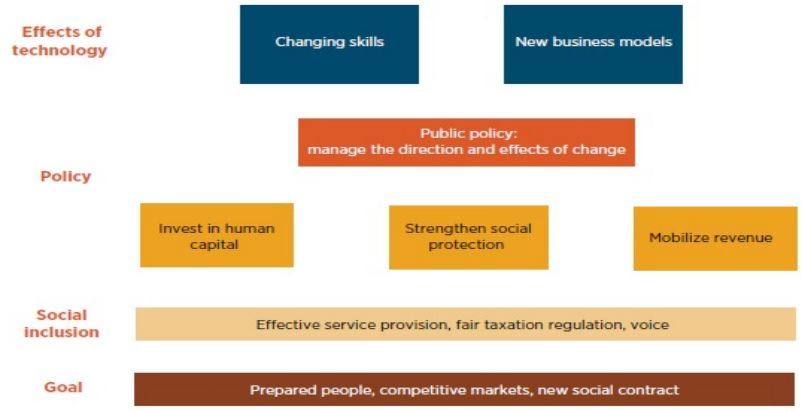
These are just two examples of how digital technologies are transforming the nature of work in Sub-Saharan Africa and are providing a counterpoint to global fears of technology suppressing job creation. Box O.1 summarizes the main findings and recommendations of *World Development Report 2019: The Changing Nature of Work*. Building on World Development Report (WDR) 2019, this companion report uses available evidence to take a closer look at Africa. It finds that the global future of work outlined in WDR 2019 is likely to play out differently in Sub-Saharan Africa than in the rest of the world. This is in large part due to different underlying conditions, including persistently low levels of human capital, a particularly large informal sector, and insufficient and inefficient social protection systems. Against this backdrop, adoption of digital technologies has the potential to have a better impact on lower-skilled and lower-educated workers in Sub-Saharan Africa than it does in higher-income regions.

Box 0.1: *World Development Report 2019: The Changing Nature of Work*

World Development Report (WDR) 2019 examines how technological advances are disrupting the nature of work. These changes are characterized by five elements:

- Technology is disrupting the nature of firms such that platform-based businesses like Amazon and Airbnb are out-competing traditional brick-and-mortar companies like retail stores and hotels. Platform companies create a network effect that connects customers, producers, and providers, while facilitating interactions through multisided business models.
- Technology is reshaping the skills needed for work. While the demand for less-advanced skills is declining, it is rising for advanced cognitive, socio-behavioral, and adaptable skills. Therefore, it is not just that new jobs are replacing old jobs, but that existing jobs increasingly require a different skill set.
- Threats to jobs from technology are exaggerated and not uniform across income groups. Although advanced economies have shed industrial jobs, industrial employment is rising in some developing countries (for example, parts of East Asia) and stable in others.
- In many developing countries, about two-thirds of the workers remain in low-productivity jobs, often in informal sector firms whose access to technology is poor. Informality has remained remarkably stable despite economic growth and the changing nature of work. Addressing informality and the absence of social protection for workers is a pressing concern for emerging economies.
- Technology, especially social media, affects perceptions of rising inequality that are often not corroborated by the data on income inequality. Increased exposure through digital communications to higher quality of life, different lifestyles, and opportunities heightens these feelings, creates frustrations, and can lead to migration or societal fragmentation.

Figure BO.1.1: How societies can benefit from the potential of technology



Source: World Bank 2019a.

For societies to benefit from technology's potential, WDR 2019 has three policy recommendations (figure BO.1.1):

- Invest in human capital: particularly early childhood education, to develop higher order cognitive and socio-behavioral skills in addition to foundational skills.
- Strengthen social protection: a solid guaranteed social minimum and strengthened social insurance, complemented by reforms in labor market rules in some emerging economies.
- Create fiscal space for investments in human capital development and social protection: strengthen underused tax instruments, combined with eliminating tax avoidance and improving tax administration.

Expectedly, the changing nature of work in the context of digital technologies and other global trends is high on the agenda of policy makers and researchers alike. Several studies have been published and are in the pipeline that address various aspects of the future of work, especially on the African continent, using different methodological approaches. For instance, a 2017 report by the World Economic Forum used LinkedIn data to conclude that the greatest long-term benefits of information and communications technology–intensive jobs in the region are likely to be in digital design, creation, and engineering (WEF 2017). To build a pipeline of future skills, the report suggests that Africa's educators design future-ready curricula that encourage critical thinking, creativity, and emotional intelligence, as well as accelerate the acquisition of digital and STEM (science, technology, engineering, and mathematics) skills to match the way people will work and collaborate in the future.

A 2018 report on regional perspectives on the future of work argues that new technologies will play an increasingly important role in Africa's economic transformation in agriculture, manufacturing, modern services, local content, and infrastructure (AfDB, ADB, EBRD, and IADB 2018). Yet, the region currently is ill-prepared, especially in having adequately skilled workers to take advantage of the unique opportunities that will come with these disruptions. A 2018 International Monetary Fund paper combines history, economic modeling, empirical evidence, and scenario analysis to assess the challenges and opportunities of digital technologies within the context of population growth, climate change, and a changing trade environment (Abdychev et al. 2018). The paper argues for decisive policy actions in infrastructure investments, flexible education systems, smart urbanization, boosting trade integration, and expanding social safety nets. A 2019 study by the Africa Center for Economic Transformation uses field surveys to assess the awareness and preparedness of policy makers in Africa for new technologies and supporting technical and vocational educational training systems (ACET 2019). The study identifies reforms in education and training systems, support for enabling regulations and infrastructure, and public-private partnerships in technology upgrading and transfer as areas where policies and investments can help absorb millions of new entrants into the labor market each year.

This report takes a different approach by building on WDR 2019 and identifying several themes that are critical to the future of work in Sub-Saharan Africa, along which the report is structured. These are the current state and potential of digital skills, infrastructure, and technology in Sub-Saharan Africa (chapter 1); the human capital needs of a young and growing workforce (chapter 2); the prevalence of informal workers and enterprises (chapter 3); and social protection policies to mitigate and manage risks stemming from labor market disruptions (chapter 4). The report also offers recommendations for policy action to turn the promise of digital technology adoption into reality. The report leverages findings from recently completed World Bank regional flagship studies and related work.[2] It highlights important unanswered policy questions where additional research, supplemented by new data, could yield learning with high policy payoffs. The report does not dwell on examining the various pathways for structural transformation for African countries, since they are treated elsewhere. Rather, it analyzes the opportunities and challenges of digital technologies and supportive policies to harness their potential.

This overview summarizes the key messages and recommendations of the analysis, in general and then chapter by chapter. It then puts forth some remaining policy questions for future study.

Overall, the report highlights three possible reasons that could lead lower-skilled workers in Sub-Saharan Africa to benefit more from digital technology adoption than in other regions. First, on the supply side, there appears to be a window of opportunity. That manufacturing production and employment are low relative to other regions means that skill-biased digital technologies that automate tasks that are specific to manufacturing sectors are not likely to displace many workers over the next years. And that many low-

educated workers are still relatively low-cost across most of Sub-Saharan Africa means that it may not yet be cost-efficient for many businesses to invest in automation.

Second, on the demand side, it appears that productivity improvements from digital technology adoption may strongly affect the demand for many products. This is because there are still relatively low levels of domestic demand for many mass consumption products in Sub-Saharan Africa, in contrast to higher-income countries where demand for these products is more satiated and therefore less responsive to price reductions from any further productivity improvements. This is good news for jobs, even based on the adoption of skill-biased digital technologies such as the internet—if production can competitively take place in Africa. This is because the cost and price reductions from productivity improvements resulting from the adoption of digital technologies can then generate large increases in production, sufficiently large to create more jobs for all types of workers.

Third, the low levels of human capital and high levels of informality provide ample scope for worker-enhancing digital technologies to be developed and adopted by businesses across Sub-Saharan Africa, in the formal and informal sectors. Many digital technologies that are accessible through the internet—such as 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—are particularly well-suited for the types of lower-educated, lower-skilled workers who are more prevalent in Sub-Saharan Africa than in other, higher income regions.

It is important to weigh these predicted beneficial effects against the risks that countries may not be positioned to take advantage of these opportunities or, even worse, that countries may witness a greater digital divide without further poverty reduction. To take advantage of these opportunities, a fundamental prerequisite is for public policies to ensure that digital infrastructure is available and affordable to all. Existing evidence points to the importance of digital infrastructure regulation that promotes competition, with more effective subsidization to support universal access and integration to create bigger markets. Usable internet services also require complementary physical infrastructure such as electricity. To avoid the risks of a worsening digital divide, internet services must be affordably available in rural as well as urban areas, in secondary as well as primary cities, for women as well as men, and for older as well as younger people.

Public policies to boost the productivity gains from digital technology adoption need to be complemented by measures to support both entrepreneurs to create local applications and enterprises and workers to adjust. These include increased investment in skills training, measures to facilitate the productivity upgrading of informal firms, and effective social protection and labor policies—to protect workers against those risks that affect Sub-Saharan Africa more than other regions, spur greater entrepreneurial and worker risk taking, and facilitate worker transitions between jobs. Additional policies are needed to address the risks associated with consumer vulnerability to fraud, manipulation and deception, over-indebtedness by less-informed poor households, data privacy and cybersecurity.

Many digital technologies come with the risk of excessive concentration of market power and anti-competitive conduct, such as dominant firms acquiring rivals instead of allowing new entrants to grow and eventually challenge them. There is also the risk of dominant firms integrating horizontally and vertically across markets to prevent more robust competition. Public policies need to ensure that market structure and conduct across industries remain competitive enough to allow the entry and expansion of entrepreneurs offering new goods and services, to ensure that current and future prices remain as low as possible, that quality (including data protection) remains high, and that innovation is not stifled. If not,

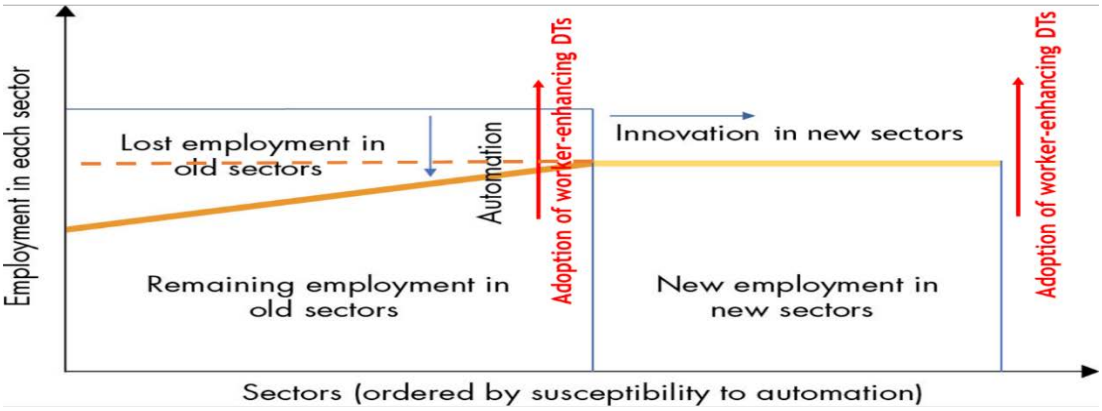
there is the risk that excessive economic power would allow dominant firms to prevent the adoption of policies in the economywide public interest.

Key messages of each chapter

Digital technologies

WDR 2019 highlights that the future of work will be determined by the tension between automation in "old" sectors and innovation in "new" sectors. Sub-Saharan African countries have the potential to create new jobs from technology adoption across all sectors and skill categories. This is because the adoption of worker-enhancing digital technologies can boost the productivity and output of low-skilled workers across all sectors, including agriculture and services, and because manufacturing sectors, which have often been labeled "old" sectors in more advanced economies, remain small and largely not automated yet, with potential for significant output expansion and jobs growth (figure O.1).[3]

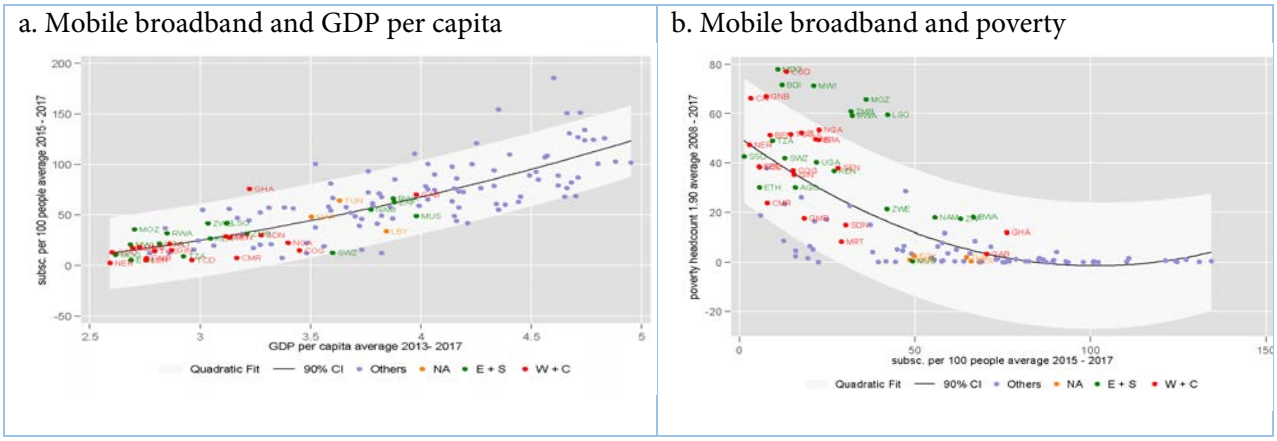
Figure O.1: Adoption of worker-enhancing digital technologies can expand work opportunities in Sub-Saharan Africa



Source: World Bank 2019a, figure 1, staff revision.
Note: DTs = digital technologies.

Closing the gap in the availability of affordable digital infrastructure services could increase growth and reduce poverty in Sub-Saharan Africa (figure O.2). Evidence from the region shows that increased availability of faster internet access has spurred the generation and adoption of digital technology–related local innovations that are beginning to address market and coordination failures, boosting productivity and affecting inclusion outcomes. The widespread adoption of mobile money accounts in some countries provides the starkest illustration of this to date.

Figure O.2: Availability of mobile broadband is correlated with GDP per capita and reduced poverty across countries

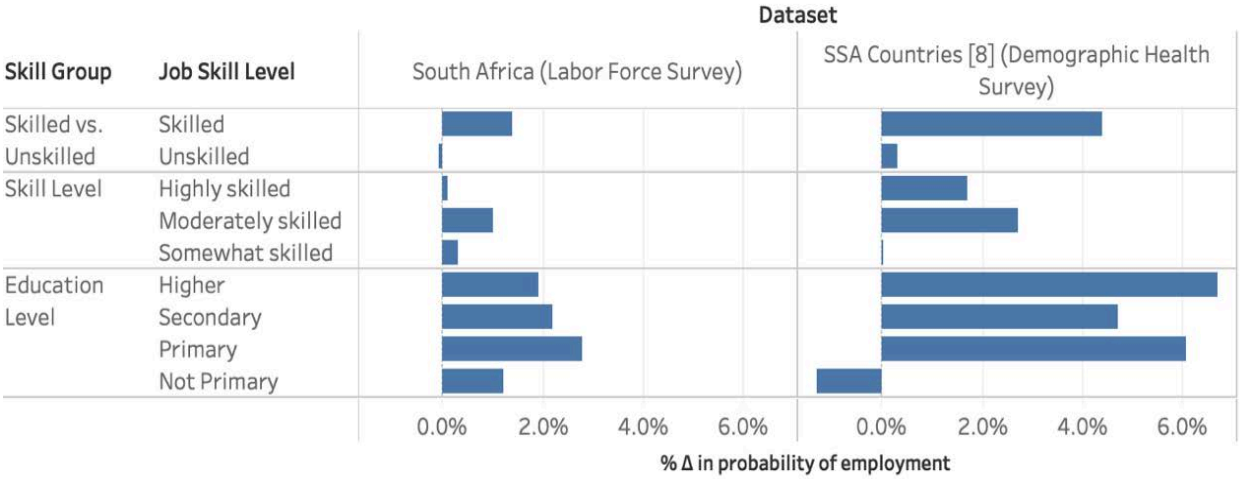


Source: Africa's Pulse, World Bank, 2019b.

Note: CI = confidence interval; E + S = East and Southern Africa; GDP = gross domestic product; W + C = West and Central Africa; NA = North Africa. Mobile broadband subscriptions per 100 people averaged over 2015–17 is correlated with (a) income (GDP per capita), and (b) the poverty headcount ratio from the World Bank's World Development Indicators.

The arrival of faster internet in Sub-Saharan Africa during the late 2000s and early 2010s increased the probability that an individual was employed by 3.1 to 13.2 percent, depending on the mix of countries and surveys available, relative to areas unconnected to submarine cables (table O.1). The job impacts on unskilled and lower-educated workers were more positive than in higher income countries. In terms of job categories, the probability that an individual held a skilled job increased by 1.4 to 4.4 percent, while the probability of holding an unskilled job did not decrease (was not statistically different from zero). The increase in the employment rate was similar for those with primary, secondary, and tertiary schooling.

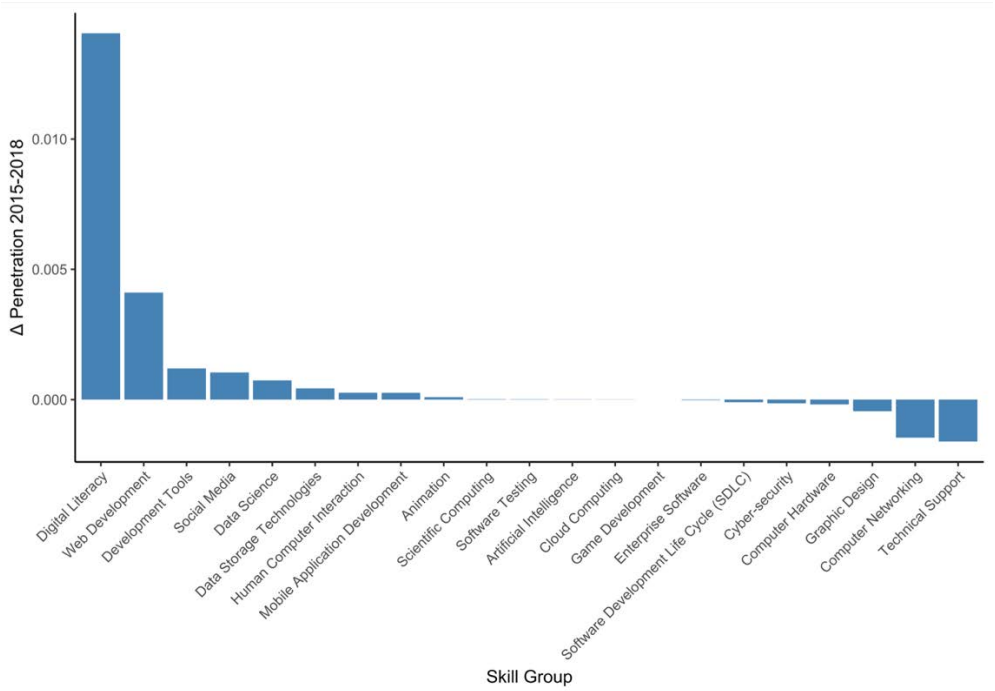
Table O.1: Faster internet access increased employment of workers across educational levels in available datasets



Source: Hjort and Poulsen 2019, tables 5 and 6.

Sub-Saharan Africa is adjusting to the changing induced demand for skills driven by technological advances. Among LinkedIn users who are familiar with digital technologies in the region, digital skills have been increasing, although with large differences across skill types (figure O.3) and countries.

Figure O.3: Digital skills such as digital literacy and web development are growing in Sub-Saharan Africa, although from a low base



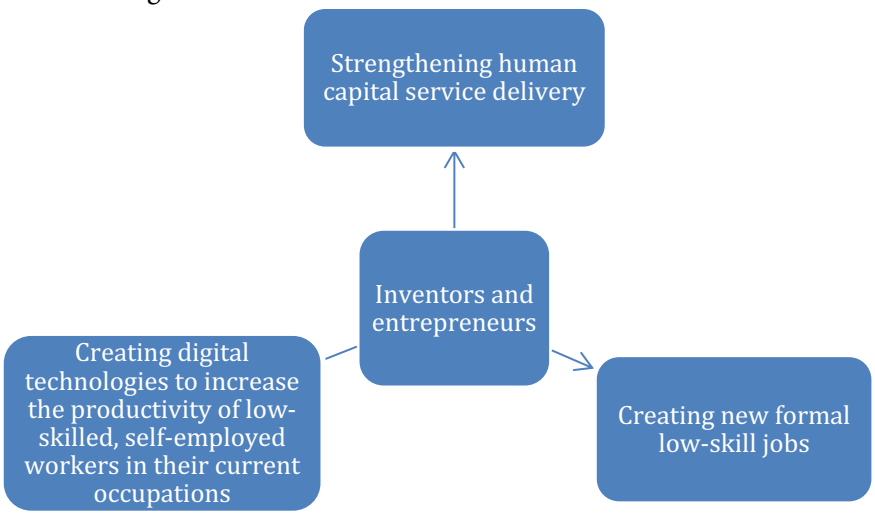
Source: Staff calculations, based on LinkedIn data on 27 countries in Sub-Saharan Africa with at least 100,000 LinkedIn members.

Countries in Sub-Saharan Africa may still have time to take advantage of globalization and follow the traditional industrialization-led growth path, if they act quickly. Until now, assessments of the effects of digital technologies on the location of production bases have remained speculative, despite concern about "re-shoring." To boost output and jobs in manufacturing sectors, countries in Sub-Saharan Africa need to integrate further with global markets, by participating in global value chains (GVCs) and attracting foreign direct investment, supported by the required complementary improvements in the business environment.

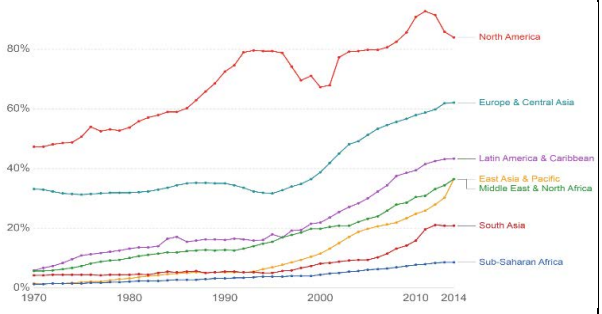
Human capital

Figure O.4: Measures of human capital

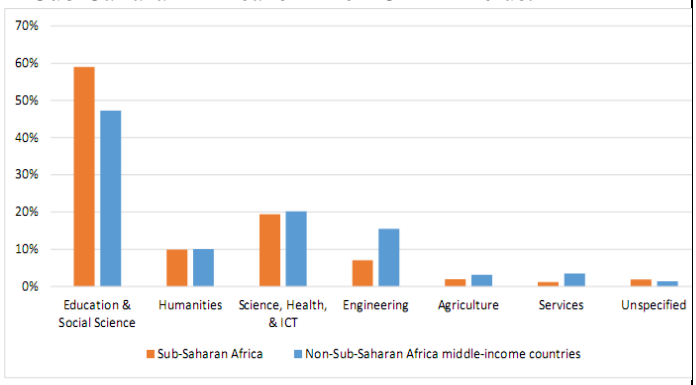
a. Inventors and entrepreneurs are central to creating the conditions for Sub-Saharan Africa to reap the benefits of digital technologies.



b. The share of the population with completed tertiary education in Sub-Saharan Africa has remained very low compared with other regions of the world.



c. The majority of tertiary education enrollment in Sub-Saharan Africa is in non-STEM fields.



Sources: One World in Data, World Bank (accessed April 9, 2019), https://ourworldindata.org/tertiary-education; Evans, Arias, and Santos 2019.

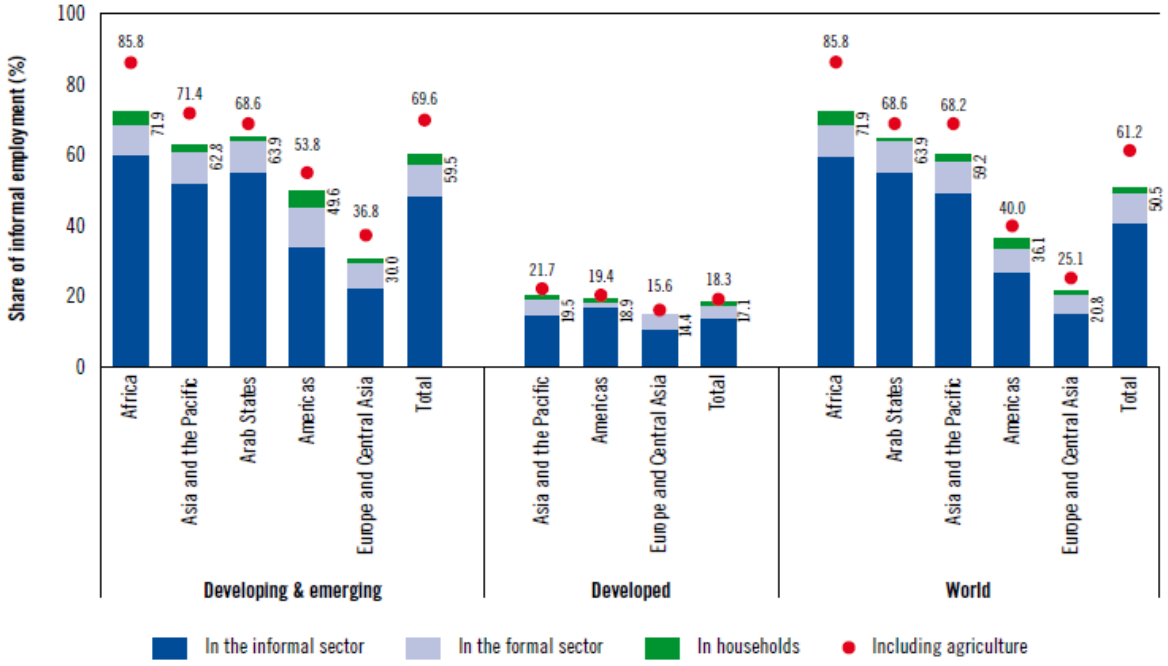
Building adequate human capital is more critical in Sub-Saharan Africa than anywhere else in the world (figure O.4). The region has not only the lowest level of human capital assets, but also the youngest and fastest growing population. Africa should adhere to the broad recommendations of WDR 2019 and prioritize policies that build strong foundational and digital skills as a basis for lifelong learning.

- Sub-Saharan Africa should leverage digital technologies to speed up its acquisition of human capital and upgrading—by increasing the availability of and access to higher quality education offerings and the efficiency and productivity of the region's health care workers.
- Sub-Saharan Africa's large stock of low-skilled workers, often working in informal and low-productivity activities, sets it apart from the rest of the world and requires additional measures. Africa needs to build and disseminate digital technologies to raise the productivity of its stock of low-skilled workers in their current occupations. The diffusion of basic digital skills would help workers to avail themselves of these new opportunities.
- Digital technologies are also generating new tasks that provide new job opportunities for millions of low-skilled people. Boosting the creation of direct and indirect digital technology–enabled jobs through the adoption of digital technologies that generate new demands for low-skilled workers will effectively leverage Africa's current labor force.
- All digital technology–enabled opportunities for job creation and productivity gains require grassroots inventors and entrepreneurs that Sub-Saharan Africa is not producing and enabling in sufficiently large numbers. In addition to investing in physical infrastructure expansion and improvements in the regulatory environment, as recommended by WDR 2019, to foster the conditions for the creation of formal, private sector jobs, the region must also act fast with targeted measures to build a critical mass of such inventors and entrepreneurs.

Informality

The informal sector is prevalent in Sub-Saharan Africa. It differs from other developing regions in size, accounting for almost 90 percent of total employment (figure O.5), as well as in composition, with not only small but also large firms.

Figure O.5: Sub-Saharan Africa has the highest share of informal employment in the world (2016)



Source: ILO 2018.

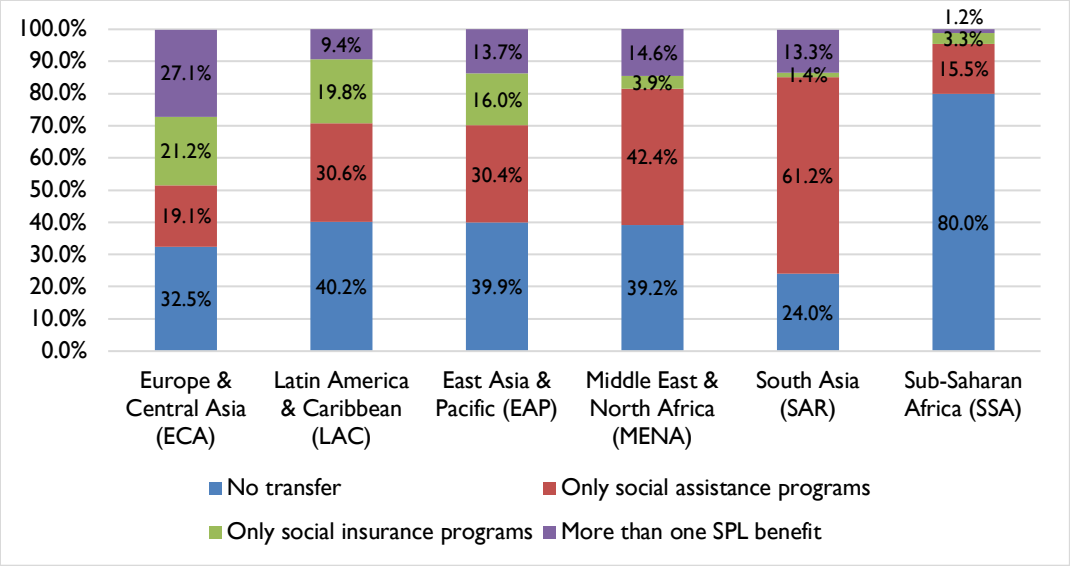
Post-reform formalization rates have been minimal despite the relatively high costs incurred by formalization programs. Moving forward, short- to medium-term policies should focus more on pro-productivity and skills upgrading interventions for informal, small-scale firms and unskilled workers. Formalization policies, as advocated in WDR 2019, should be more targeted in the short term on large, informal firms that aggressively compete with formal firms.

Digital technologies can be leveraged to boost productivity, job creation, access to credit, and financial inclusion in the informal sector, while also making formalization easier over time.

Social protection

Social protection and labor (SPL) programs have increased across Sub-Saharan Africa in the past two decades, but coverage remains low due to fiscal and policy constraints (figure O.6). In addition to the risks posed by digital technologies, as identified by WDR 2019, other disruptions to labor markets that are likely to be particularly pronounced in Sub-Saharan Africa create more SPL needs. These disruptions include those arising from climate shocks, fragility, economic integration, and population transitions.

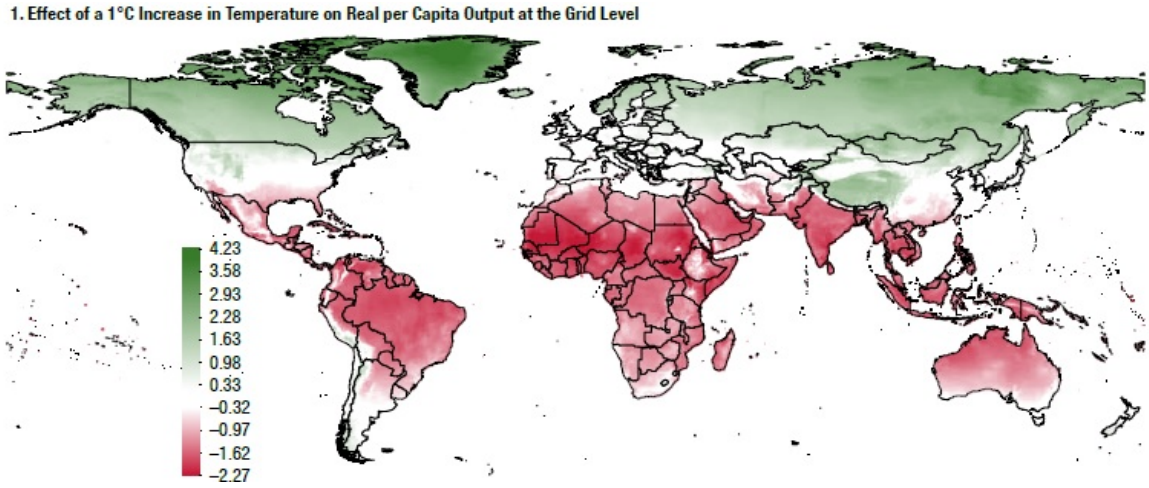
Figure O.6: Most of Sub-Saharan Africa's population is not covered by any SPL program



Source: World Bank Atlas of Social Protection database.

As noted in WDR 2019, governments in the region need to focus SPL solutions on addressing the risks confronting the poorest and most vulnerable. To mitigate disruptions from digital technologies and trade adjustment costs will entail extending social insurance systems to cover informal workers. To address vulnerabilities to climate change (map O.1) and conflict, "adaptive social protection" can increase households' resilience against shocks and post-crisis response. To mitigate the risks confronting populations in transition, a combination of short-term safety nets with complementary active labor market interventions in urban areas can facilitate productive employment.

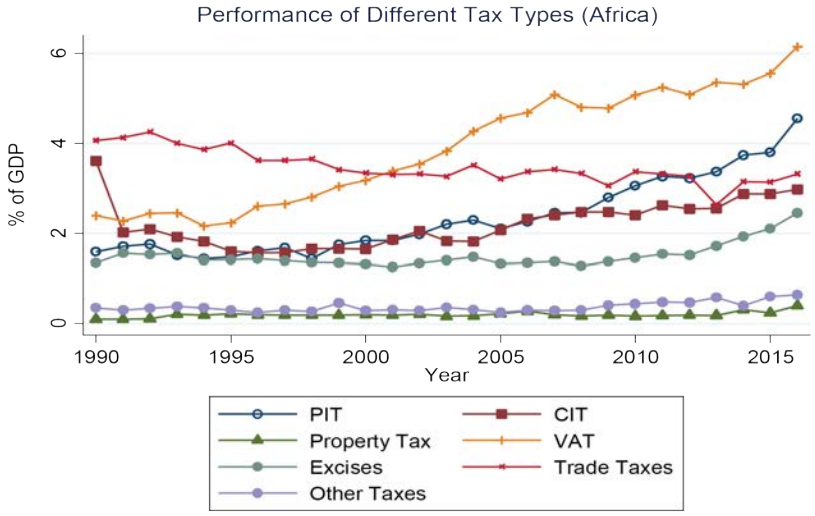
Map O.1: Africa is highly vulnerable to climate shocks



Source: International Monetary Fund.

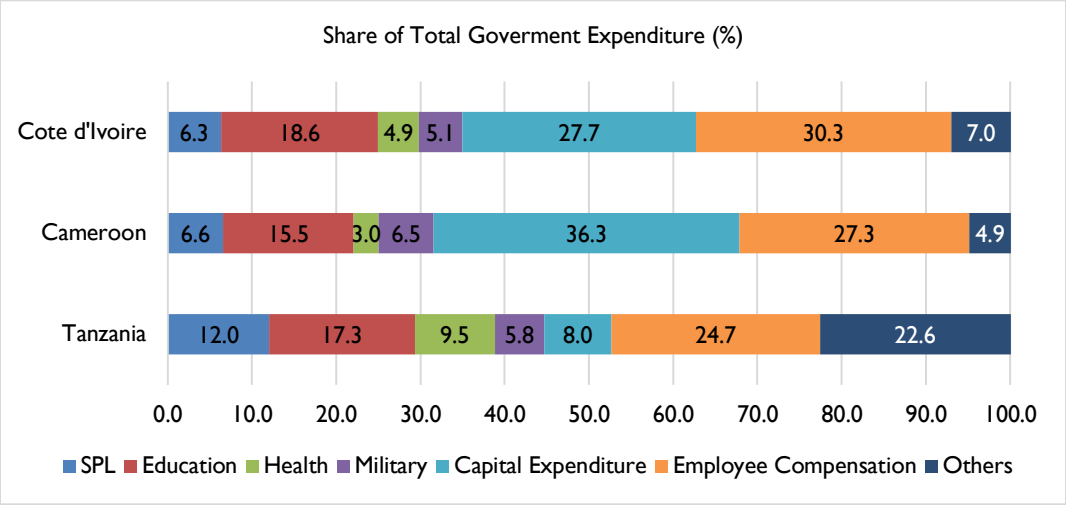
In expanding coverage of SPL programs for the poor and vulnerable, it will be important to strengthen domestic resource mobilization, as WDR 2019 recommends (figure O.7). It will also be vital to consider rebalancing expenditures and instruments (figure O.8). Effective communication of findings from public expenditure reviews on the need for rebalancing in resource allocation toward more vulnerable groups and the use of instruments with more productive impacts can help temper political resistance.

Figure O.7: Revenues improved in Africa but not across all tax instruments and are still below global levels



Sources: Staff calculations based on World Bank and UN WIDER data.

Figure O.8: SPL expenditures are lower than other public investments

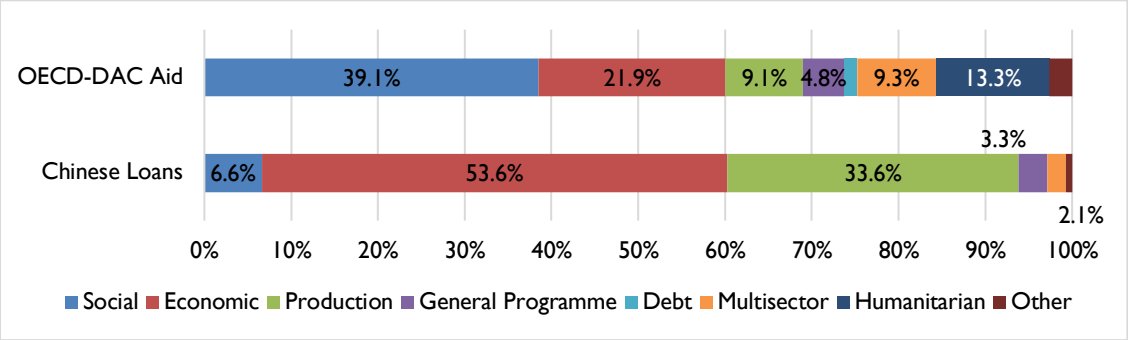


Source: Staff calculations from World Development Indicators and International Monetary Fund data.
Note: SPL = social protection and labor.

To optimize finite resources and overcome the political resistance that can often accompany social safety nets for the poor, SPL should be part of broader national economic strategies on employment, poverty reduction, and economic transformation, rather than stand-alone initiatives. Increasing public investment in productivity-increasing safety nets can be linked to a broader strategy to provide regional public goods in an era of increased integration.

The effective coordination of various stakeholders is also crucial to expand SPL coverage in Sub-Saharan Africa. At a transnational level, regional organizations should play a stronger coordination role on common taxation policies for revenue mobilization. Financial regulators at the regional and global levels should reduce the transfer costs for remittances. Development partners, including the Organisation for Economic Co-operation and Development's Development Assistance Committee and new actors, should harmonize their development assistance for SPL based on their comparative advantage and align it with recipient countries' economic strategies (figure O.9).

Figure O.9: OECD-DAC bilateral aid to Africa is more supportive of SPL compared with Chinese loans, 2016



Source: Staff calculations based on data from the Johns Hopkins University School of Advanced International Studies–China-Africa Research Initiative database and Organisation for Economic Co-operation and Development statistics.

What should governments do?

The promise of digital technology adoption will not be realized without government attention to support essential analog complements (table O.3). Africa's digital transformation needs, among other things, competition, capital, and capacity (Africa's three analog complement "C's").

Ensuring sufficient market *competition* is all about the rivalry between businesses that spurs and enables them to adopt and use the newest technologies and expand output at affordable prices. This is critical for improving the availability of digital technologies, by ensuring sufficient investment and deployment of digital infrastructure in response to consumer needs. And it is critical to stimulate adoption and use by all enterprises of cost-reducing and quality-enhancing digital technologies that are facilitated by access to broadband internet.

Ensuring sufficient *capital* is not just about the availability of sufficient financing to allow businesses to expand in existing markets and enter new markets. Businesses also need better entrepreneurial and worker human capital and better physical infrastructure capital—electricity and transport as well as digital infrastructure (which also are facilitated by more intense market competition). A key how-to-do message for boosting capital is to enable entrepreneurship. It is critical for policy makers to create business environments that let good ideas flourish no matter where they come from—so that local entrepreneurs also build apps that enable Africa's bulge of low-skilled, largely informal workers to improve their human capital as they work. This is linked to a key how-to-do message for addressing informality. Rather than focusing policy largely on trying to formalize most informal enterprises, governments should put in place business environment conditions that boost the productivity of informal businesses and workers—so that they adopt and use technologies that can help them become more efficient.

Finally, governments need stronger *capacity*. To extend social protection coverage, countries need to improve revenue collection, rebalance government spending, and better coordinate development assistance. This will help to support greater risk-taking by entrepreneurs and workers as well as workers in their transitions between jobs, as the challenge of expansion of social protection is more daunting in Africa than elsewhere because of low initial coverage, huge needs, and limited fiscal resources.

Table O.3: Main policy recommendations suggested by this report

Outcome	Policy actions
Improving availability of digital technologies[a]	• Close the current gap in digital infrastructure and enhance affordable broadband access with improved regulatory frameworks. Further regional harmonization, supported by increased regulatory capacity through regional hubs, should allow (i) more effective subsidization to support universal access and thereby boost poverty reduction, combined with (ii) more effective pro-competition regulation of digital infrastructure to create bigger markets. The positive interactions between subsidies (to boost demand) and lower costs (spurred by asset sharing and trading and greater economies of scale and scope) should allow larger markets to sustain more operators—with competition spurring innovation and access for all. • Support the accumulation of digital skills. Public-private partnership support could include education and worker training programs focused on digital literacy (for all users) and digital skills (for more specialized careers). • Invest in "analog" complementary assets. Public-private investments are required in electricity and transport/logistics infrastructure. Favorable trade policies and broader business environment reforms remain crucial to enhance Sub-Saharan African firms' participation in global value chains and foreign direct investment attraction.
Boosting human capital	• Use targeted measures to train a critical mass of inventors and entrepreneurs to develop and scale digital technologies to boost the productivity of all workers, especially low-skilled workers in current and new occupations, and to strengthen the delivery of education and health services. • Enable inventors and entrepreneurs by fostering those ecosystems and mitigating appropriate risks that the private sector faces in funding them. • Promote universal basic digital literacy to enable broader participation of all segments of the population in the digital economy.
Addressing informality	• Focus on pro-productivity and skills-upgrading interventions for small, informal farms and firms and unskilled workers. Leverage low-skill-biased digital technologies to boost productivity, job creation, access to credit, and financial inclusion. • Target traditional formalization policies on larger informal firms that aggressively compete with formal firms.
Extending social protection coverage	• Create the enabling environment to establish effective early warning systems, including insurance markets, to identify risks in time for effective mitigation. • Increase public investments in social protection and labor systems by improving revenue collection, using public expenditure reviews to justify the need for rebalancing government spending and coordinating development assistance. • Integrate social protection and labor policies into longer-term national and regional strategies for economic transformation, employment, and poverty reduction. • Coordinate regional organizations, financial regulators, and development partners toward common objectives on tax policy, reducing remittances costs and providing development assistance to enhance social protection coverage.

a. The importance of increasing the availability of digital technologies is discussed in chapter 1. As that chapter sets the stage by providing an overview of the availability of digital infrastructure and digital skills without exploring in detail specific policy actions, these policy actions are merely suggestive. They would benefit from additional research to explore the potential payoffs from more detailed implementation actions.

Important unanswered policy questions

Additional research could yield learning with high policy payoffs in several areas, including the following:

Digital technologies:

- Better understanding of the economic case for moving to a harmonized/integrated regional approach to digital infrastructure regulation, supported by more competition and better auction design, together with the impact of innovative infrastructure solutions that could enhance access to and affordability of digital technologies for low-income people in rural locations (for example, lower cost, low-earth-orbiting satellites).
- Better understanding of the effects of different types of digital technologies, and especially low-skill-biased digital technologies, on net job outcomes and the composition of skills.
- Better understanding of the impacts of specific digital technologies on Sub-Saharan Africa's revealed comparative advantages—and more broadly understanding of the mechanisms that explain why the effects of digital technologies on low-educated/low-skilled workers could be different in Sub-Saharan African countries relative to higher-income countries.
- Better use of big data, supported by machine learning to inform policy discussions.

Human capital:

- Better understanding of how transformational inventors and entrepreneurs can be identified and trained, and how best to identify and empower them.
- Along with using digital technologies to promote access to human capital services, exploration of the extent of the impact of digital technologies on the quality of human capital service delivery. Would digital technologies mainly complement already high-performing human capital workers to perform better, or can they improve the performance of low-performing workers? What is the extent of substitution and complementarity of digital technologies with prevailing lower-skill and higher-skill job tasks?
- Development of better measures of worker, inventor, and entrepreneurial skills, especially soft skills and skills for adaptation.

Informality:

- Better understanding of how various policies toward diffusion and adoption of digital technologies can influence the (mis)allocation of skills and resources across sectors, based on a model of the channels through which the taste for digitization can shape occupational choices and entrepreneurship amid informality.
- Assessment of the extent to which major development strategies for Africa, such as the 2030 Sustainable Development Goals and Agenda 2063, account for pervasive informality on the continent.
- Identification and discussion of the refinements that are warranted to improve the effective implementation of these strategies in achieving ambitious development goals.
- Exploration of how digital business incubators and joint ventures can help firms to internationalize and boost their exports.

Social protection:

- A more precise understanding of the implications of disruptive trends for labor dynamics within specific countries and subregions.
- A rigorous assessment of the effectiveness of emerging SPL interventions that aim to extend social protection to the informal sector and the "gig economy."
- How to improve collaboration with the private sector to design and implement effective labor market policies to address urban poverty, youth unemployment, and population transitions.
- Better leveraging of informal private transfers, including remittances and faith-based transfers, to serve a more effective risk-sharing and co-insurance function, especially in fragile settings.

Building a data agenda to support growth and inclusion outcomes of digital technologies:

- A forward-looking data agenda at the national, regional, and continental levels, highlighting the kinds of data that should be collected and the types of analyses that are most important for policies to promote opportunities and mitigate risks associated with digital technology adoption for more productive and inclusive growth. Examples of risks include data collection by enterprises as a basis for consolidating and extending market power, data privacy and cybersecurity issues, and consumer protection issues related to fraud, manipulation and deception.

The upcoming "A Continent-wide Digital Transformation for Africa" flagship report is expected to help fill some of these knowledge gaps and answer some of the remaining unanswered questions on the promise of digital technologies for all Africans.

Notes

[1] See Kordunsky (2017) and the Paga website.
[2] The availability of these materials makes this companion report feasible and timely. No new research was undertaken, except for the team's analysis using LinkedIn data to understand the availability of digital skills in chapter 1 and the analysis on employment in the mining sector in chapter 4.
[3] The dynamics underlying figure 1 in WDR 2019 are also relevant for Sub-Saharan Africa, because innovation creates jobs in "new" sectors by creating demand for new goods and services. The red arrows in figure O.1 illustrate the potential of the adoption of worker-enhancing digital technologies to boost the productivity of low-skilled workers across all sectors, lowering costs, expanding output, and increasing employment. The dotted lines show that lost employment in "old" sectors is expected to be smaller in Sub-Saharan Africa than in other regions.

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CHAPTER 1: DIGITAL TECHNOLOGIES

Jieun Choi

Abstract

This introductory chapter investigates the extent of availability of digital technologies and relevant digital skills in Sub-Saharan Africa, and what we know to date about the effects of digital technologies on the future of work. The chapter explores whether automation in advanced countries is likely to prevent the traditional manufacturing-led jobs growth path in the region. The findings indicate that the adoption of digital technologies can have a positive and inclusive net effect on jobs. But this outcome would require quick improvement in digital infrastructure and support for complementary analog assets, such as worker skills, transport infrastructure, and the broader business environment. The development, diffusion, and adoption of skill-biased and low-skill-biased, worker-enhancing digital technologies are likely to be facilitated by accessible and affordable internet for all, especially in the low-productivity agriculture and service sectors. The widespread adoption of mobile money accounts in some Sub-Saharan African countries provides the starkest positive illustration of the pro-productivity and pro-inclusion effects of these digital technologies. The availability of higher-level digital skills is highly correlated with the availability of broadband, but not mobile voice infrastructure—further highlighting the importance of boosting affordable availability of internet for all. Despite rising concern about re-shoring, Sub-Saharan African countries may still have time to take advantage of globalization and follow the traditional industrialization-led growth path, if they act rapidly. This will require further integration with global markets, by participating in global value chains and attracting foreign direct investment, supported by complementary improvements in the business environment.

1.0 Introduction

The 2019 World Development Report (WDR) investigates the future of work at a time when there is growing concern that modern robots and a range of other worker-replacing automation technologies could take over millions of routine tasks, reducing the need for less-skilled workers (World Bank 2019a). WDR 2019 explains that technological progress creates risks and opportunities for global production networks and employment in developed and emerging economies.

This report addresses concerns about the effects of automation raised in WDR 2019 in the context of Sub-Saharan Africa, by focusing on the unique characteristics of the region's economies, in particular their low levels of human capital, large informal sectors, and inadequate levels of social protection. This introductory chapter sets the stage by investigating the following:

- The extent to which digital technology infrastructure and digital skills are available in Sub-Saharan Africa and their likely effects on work-related outcomes
- Whether automation in advanced countries would prevent the traditional manufacturing-led growth path in Sub-Saharan Africa.

The chapter argues that the analytical framework of WDR 2019 should be modified to be more relevant to the context of Sub-Saharan Africa. WDR 2019 focuses on the tension between process automation displacing workers in "old" sectors and product innovation providing job opportunities in "new" sectors as the key determinants of the future of work. WDR 2019 predicts that automation will reduce the demand for low- and medium-skilled workers in routine jobs, and that innovation will increase the demand for highly skilled workers. Given the low levels of human capital prevalent in Sub-Saharan Africa, coupled with its large, overwhelmingly informal and low-productivity agriculture and service sectors and small manufacturing sectors, as well as its large unmet demand for social protection, the future of work is likely to play out differently in Sub-Saharan Africa. This is because enterprises' adoption of skill-biased digital technologies, such as the internet, has the potential to generate low-skill jobs as well, provided there are sufficiently large output expansion effects from the productivity benefits of these technologies. This may be more likely in Sub-Saharan Africa, given the still relatively low levels of domestic demand for many mass consumption products, for which demand is likely more elastic to productivity and price changes. Thus, the situation in the region is in contrast with that in high-income countries, where demand is relatively more satiated and inelastic in its response to any further productivity and price changes (Bessen 2019).

The demand for skilled workers has increased with no reduction in the demand for low-skilled workers in areas of Sub-Saharan Africa where connections to faster internet have increased; and the increase in jobs has been of comparable magnitude for those with primary, secondary, and tertiary education (Hjort and Poulsen 2019). Perhaps even more importantly for inclusion outcomes, the adoption of low-skill-biased, worker-enhancing digital technologies that are accessible through the internet has the potential to boost the productivity of the large number of low-skilled agricultural workers. This process has largely been completed in advanced economies, as well as across all manufacturing and service sectors. Digital technologies, such as apps to allow workers to boost their numeracy skills and learn how to apply better farming practices and sell their products more effectively through markets, are likely to be facilitated by internet that is accessible to and affordable by all.

Finally, those manufacturing sectors that are typically considered "old" in more advanced economies represent only a small share of employment in Sub-Saharan Africa. To date, the automation of these sectors has been limited—likely because it has not yet been cost-efficient to invest intensively in these machines. Given the relatively low levels of adoption of newer process and product technologies across all sectors in the region, it is not appropriate to view its economies as populated by "old" and "new" sectors. Rather, Sub-Saharan Africa has the potential to catch up and learn from the mistakes of more advanced economies—

with businesses adopting new, worker-enhancing digital technologies, lowering production costs, and boosting demand and jobs across all sectors of the economies.

The chapter finds that Sub-Saharan African countries have the potential for positive net job effects from digital technology adoption if they quickly close the gaps in digital infrastructure and digital skills. Widespread automation of specific processes across the agriculture and manufacturing sectors as well as economywide adoption of other digital technologies have not yet taken place, partially due to the limited access to and affordability of digital internet infrastructure services. Contributing factors also include other key defining attributes of Sub-Saharan Africa, including low levels of human capital, high levels of informality, and inadequate social protection measures—that could protect against the risks that affect Sub-Saharan Africa to a greater extent than other regions and spur greater entrepreneurial and worker risk-taking. The chapter reports that the availability of broadband, rather than just mobile voice, has positive correlations with diverse work-related outcomes, including increased income and inclusion. Furthermore, the adoption of basic digital technologies, such as access to mobile phone devices, has spurred additional local digital technology innovations, such as mobile payment systems. These digital financial services, in turn, have begun to address widespread market and coordination failures, thus boosting productivity, increasing income and employment opportunities, and reducing vulnerability.

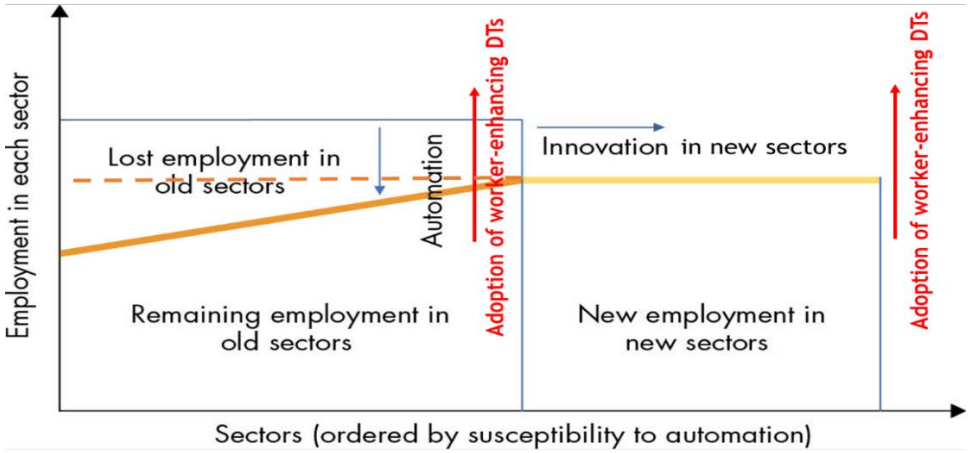
Sub-Saharan Africa is adjusting to the changing demand for skills driven by technological development. The chapter shows that, among LinkedIn users who are more familiar with digital technologies, digital skills are increasing rapidly, although from a low base. Importantly, there is large heterogeneity across skill types and country income levels. For instance, Kenya, Nigeria, and South Africa have more diversified digital skills than other countries in the region. Meanwhile, the level of digital infrastructure, particularly broadband, is highly correlated with the induced demand for and availability of digital skills across countries. Complementary analog assets, such as electricity and human capital, are important determinants for expanding digital infrastructure and digital skills.

Despite rising concern that automation in advanced countries may limit the traditional growth path through industrialization for developing countries, Sub-Saharan African countries still have time to take advantage of globalization to boost productivity and jobs in manufacturing sectors if they act quickly. Assessments of the effects of the adoption of new technologies on the location of production bases remain speculative. Thus far, worldwide evidence is limited that digital technologies such as big data analytics, additive manufacturing, 3D printing, and advanced robotics are having a significant impact on the location of production bases and foreign direct investment (FDI). Globally, there has been little evidence of reshoring, and thus negligible effects of reshoring in Sub-Saharan Africa for the time being. Moreover, the risk of displacement is low, because there is little presence of off-shoring firms in the region. A more important question is how to increase the current low level of integration of Sub-Saharan African firms into global markets through participation in global value chains (GVCs) and by attracting FDI, both of which facilitate technology transfer. A related question is whether countries in the region can keep the unit cost of labor in line with and not exceeding growing productivity levels, as this will determine whether firms choose to automate production or move elsewhere. At present, traditional determinants of competitiveness, such as favorable trade policies and a supportive business environment, remain crucial to growth, supported by digital connectivity and manufacturing-service linkages.

1.1 WDR 2019 analytical framework and predicted effects for Sub-Saharan Africa

WDR 2019 highlights how new technologies are affecting the changing nature of work. It posits that the future of work will be determined by the tension between automation in "old" sectors and innovation in "new" sectors by creating demand for new goods and services (figure 1.1). Newer digital technologies, such as advanced robotics, big data, 3D printing, the Internet of Things, cloud computing, blockchain, and emerging platforms are transforming industries, firms, and jobs. WDR 2019 predicts that automation will reduce the demand for low- and medium-skilled workers in routine jobs in "old" sectors and that innovation will increase the demand for highly-skilled workers in "new" sectors, as well as the technical skills that necessitate adaptability through lifelong learning about new technologies.

Figure 1.1. Technological progress can expand work opportunities



Source: World Bank 2019 and staff revisions.
Note: DTs = digital technologies.

Within the set of available new technologies, digital technologies are the focus of this report, because their widespread adoption, including the adoption of low-skill-biased digital technologies that allow low-skilled workers to learn and upgrade their skills as they work, offers the possibility of particularly strong productivity and jobs growth benefits.[4] The following section provides available evidence on how the generation and adoption of digital technologies has boosted growth and inclusion outcomes in Sub-Saharan Africa to date.

The dynamics underlying figure 1.1 are also relevant for Sub-Saharan Africa because *innovation creates jobs in "new" sectors by creating demand for new goods and services*. For instance, in the financial services sector, rapid adoption of mobile payments in Kenya has led to the closing of bank branches (39 bank branches closed in Kenya between 2016 and 2018 (Bloomberg 2018)) and consequent job losses. The Bank of Kenya reports that 6,020 bank staff jobs were lost between 2014 and 2017. Concurrently, the number of mobile financial services agents increased by 69,342 during the period (Brookings 2018), demonstrating a large, positive net effect on jobs driven by technology.

At the same time, the trends illustrated in figure 1.1 manifest themselves differently in Sub-Saharan Africa, since the production and employment composition across sectors, the likely responsiveness of demand to productivity improvements, and the appropriate skill bias of technologies differ significantly from other regions. There are several reasons why the predicted inclusive jobs effects of digital technology adoption on lower-skilled and/or lower-educated workers may be different and more favorable for low-income Sub-Saharan African countries than for higher-income developing and developed countries. Three possible reasons examined here are linked to (i) supply-side effects of the sectoral composition of production and employment coupled with the relatively low cost of lower-skilled labor (so that adoption of skill-biased, worker-replacing automation technologies is not likely to be cost-effective yet, and even if adopted, not likely displace many workers), (ii) demand-side effects of the elasticity of demand to productivity improvements (so that the output expansion effect of skill-biased digital technology adoption is likely to be particularly large), and (iii) the likely greater relevance of generating and adopting low-skill-biased digital technologies appropriate to worker needs in the region.[5]

First, on the sectoral composition of production and employment in Sub-Saharan Africa, the share of employment in agriculture is still very high (31 percent versus 18 percent in other developing countries and 2 percent in advanced economies in 2017), while the share of employment in manufacturing is exceptionally low (8 percent).[6] Although the share of employment in services sectors (34 percent) is similar to other regions (35 percent for other developing countries and 42 percent among advanced economies), the services sectors are distinct from other regions, as they are largely informal (World Bank 2019c). The rapid automation of manufacturing sectors that are considered "old" sectors in more advanced countries has not yet taken place, due in part to the limited availability of foundational digital infrastructure.[7] That manufacturing employment is low in Sub-Saharan Africa means that skill-biased, low-skill worker-replacing automation digital technologies are not likely to displace many workers yet, even if adopted (see the newly-added dotted line in figure 1.1, which shows that lost employment in "old" sectors is likely to be significantly smaller in Sub-Saharan Africa than in other regions). And that low-educated, low-skill workers are still relatively low-cost across most of the region means that it may not yet be cost-efficient for businesses to invest in worker-replacing digital technologies, even if they are increasingly being used for the automation of more repetitive tasks in higher-income countries.

Second, the predicted effects of businesses' adoption of skill-biased digital technologies like the internet on lower-skilled workers depends on the responsiveness of demand to the price decreases that follow from the cost savings enabled by the digital technologies. If there is sufficient competition in product markets so that prices fall more than they would in monopolized markets and if demand is sufficiently elastic, there will be a significant output expansion effect. As long as the output expansion effect is sufficiently large to outweigh the substitution of lower-skilled workers for technology at initial output levels, the number of jobs will increase not only for high-skilled workers, but also for lower-skilled workers.[8] That there are still relatively low levels of domestic demand for many mass consumption products in Sub-Saharan Africa means that demand is likely to be more elastic to productivity and price changes—in contrast to high-income countries where demand is relatively more satiated for these products and therefore more inelastic in its response to any further productivity changes.[9]

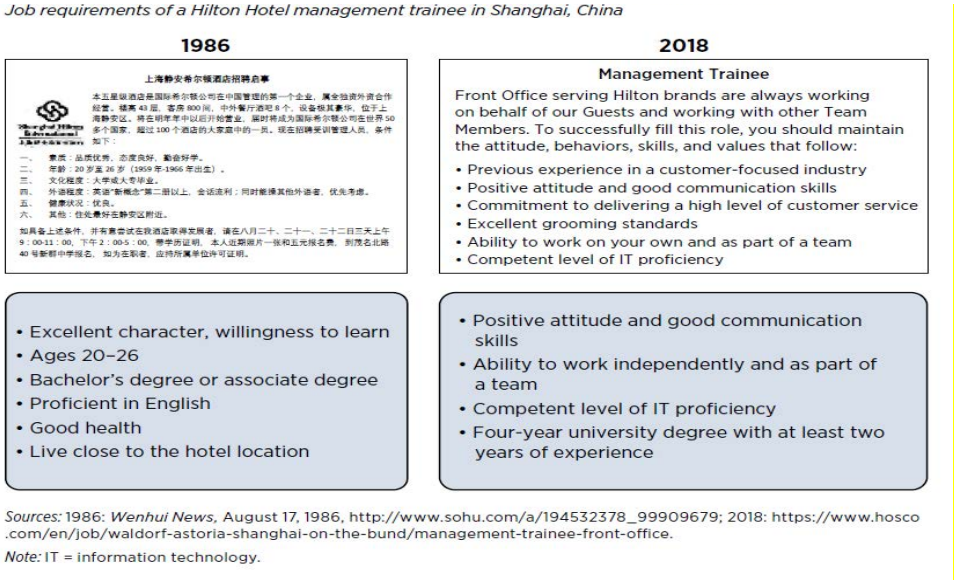
Third, given the low levels of human capital and high levels of informality in low-income Sub-Saharan African countries relative to higher-income countries, there is likely more scope for low-skill-biased, worker-enhancing digital technologies to be developed and adopted by businesses in Sub-Saharan Africa. The adoption of low-skill-biased, worker-enhancing digital technologies that are accessible through the internet has the potential to boost the productivity of the large number of low-skilled workers in agriculture, a process that has largely been completed in advanced economies, as well as across all manufacturing and service sectors. These digital technologies, such as apps to allow workers to boost their numeracy skills and learn how to apply better farming practices and sell their products more effectively through markets, can

help to upskill workers with low literacy and numeracy skills and provide productivity-boosting information to low-income informal farmers and retail street-sellers. These types of low-educated, low-skilled workers are less prevalent in higher-income countries. Based on these predicted channels from digital technology adoption to more productive jobs for low-educated, low-skill workers, it is therefore less relevant to view Sub-Saharan African economies as populated by "old" and "new" sectors. Rather, the adoption of worker-enhancing digital technologies, skill-biased and low-skill-biased, has the potential to boost the productivity, output, and jobs for low-skilled workers across all sectors of the economy, as illustrated by the red process innovation arrows in figure 1.1.

The predicted effects of the adoption of digital technologies suggest pro-inclusion opportunities for Sub-Saharan African countries if there are sufficiently large output expansion effects and if entrepreneurs are able to invest profitably in low-skill-biased digital technologies that help boost the skills of low-educated workers. But the effects will only materialize if there is an appropriate business environment with pro-competition government regulation and appropriately targeted subsidies to ensure that the internet is available and affordable to all. Available and usable internet services also require complementary physical infrastructure, such as electricity and transport and logistics. To avoid the risks of a further digital divide, internet services must be affordably and equally available in urban and rural areas, in secondary as well as primary cities, for women as well as men, and for older as well as younger people. In addition, the predicted effects are average effects. The reallocation of physical capital and workers in response to productivity increases by some firms and not by others is not without frictions, and thus the benefits of increased competition and efficiency will not be equally distributed. Poorer workers will gain from lower prices of products in their consumption basket. However, some may lose if they are employed in enterprises or industries that are forced into decline by the adoption of new digital technologies by leading enterprises and not by the ones where they are employed. There will likely be negative individual effects at the regional and industry levels, particularly for specific low-skilled workers, although the overall benefits may be large. Policies to boost productivity gains from digital technology adoption thus need to be complemented with measures to help enterprises and workers adjust. Such policies include increased investment in skills training, as discussed in chapter 2; measures to facilitate the productivity upgrading of informal enterprises, as discussed in chapter 3; and targeted social protection and labor policies, as discussed in chapter 4, including job search support.

Enterprises' adoption of digital technologies is also changing their demand for skills—particularly for *digital skills*. The skill composition demand by enterprises has been changing across all occupations. As an example, WDR 2019 cites the changing job requirements of a Hilton Hotel management trainee to illustrate the increasing importance of information technology (IT) literacy over the past 20 years (figure 1.2). However, the changing demand for skills might also be different in Sub-Saharan Africa compared with other regions, due to the region's low levels of human capital. This chapter reviews the availability of high-demand digital skills in the subpopulation of workers who use LinkedIn, the online platform that provides intermediate services for workers and enterprises. It finds that Sub-Saharan African economies appear to be gradually adjusting to the changing demand for skills, as digital skills are growing, although from a low starting point and with large heterogeneity across skill types and countries. The availability of digital skills is highly correlated with the availability of broadband infrastructure, but not with mobile voice infrastructure.

Figure 1.2: Example of changing skill composition demand, 1986 versus 2018 (from WDR 2019)



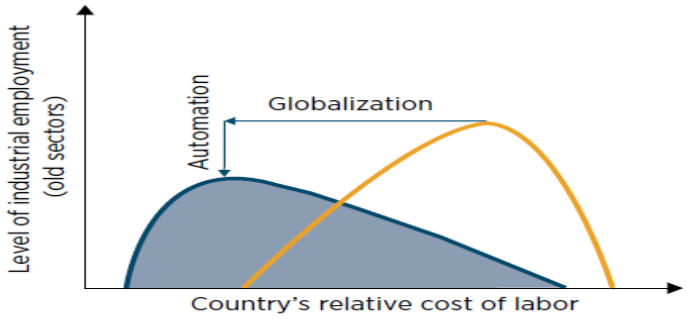
Sources: 1986: *Wenhui News,* August 17, 1986, http://www.sohu.com/a/194532378_99909679; 2018: https://www.hosco.com/en/job/waldorf-astoria-shanghai-on-the-bund/management-trainee-front-office.

Note: IT = information technology.

WDR 2019 also raises the concern that technological progress will facilitate automation in advanced countries driven by reshoring, which in turn would mean that African countries never experience a traditional industrialization-led growth path. Automation occurs more quickly in locations with high labor costs, assuming the incentive to reduce labor costs exceeds other profit-related differences between locations. Figure 1.3, from WDR 2019, illustrates how automation and globalization affect manufacturing employment worldwide. If this graph were adapted to Sub-Saharan Africa, the curves pictured would likely be much flatter, because formal sector and manufacturing employment across most countries in the region is at much lower levels. This will continue to be the case, as workers shifting out of agriculture are most likely to move to service sectors.

This chapter examines whether the adoption of new worker-saving digital technologies in advanced countries could challenge the traditional manufacturing-led growth model in Sub-Saharan Africa, as the region's comparative advantage in labor costs becomes less salient. It finds that the potential effects of new digital technologies on global production networks and employment remain speculative for now. The demise of offshoring appears vastly exaggerated, at least for the foreseeable future. Until now, robotization in developed countries is concentrated in a few technology-intensive sectors, such as the automotive, rubber and plastics, metals, and electronics sectors. It is limited in labor-intensive sectors such as textiles. And increased automation in richer countries can enhance productivity and income, thus further increasing demand for intermediate inputs and other goods from developed countries. At the same time, new digital technologies, such as 3D printing, could provide new opportunities for Sub-Saharan Africa by facilitating the growth of regional value chains and enhanced manufacturing-service linkages. However, a bigger concern for the region is the current low level of integration with global markets through GVCs and FDI, commonly understood to be channels by which technology is transferred from more advanced foreign firms.

Figure 1.3: Automation, globalization, and manufacturing employment



Source: Glaeser 2018.

Note: The curves are inverse U-shaped to reflect the empirical regularity that manufacturing employment constitutes a larger share of employment in middle-income countries; higher-income countries tend to specialize in services; and low-income countries have a relatively higher share of employment in agriculture.

Source: World Bank 2019.

The future of work is likely to play out differently from other regions, due to Sub-Saharan Africa's unique specificities, including the continuing low levels of human capital in most countries, the region's particularly large informal sector, and its insufficient and inefficient social protection systems, in addition to the above-mentioned shortcomings in the adoption and availability of broadband and related digital technologies and digital skills. These specificities of Sub-Saharan Africa provide the context for a more detailed examination of these issues in the following chapters.

Sub-Saharan African countries have a large stock of ill-equipped workers and low levels of *human capital*. This situation is likely to persist despite growing efforts by countries to enhance human capital. On the upside, digital technologies can improve the availability and quality of education and health services, boosting human capital upgrading. Digital technologies also can complement ill-equipped workers by enabling them to learn and perform more sophisticated tasks in their existing occupations, while generating new occupations. Chapter 2 discusses the linkages between digital technologies, human capital, and the future of work.

The *informal sector* in Sub-Saharan Africa, which typically has the lowest levels of productivity, accounts for a sizable proportion of employment (90 percent of total employment). It will likely remain large over the next years, since efforts to formalize farms and firms have had limited success to date. Appropriately designed digital technologies can offer opportunities to enhance the productivity of informal firms and farms by enabling informal entrepreneurs and workers not only to learn, but also to access credit and insurance products, thereby making formalization more likely over time for those informal firms that grow and start benefiting from more formal services. Chapter 3 discusses the linkages between digital technologies, informality, and the future of work.

There are other factors beyond technologies that will disrupt labor markets in Sub-Saharan Africa, such as increased economic integration, climate change, fragility, and demographic transitions. All these factors not only create opportunities, but also risks for enterprises and workers, increasing the need for risk-sharing *social protection* policies. However, the coverage of social protection remains low in Sub-Saharan Africa, given governments' fiscal constraints, inefficient public spending, and competing policy priorities for

limited public investments. Chapter 4 discusses how Sub-Saharan African countries can improve their social protection policies to prepare for the future of work, supported by more effective and efficient domestic and international resource mobilization.

1.2 Availability of digital technologies and their effects to date

Automation and innovation today are largely driven by the availability of digital technologies, with most digital technologies facilitated by the internet and mobile telecommunications as the main connectivity-related digital technologies. Globally, it is widely documented that digital technologies reduce the economic costs associated with search, replication, transportation, tracking, and verification (Goldfarb and Tucker 2019), thereby supporting inclusion (expanding market access to individuals and firms), efficiency (boosting the productivity of the different inputs), and innovation (through the creation of new business models) (Deichmann, Goyal, and Mishra 2016; World Bank. 2016a). This section investigates to what extent these digital technologies are available in Sub-Saharan Africa and what we know about their effects to date in the region.

1.2.1 Availability of digital infrastructure

Mobile voice users and networks are rapidly growing in Sub-Saharan Africa.[10] Mobile voice subscriptions were 15 times higher in 2015–17 than in 2010–12. After rapid expansion over the past decade, almost 86 percent of the population in the region is covered by mobile networks, although this is still lower than emerging economies in East Asia that reached universal access to mobile voice networks by the end of 2017. Africa has fewer mobile phone subscribers than other regions, with about 14 percent of the population not yet having a subscription by the end of 2017, while other regions have already surpassed 100 percent penetration. Moreover, quality in mobile cellular services is poor relative to other regions. The percentages of unsuccessful calls (2.2) and dropped calls (1.1) in Sub-Saharan Africa were larger than those of lower-middle-income countries (1.5 and 0.8, respectively, in 2015–17). Moreover, the affordability of mobile cellular services is a concern. Connection charges and the fee for a one-minute call have decreased significantly in Sub-Saharan Africa but are still high relative to income levels. Figure 1.4, panel a, plots mobile voice subscribers (per 1,000 people), using quarterly data from 2004q1 to 2018q3. The number of mobile voice subscriptions was 1,348 per 1,000 people in advanced economies. In Africa, mobile subscribers amounted to 806 per 1,000 people in 2017, up from 226 in 2007.

Despite the increase in mobile voice availability, Sub-Saharan Africa continues to have limited access to broadband networks that provide internet and data services. Overall, access to internet service remains unattainable for most people on the continent. Africa's continent-wide level of international internet bandwidth used in 2017 (7,314 billion bits per second) represented only 1 percent of the world's total, a third the level of the Middle East, and about the level of Chile or Romania (TeleGeography 2018). Eighteen of the 20 least wireless connected countries in 2017 are in Sub-Saharan Africa (GSMA 2018).

Fixed broadband access is extremely low, with fewer than 0.6 percent of the Sub-Saharan African population having fixed broadband subscriptions in 2015–17. Although fixed broadband provides stable connectivity and is suitable for large-scale data needs, it is less cost-effective than mobile broadband, as deploying it requires a significant amount of installation work. It is on average three times more expensive than mobile broadband (average purchasing power parity (PPP) $40 for mobile broadband versus PPP$ 134 for fixed broadband for 1 gigabyte of data across less developed countries (ITU 2018).

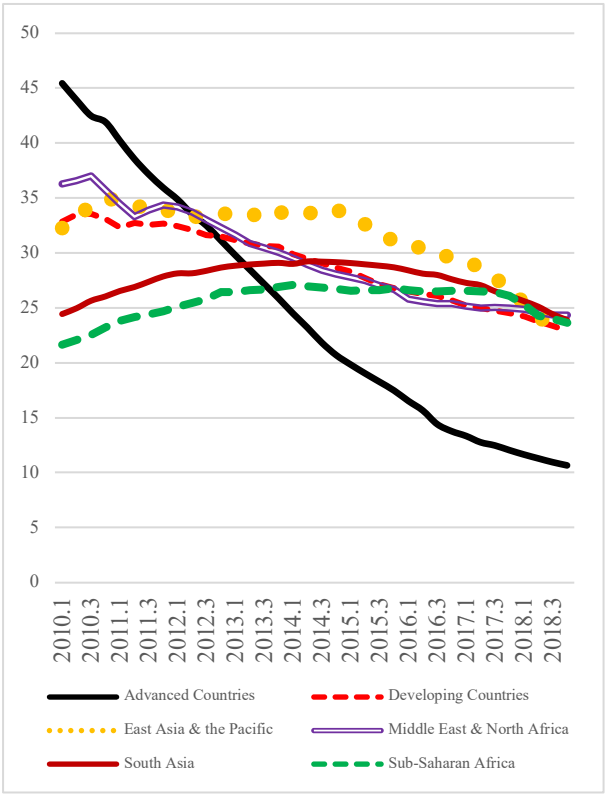
Mobile broadband subscriptions are somewhat higher, at 30 percent (and 24 percent for unique users, counting only one user for those with multiple connections). But they are significantly lower than other regions (68 percent in Asia and the Pacific and 90 percent in Europe) at the end of 2018 (GSMA 2018). The rapid expansion of mobile voice networks and ongoing upgrades of telecommunication networks by mobile operators in Sub-Saharan Africa give opportunities to expand mobile broadband in the future (Mahler, Montes, and Newhouse, 2019). Although most operators in the region still provide 2G or 3G networks with limited data services, 11 of the 48 Sub-Saharan African countries are now covered by a 4G network (TeleGeography 2018).

Figure 1.4, panels a and b, presents the expansion of mobile narrowband and mobile broadband unique subscriptions across different regions. It shows a large gap in mobile broadband infrastructure in Sub-Saharan Africa, which has not yet replaced the mobile narrowband, which is in contrast to advanced economies where mobile broadband has been replacing mobile narrowband.

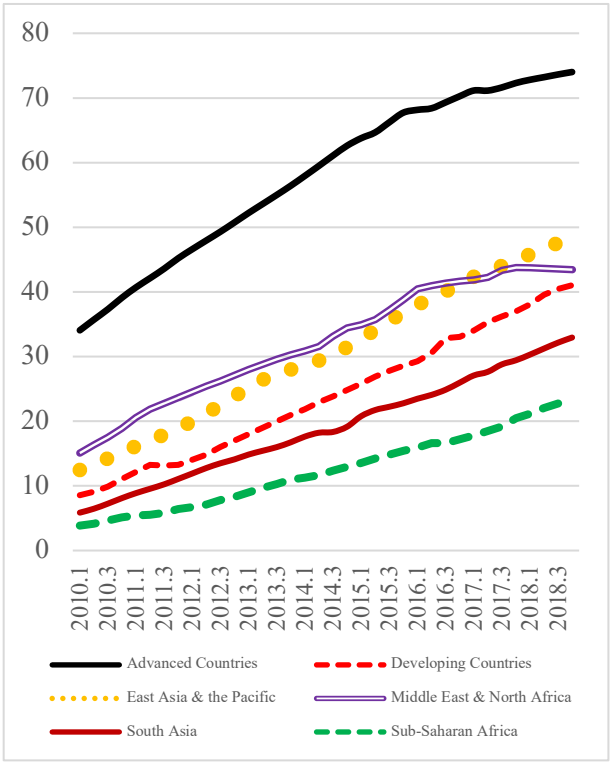
Figure 1.4, panel c, shows unique mobile broadband penetration relative to total subscribers across countries. There is a high heterogeneity in mobile broadband penetration across countries.

Figure 1.4: Unique mobile broadband penetration, by region, 2010–18

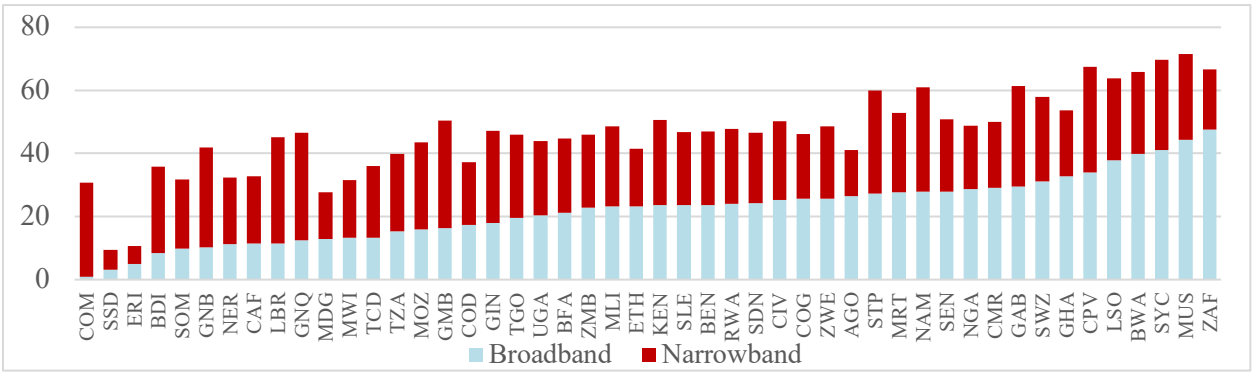
a. Unique mobile narrowband (2G, mobile cellular) subscribers (percentage of population)



b. Unique mobile broadband (3G+) subscribers (percentage of population)



c. Large heterogeneities in broadband and narrowband penetration across countries in Sub-Saharan Africa



Source: GSMA.

Note: In panel a, the regional figures depicted are medians across countries for each corresponding year. Unique subscribers imply total unique users who have subscribed to mobile services at the end of the period, excluding M2M. In panel b, mobile internet unique subscribers imply total unique users who have used internet services on their mobile device(s) at the end of the period. Mobile internet services are defined as any activity that consumes mobile data (excluding SMS, MMS, and cellular voice calls).

1.2.2 Digital technologies' effect on growth and inclusion outcomes

Digital technologies can generate significant poverty reduction and inclusion outcomes, if supported by appropriate public policies including measures to mitigate the risks of widening digital divides—associated with challenges of affordable access and use of internet by all (including women, old people, and people in rural areas and secondary cities, supported by sufficient relevant local content) and low skills (particularly prevalent in Sub-Saharan Africa's large informal sector), among others. Inclusion outcomes are generated to the extent that digital technology adoption results in more jobs and higher incomes for lower-skilled workers, higher returns to low-income entrepreneurs, more efficient income transfers and other government services for poor people, and lower-priced goods and services consumed by poor people, including health and education services.

Digital technologies influence development outcomes in Sub-Saharan Africa through diverse channels. Although the evidence is scarce at the aggregate level, there is emerging evidence at the enterprise and individual levels from different countries.

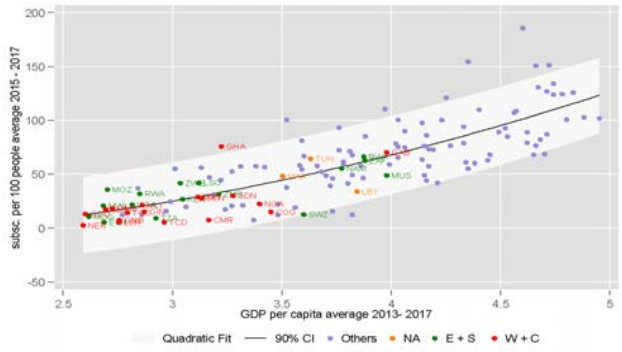
At the aggregate level, digital technologies can lead to growth and poverty reduction in Africa. In contrast to the large amount of literature on growth and productivity in developed economies,[11] the empirical evidence of the effect of digital technologies across countries and industries is rare in Sub-Saharan Africa. However, a recent study finds that mobile voice and broadband infrastructures have positive and significant impacts on real gross domestic product (GDP) growth per capita and poverty reduction. Reaching the African Union's "Digital Transformation for Africa" digital infrastructure goal of universal and affordable internet network coverage with universal penetration of mobile cellular phones would raise growth per capita by 2 percentage points per year and reduce the poverty headcount by 1 percentage point per year across Sub-Saharan African countries. When complemented with appropriate human capital investments, the effects could more than double, with growth per capita increasing by roughly 5 percentage points per year and the poverty headcount falling by roughly 2.5 percentage points per year.[12]

There are positive correlations between the usage of digital technologies and economic outcomes across countries with different income levels. Although causality is difficult to establish, these patterns suggest that the availability of digital technology infrastructure is complementary to growth and inclusion. Specifically, the greater is the percentage of the population using mobile broadband (internet) and mobile cellular (voice), the higher are the levels of per capita income and human capital and the reliability of the electricity supply (figure 1.5).

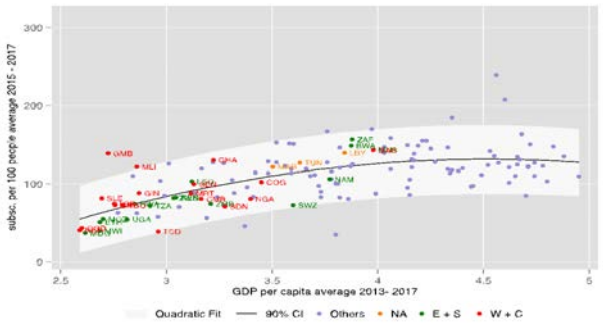
Interestingly, those economic outcome indicators have a linear relation with mobile broadband but a nonlinear relation with mobile voice service, which may reflect almost universal cellphone subscriptions above a certain income level. Most Sub-Saharan African countries are below this "universal access" income. Additionally, mobile broadband and mobile voice subscriptions are negatively associated with poverty. Although the usage of mobile broadband is negatively associated with income inequality (as proxied by the Gini index), the usage of mobile voice services does not show a clear pattern with the inequality level for Sub-Saharan African countries. All figures show a great deal of heterogeneity in income inequality across countries.

Figure 1.5. Availability of mobile broadband has higher correlations with growth and inclusion indicators than mobile voice

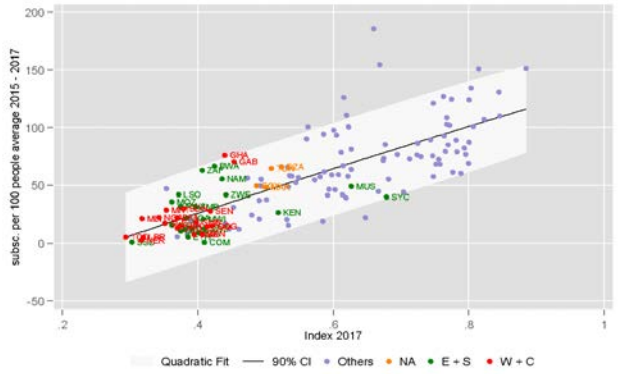
a. Mobile broadband and GDP per capita



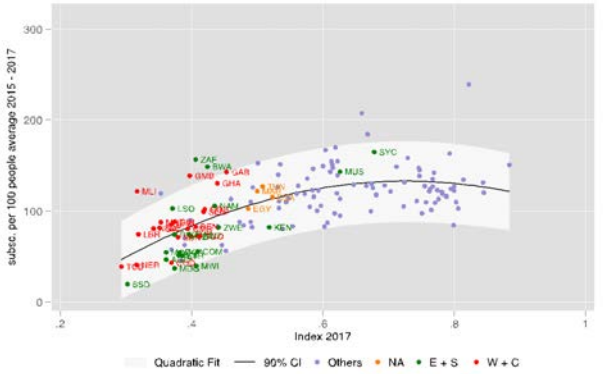
b. Cell phone subscriptions and GDP per capita



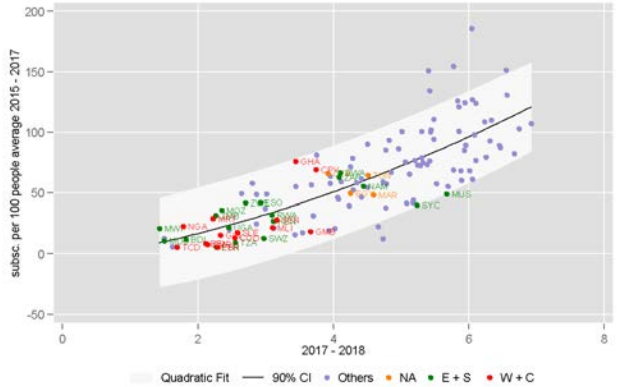
c. Mobile broadband and the Human Capital Index



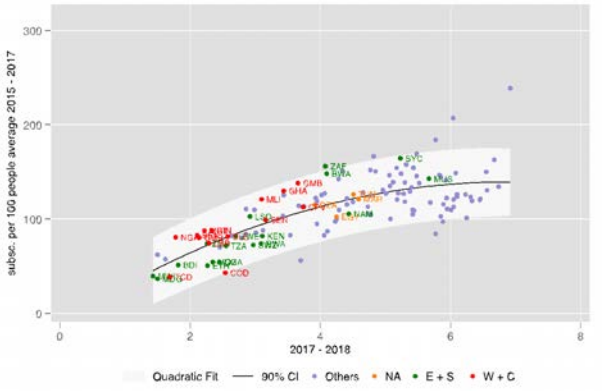
d. Cell phone subscriptions and the Human Capital Index



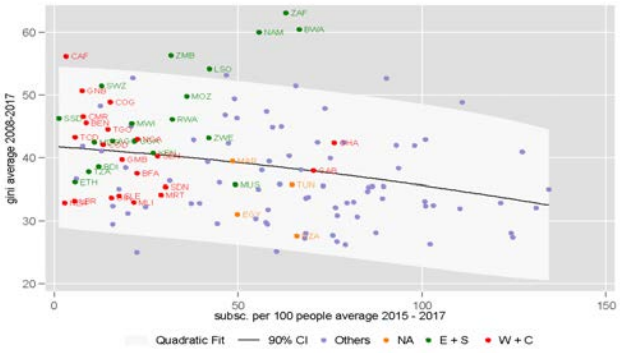
e. Mobile broadband and electricity infrastructure



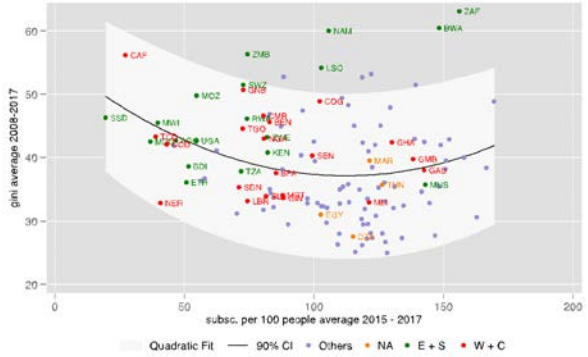
f. Cell phone subscriptions and electricity infrastructure



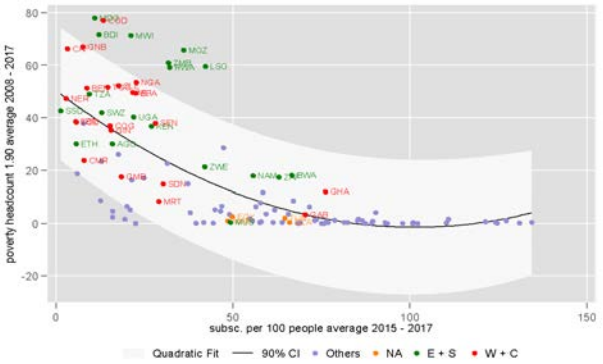
g. Mobile broadband and the Gini index



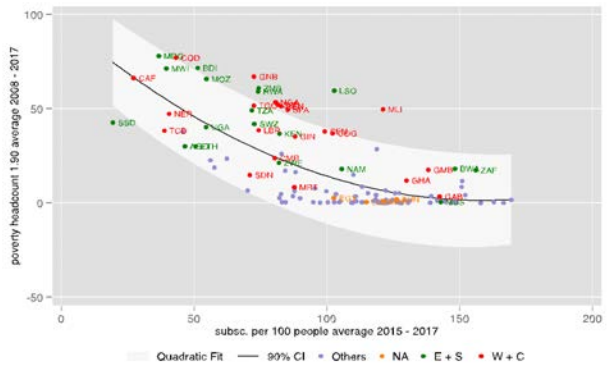
h. Cell phone subscriptions and the Gini index



i. Mobile broadband and poverty



j. Cell phone subscriptions and poverty



Source: All the variables were downloaded from the World Bank's World Development Indicators.
Note: CI = confidence interval; E + S = East and Southern Africa; NA = North Africa; W + C = West and Central Africa. The digital economy indicator is measured as (a) mobile broadband subscriptions per 100 people, (b) cell phone subscriptions per 100 people, averaged over 2015–17. Development variables are (a) income (GDP per capita), (b) complementary assets (the World Bank's Human Capital Index (HCI), and the World Economic Forum's (WEF's) indicator of the reliability of the electricity supply), (c) the Gini index of inequality, and (d) the poverty headcount ratio.

At the enterprise and individual levels, more evidence, including emerging evidence from randomized experiments, is becoming available on the effects of digital technologies on productivity growth and inclusion outcomes.

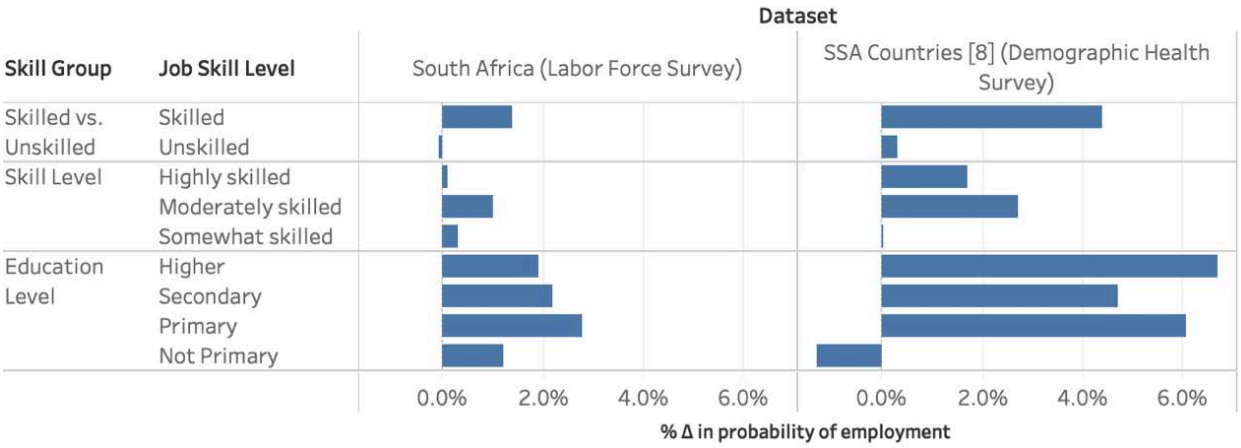
Importantly, new empirical findings from Sub-Saharan Africa suggest that digital technology adoption may not necessarily reduce the demand for low- and medium-skilled workers. As explained in greater detail in box 1.1, the arrival of faster internet across Sub-Saharan Africa has provided a natural experiment to assess the impact of the adoption of this digital technology (and presumably related digital technologies that rely on faster internet) on individuals and businesses. The study finds that the predictions explored in section 1.2, namely that the adoption of skill-biased digital technologies like the internet can lead to more favorable pro-inclusion outcomes in Sub-Saharan Africa than in higher-income countries, are supported by available data. The demand for skilled workers increased sizably, with no reduction in the demand for low-skilled workers in the region in areas where the connection to faster internet increased; and the increase in jobs has been of comparable magnitude for those with primary, secondary, and tertiary education (Hjort and

Poulsen 2019). Earlier empirical work by Dutz, Almeida, and Packard (2018) shows that low-skilled workers also benefit from significant job expansion from the adoption of internet and related skill-biased digital technologies, suggesting an important empirical mechanism that underlies the inclusive outcomes found in Sub-Saharan African countries.

Box 1.1: Faster internet adoption boosts jobs of less educated workers as well as the better educated

When faster internet became available in Sub-Saharan Africa, the probability that an individual is employed increased by 6.9 and 13.2 percent, respectively, for countries in different samples (Demographic Health Surveys (DHS) across eight Sub-Saharan African countries and Afrobarometer across nine Sub-Saharan African countries), and by 3.1 percent in South Africa, relative to areas unconnected to submarine cables.[a] Importantly, the increase in employment in these areas was not due to displacement of jobs in unconnected areas. These impacts due to faster internet are net positive job increases and sizable in magnitude (Hjort and Poulsen 2019).[b]

Figure B1.1.1: Faster internet boosts skilled occupations as well as jobs across education levels



Source: Hjort and Poulsen 2019, tables 5 and 6.

These aggregate findings can be broken down by skilled and unskilled employment categories to examine their impact on job inclusion outcomes. In South Africa and DHS countries, the probability that an individual holds a skilled job increases by 1.4 and 4.4 percent, respectively, when faster internet becomes available, as shown in the upper part of figure B1.1.1. The probability of holding an unskilled job does not decrease (the change is statistically insignificant), so those individuals are not worse off. These findings imply that faster internet adoption is skill-biased in Sub-Saharan Africa, that is, it complements more skilled jobs—as has been shown in high-income countries. Importantly, there is a relatively large estimated increase in the probability of moderately skilled employment when the skilled category is broken into its subcategories, as shown in the middle part of the figure. Moderately skilled employment contributes most of the overall increase in skilled employment when faster internet becomes available.[c]

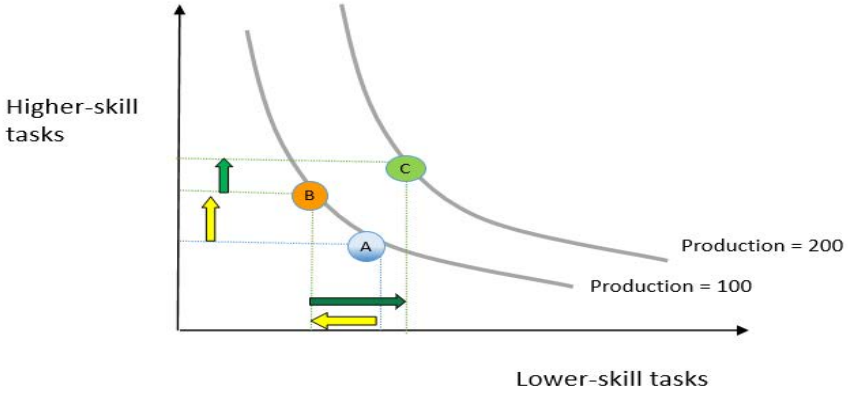
Most importantly, an examination of the impact of faster internet arrival on workers by educational attainment rather than job categories highlights that the estimated increase in the employment rate is of comparable magnitude for those with primary school, secondary school, and tertiary education in all samples studied.[d] In the Afrobarometer countries (not shown here), the estimates suggest that faster internet also increases the employment rate for those who did not complete primary school. And, importantly, a proxy for incomes rises as a result: analysis of data on nighttime lights from satellite images shows that fast internet causes increases in average incomes in the areas that benefited from increases in jobs.

These findings of net positive effects on jobs and incomes, also for less educated worker groups, are important because they are based on the identification of causal impacts. Causal effects are identified by comparing individuals and firms in locations in Sub-Saharan Africa that are on the terrestrial network of internet cables with those that are not, during the gradual arrival of 10 submarine cables from Europe in the late 2000s and early 2010s that greatly increased speed and capacity on the terrestrial network.

What are the mechanisms through which faster internet increases jobs, including for lower-educated workers? Hjort and Poulsen (2019) report that part of the increase in jobs may be explained by net firm entry (around 23 percent when fast internet arrives in South Africa), including a large increase in firm entry and a decrease in firm exit of similar magnitude. Another part of the jobs increase appears to be due to productivity increase in existing manufacturing firms (in Ethiopia). And they show that firms in Ghana, Kenya, Mauritania, Nigeria, Senegal, and Tanzania export more, communicate with clients more, and train employees more, based on World Bank Enterprise Survey data.[e] They suggest that the productivity of less-educated workers may have benefited from employers providing targeted on-the-job training.

A key mechanism that likely underlies the inclusive jobs outcome of the skill-biased digital technology adoption found by Hjort and Poulsen is the output expansion effect highlighted by Dutz, Almeida, and Packard (2018) in Latin American countries. The contributing authors (see their appendix A) take advantage of firm-level data from national enterprise surveys where the causal effects of firm investments in information and communications technology (ICT) capital and firm-level use of fast internet on high- versus low-skill worker jobs are identified by the gradual rollout of internet across these countries.[f] In separate complementary studies on Argentina, Brazil, Chile, Colombia, and Mexico, they show that lower-skilled workers also benefit from the more intensive use of internet as firm productivity increases. The inclusive jobs outcomes arise when the effects of increased productivity, lower prices, and expanding output overcome the substitution of lower-skilled workers for technology at initial output levels. While the substitution effect replaces some lower-skilled workers with new technology and more highly-skilled labor (as shown by the movement from A to B in figure B1.1.2, holding output constant), the output effect can lead to an increase in the total number of jobs for less-skilled workers (as shown by the movement from B to C). Critically, output can rise sufficiently to increase jobs across all tasks and skill types within adopting firms, including jobs for lower-skilled workers. This effect holds as long as lower-skilled task content remains complementary to new technologies and related occupations are not completely automated and replaced by machines.

Figure B1.1.2: Skill-biased digital technology and output expansion boost high- and low-skill jobs



COUNTRY	YEARS	SECTORS	VARIABLE	JOBS				PRODUCTIVITY
				TOTAL	HI-SKILL	LO-SKILL	GAP	
Argentina	2010-12	Manufacturing	investment in ICT capital	+	+	+	+	+
Brazil	2000-14	Tradables	percent internet availability	+	+	0		+
Chile	2007-13	Economy-wide	complex software use	+	0	+	-	
Colombia	2008-14	Manufacturing	hi-speed Internet use	+	+	+		+
Mexico	2008-13	Manufacturing	Internet use	+	+	+	+	+
		Services	Internet use	+	+	+	0	+
		Commerce	Internet use	+	+	+	0	+

Source: Dutz, Almeida, and Packard 2018.

a. The DHS sample covers Benin, the Democratic Republic of Congo, Ghana, Kenya, Namibia, Nigeria, Tanzania, and Togo. The Afrobarometer sample covers Benin, Ghana, Kenya, Madagascar, Mozambique, Nigeria, Senegal, South Africa, and Tanzania. The three data sets together cover 12 countries in Sub-Saharan Africa with a combined population of roughly half a billion people.
b. Additional robustness checks by the authors include sensitivity analysis on the definition of "connectivity" by altering the radius from the backbone network, measuring the impact of other infrastructure, and labor displacement effects arising from commuting, all resulting in indiscernible changes in the reported outcomes. The authors also note that the response in employment did not appear to arise from formalization of "pre-existing informal jobs," nor did they find evidence of employment rising in connected areas prior to the arrival of submarine cables.
c. Data on the "somewhat skilled" job category are not available for the DHS sample.
d. The changes for workers who did not complete primary school are not significant in these samples. And the difference in estimated jobs gain for those with primary relative to secondary school is also not statistically significant.
e. In earlier related work based on a sample of 26,000 manufacturing firms including 15 African countries from World Bank Enterprise Survey data, Dutz et al. (2012) find that firms innovate more in products and processes and show greater employment growth if they use internet.
f. The studies exploit plausible exogenous changes in the availability of ICT access or its quality over time and space. The Mexico study, for instance, interacts average ICT intensity in the United States with the average elevation of municipalities to reflect the geographical challenges of internet availability in more difficult-to-access areas.

Subsequent chapters present evidence of how digital technologies can improve human capital, the impact of digital technologies on farms and firms in the informal sector, as well as the provision of social protection services in Sub-Saharan Africa. This subsection provides a summary of some of the available evidence of the effects of mobile money, an area where some of the most significant effects have appeared to date.

Mobile money, which allows people to deposit, withdraw, and send money using their mobile phones, is widely adopted in Sub-Saharan Africa, where traditional financial accounts are not widely available. More than one in five adults in the region have a mobile money account, and more than half of all mobile money services in the world are in Sub-Saharan Africa (World Bank 2018; Global Financial Index 2017; Demirgüç-Kunt et al. 2018; GSMA 2018). Kenya's M-PESA, one of the successful mobile money services, has been adopted by at least one individual in 96 percent of households outside Nairobi since its launch in 2007, and over half the population uses the system at least once a month (Suri and Jack 2016). As a result, the number of Kenyans included in the formal financial system has grown by 50 percent, and financial exclusion has more than halved, down to 17.4 percent as of 2016. M-PESA reported annual service revenue of US$2.4 billion for the financial year to the end of March 2019 (Safaricom 2019).

Evidence shows that access to mobile money has increased productivity, through individual economic outcomes and occupational choices and different financial behavior. Increases in productivity in turn typically lead to an expansion in output and thus to increases in employment. Inclusion effects can be generated through a variety of related channels.

Mobile money can empower *occupational choices and individual economic outcomes*. For instance, access to M-PESA facilitated occupational choice in Kenya and increased the efficiency of the allocation of labor, particularly for female-headed households, and induced women to move out of agriculture and change their main occupation to business or retail (Suri and Jack 2016). More detailed information about the effect of mobile money on occupational choice is provided in box 1.2.

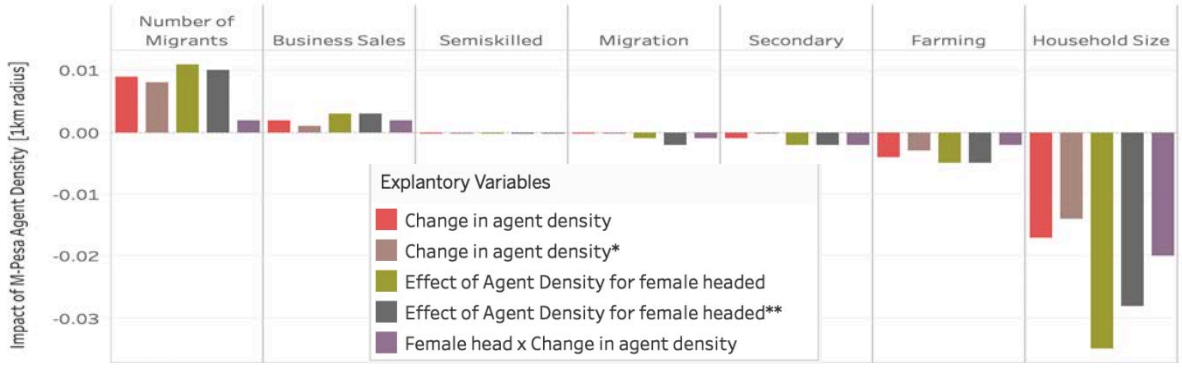
Box 1.2: Access to M-PESA changed the occupations of its users over time

Suri and Jack (2016) investigate the causal effects of M-PESA on the economic outcomes of households over time. Using five rounds of a household panel survey over 2008–14, they estimate the changes in access to mobile money at the household level, measured by the geographic proximity of households to M-PESA agents, and explore their effects on economic outcomes of the households and the factors that influence these effects.

They find that the usage of M-PESA increased per capita consumption levels and lifted an estimated 2 percent of Kenyan households (194,000 households) out of poverty. The impacts appear to be larger for female-headed households, which is partially due to changes in labor market outcomes, as access to M-PESA enabled 185,000 women to move out of subsistence farming and into business or sales occupations.

Figure B1.2.1 shows that individuals who had increased access to M-PESA agents were more likely to be working in business or sales, and less likely to be working in farming. Access to M-PESA reduced women's reliance on multiple part-time jobs (or secondary occupations) and led to a reduction in the average household size.

Figure B1.2.1: Access to M-PESA influences individuals' occupational choices



Source: Suri and Jack 2016, table 3.

Ongoing policy experiments are investigating the effects of mobile money accounts on enterprises and workers in Sub-Saharan Africa, and these will provide additional insights soon. For instance, Gautam et al. (2018) examine a policy intervention that promotes access to a mobile savings among female micro-entrepreneurs in Tanzania, and suggest the importance of complementary financial literacy training to take benefit from access to mobile accounts. Carranza et al. (2018) investigate the effects of a direct-deposit account that cannot be accessed by others, to understand the impact of redistributive pressure on workers' labor supply and earnings in Côte d'Ivoire. Buehren et al. (2018) investigate the impacts of mobile savings accounts with different commitments for salaried workers and customers in Ghana.[13]

Meanwhile, the more direct effect of mobile money accounts is changes in financial behaviors, driven by the reduced cost of transfers and payments, which results in enhanced *saving, consumption-smoothing, and risk-sharing mechanisms*. In countries and/or areas with an increased network of M-PESA-affiliated agents, total financial savings have increased, especially among female-headed households. M-PESA-registered users are more likely to save than those who are not registered (Demombynes and Thegeya 2012). Recent evidence from Burkina Faso shows that mobile money users are more likely to save for health emergencies, especially among the rural population, women, and less educated individuals (Ky et al. 2018). Mobile money provides a safe method for individuals to deposit savings and make changes in the composition of household assets (Aker and Wilson 2013; Ky et al. 2018). In response to income shocks, the consumption of M-PESA users remained invariant, as they were more likely to receive remittances, while the consumption of nonusers declined. Increased savings can help microentrepreneurs increase their ability to cope with unexpected shocks and finance lumpy investments. Greater risk-sharing ability than the previous costly self-insurance mechanisms and informal risk-sharing networks was followed by increased saving, higher consumption, and positive occupational changes for user households (Jack and Suri 2014). Similarly, usage of mobile money is associated with an increase in investment of small formal firms among those Sub-Saharan African countries for which World Bank Enterprise Survey data are available (Islam, Muzi, and Meza 2018).

Mobile money accounts enhance *inclusion* by supporting access to financial services and loans to those unbanked, particularly women and rural populations, who cannot meet the collateral requirements of traditional financial institutions (Mbiti and Weil 2016). For instance, female entrepreneurs are less likely to have collateral due to inequality in the ownership of fixed assets (for example, land or a house). Mobile loan providers use telecommunications data to develop alternative credit scores, thus facilitating the extension of loans to users without collateral or traditional scores calculated by a credit bureau. Digital-based credit scores may grant financial inclusion to individuals without credit scores in environments that lack verifiable

financial history or have inexistent or ineffective credit bureaus (Jack and Suri 2014). Alibhai et al. (2018) tested psychometric technology that predicts the likelihood that an entrepreneur will be able to repay a loan, as an alternative to traditional collateral for Ethiopia's female entrepreneurs. Customers scoring at a high threshold on the psychometric test were seven times more likely to repay their loans compared with lower-performing customers. Changes in access to mobile money services have also raised the probability of using a bank account. This effect may reflect that banking institutions started collaborating or competing with M-PESA. Mobile accounts can enhance the efficiency of public transfer programs and payments, and if those are provided to women, resource allocation within households is likely to be affected (Duflo and Udry 2004; Aker et al. 2013). Access to M-PESA has led to an increase in consumption per capita among households living in areas with increased access to mobile money agents—and this effect was twice as large for female-headed households, resulting in 2 percent of households (mostly female headed) being pulled out of extreme poverty over 2008–14 (Suri and Jack 2016).

1.3 Availability of digital skills and their determinants

Despite the gradual increase in basic education and literacy rates in recent decades, Sub-Saharan Africa still lacks basic skills. The starting level was very low and recent gains in enrollment and completion do not necessarily translate into improvements in the quality of education. High repetition rates, teacher shortages, and underperformance in test scores all contribute to the poor quality of education in the region (UNESCO 2016). Sub-Saharan Africa has the lowest literacy rates among all world regions. On average, only one-third of the population above age 15 is able to read and write, well below the global average of 86 percent (UNESCO Statistics 2016). The level of basic skills varies significantly across countries: higher-income Sub-Saharan African countries tend to have higher literacy rates than poorer countries (19 percent of adults in Mali are literate, compared with 90 percent in the Seychelles). The level of basic skills also varies within countries by income level: for example, in Tanzania and Uganda, the pass rate for basic literacy and numeracy skills falls by nearly 50 percent from "non-poor" to "ultra-poor" populations (Evans, Arias, and Santos, 2019). Chapter 2 provides more detailed information on the human capital landscape in Sub-Saharan African countries.

This section provides a closer look at the availability of high-demand digital skills in the subpopulation of workers who use LinkedIn, the online platform that provides intermediation services for labor demand and supply. The section reviews specific skills that are growing or declining across selected Sub-Saharan African countries and explores the determinants of those skills.

1.3.1 Availability of digital skills

This section uses data from self-reported information by LinkedIn users and therefore reflects a relatively narrow, nonrandom subset of the working age population that consists primarily of tech-savvy, white-collar professionals employed in knowledge intensive sectors, such as information and communications technology (ICT) and professional services. Additionally, these user-generated data have large heterogeneity across users in their willingness to report their specific skills and in the interpretation of different skills across cultures and countries, influencing the interpretation of cross-country skill comparisons. Nonetheless, the LinkedIn data offer value, specifically for the skill composition of the labor force, where other sources of data are limited.

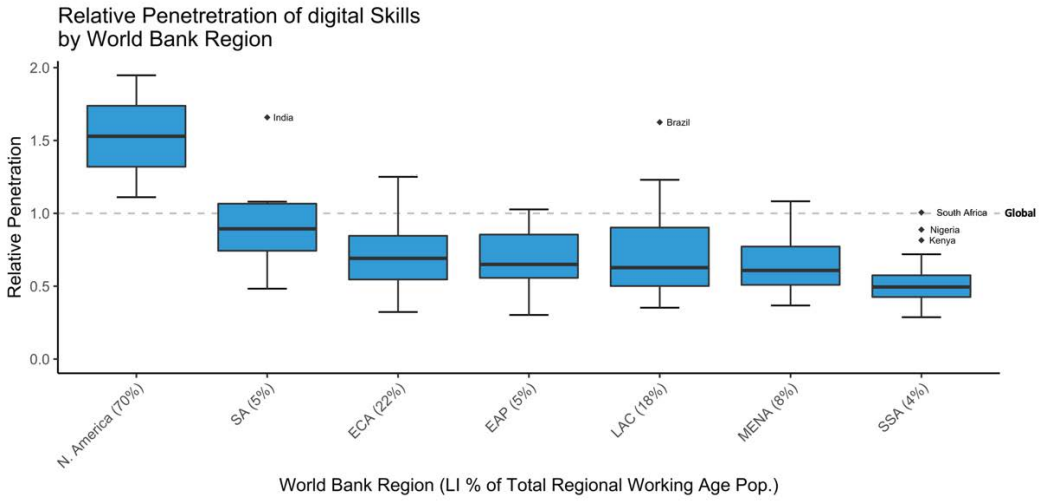
In Sub-Saharan Africa, the LinkedIn data capture information on 27 countries, each with at least 100,000 LinkedIn members, and, for certain countries, such as South Africa, more than one million members. The percentage of LinkedIn members as a proportion of each country's labor force (population ages 15-65) is

presented in figures, as appropriate. A more detailed discussion on the benefits and caveats of using LinkedIn data for cross-country comparisons can be found in annex 1A.

Although all members of the LinkedIn platform have at least some basic digital skills as a prerequisite, this section narrowly focuses on business-related digital skills.[14] This definition differs from other available definitions of digital skills, such as that used by UNESCO, which broadly refers to the abilities needed to access and understand information from digital devices,[15] and by the OECD, which provides a less precise definition but notes that digital skills differ from exclusively ICT skills.[16]

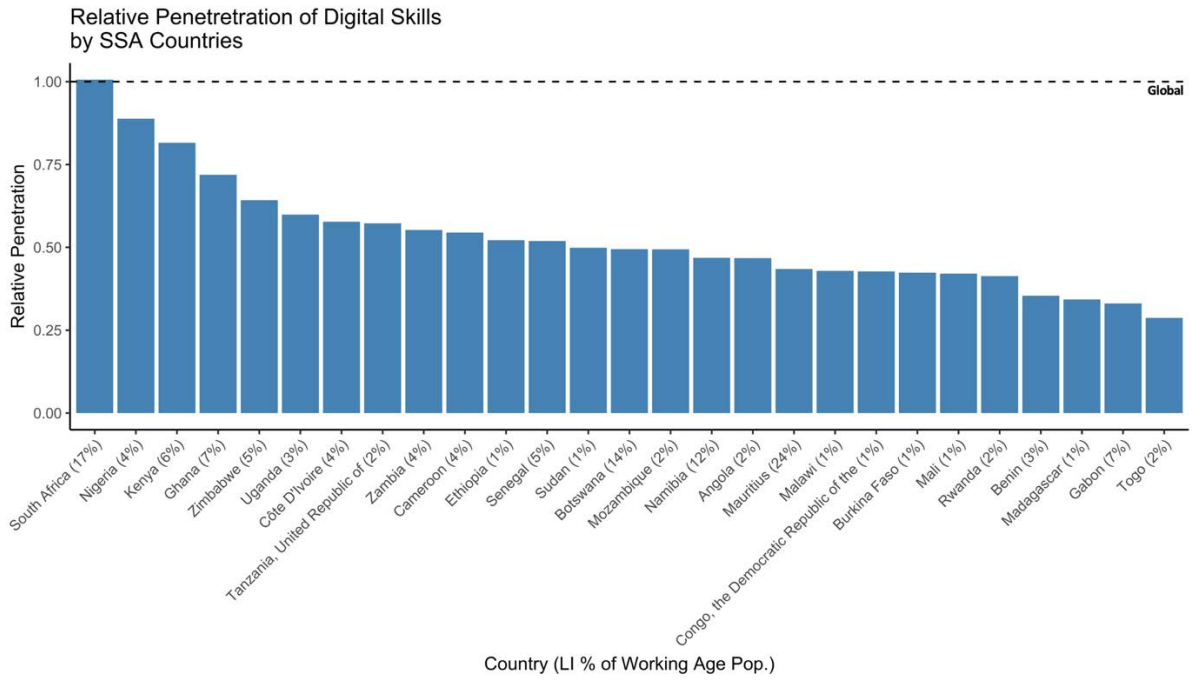
The LinkedIn data suggest that Sub-Saharan African workers have a lower level of digital skills than those in other regions, even among the small portion of the labor force that uses LinkedIn, which constitutes, on average, 4 percent of the labor force among the 27 Sub-Saharan African countries for which LinkedIn data are available. In North America, by contrast, 70 percent of the labor force uses the platform (figure 1.6). The availability of digital skills varies significantly across Sub-Saharan African workforces. In South Africa, 17 percent of the labor force are LinkedIn members, and they report digital skills equivalent to the global average. Although digital skills are relatively high in Nigeria and Kenya, these countries have only a small population of LinkedIn users relative to the total labor force. Despite these differences, Nigeria, Kenya, and South Africa are often referred to as the Sub-Saharan African countries with greater relative demand for technical skills and 1established tech hubs and communities (Kelly and Firestone 2016). The majority of Sub-Saharan African countries, in contrast, have digital skills at roughly half the average global adoption level (denoted by 1 in figure 1.6), with the lower tail falling below 30 percent, and have relatively small numbers of LinkedIn users relative to the labor force (figure 1.7).

Figure 1.6: Sub-Saharan Africa lags in digital skills relative to other regions



Source: Staff calculations using Linkedin data.
Note: Parentheses show the share of LinkedIn users in the total working age population of each region.

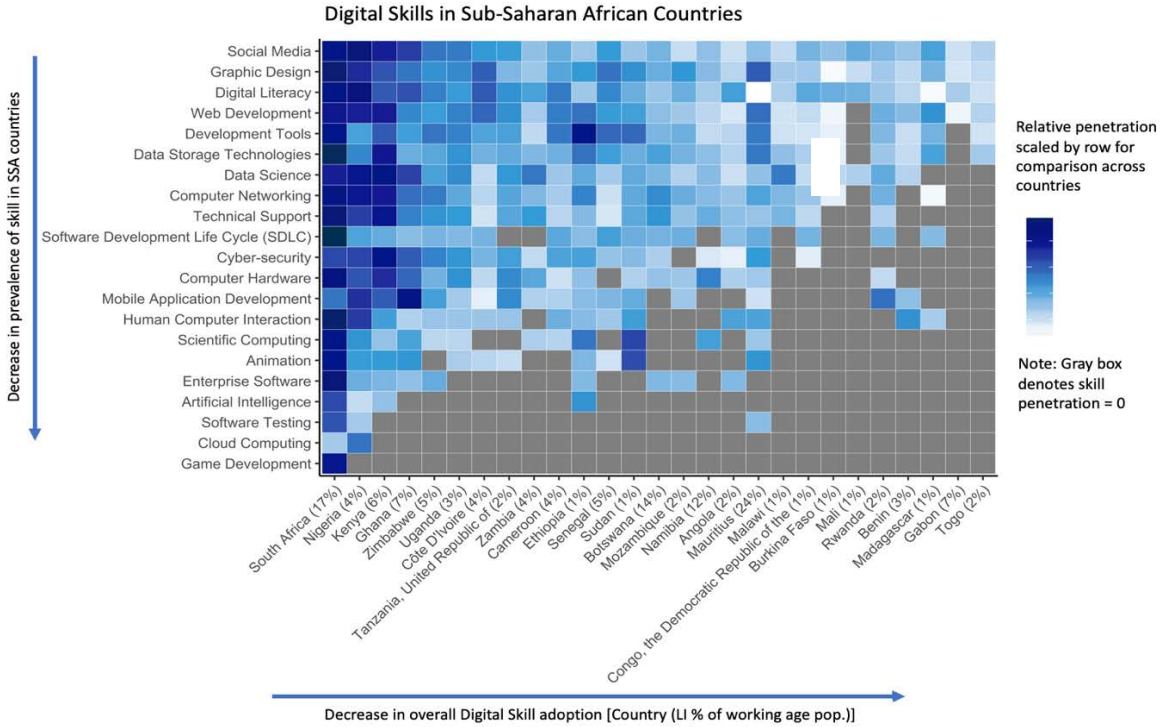
Figure 1.7: Large heterogeneity in relative penetration of digital skills across countries in Sub-Saharan Africa



Source: Staff calculations using Linkedin data.
Note: Parentheses show the share of LinkedIn users in the total working age population of each country. Relative penetration of digital skills is measured as the sum of the penetration of each digital skill across occupations in a given country, divided by the average global penetration of digital skills across the same occupations. Skill group penetration is defined as the percentage of the top 50 individual skills that belong to a given skill group (that is, if five of the top 50 skills for data scientists in South Africa fall into the artificial intelligence skill group, artificial intelligence has a 10% penetration for data scientists in South Africa).

For certain digital skills, the availability varies even more across Sub-Saharan African countries, suggesting that some countries will need to catch up more than others in developing the needed talent of specific digital skills. For one-third of the specific skills, fewer than half of the Sub-Saharan African countries have a penetration rate greater than zero (figure 1.8, gray areas). Moreover, the countries with higher overall digital skill penetration are also the ones with the most diversified digital skills. Exceptions include digital literacy, development tools, web development, and, to a lesser degree, mobile application development, where penetration rates are more equally distributed across countries. This information on specific digital skill gaps across Sub-Saharan African countries could inform the design of technology and digital skills training programs in the region.

Figure 1.8: Large heterogeneity in relative penetration across specific digital skills and countries

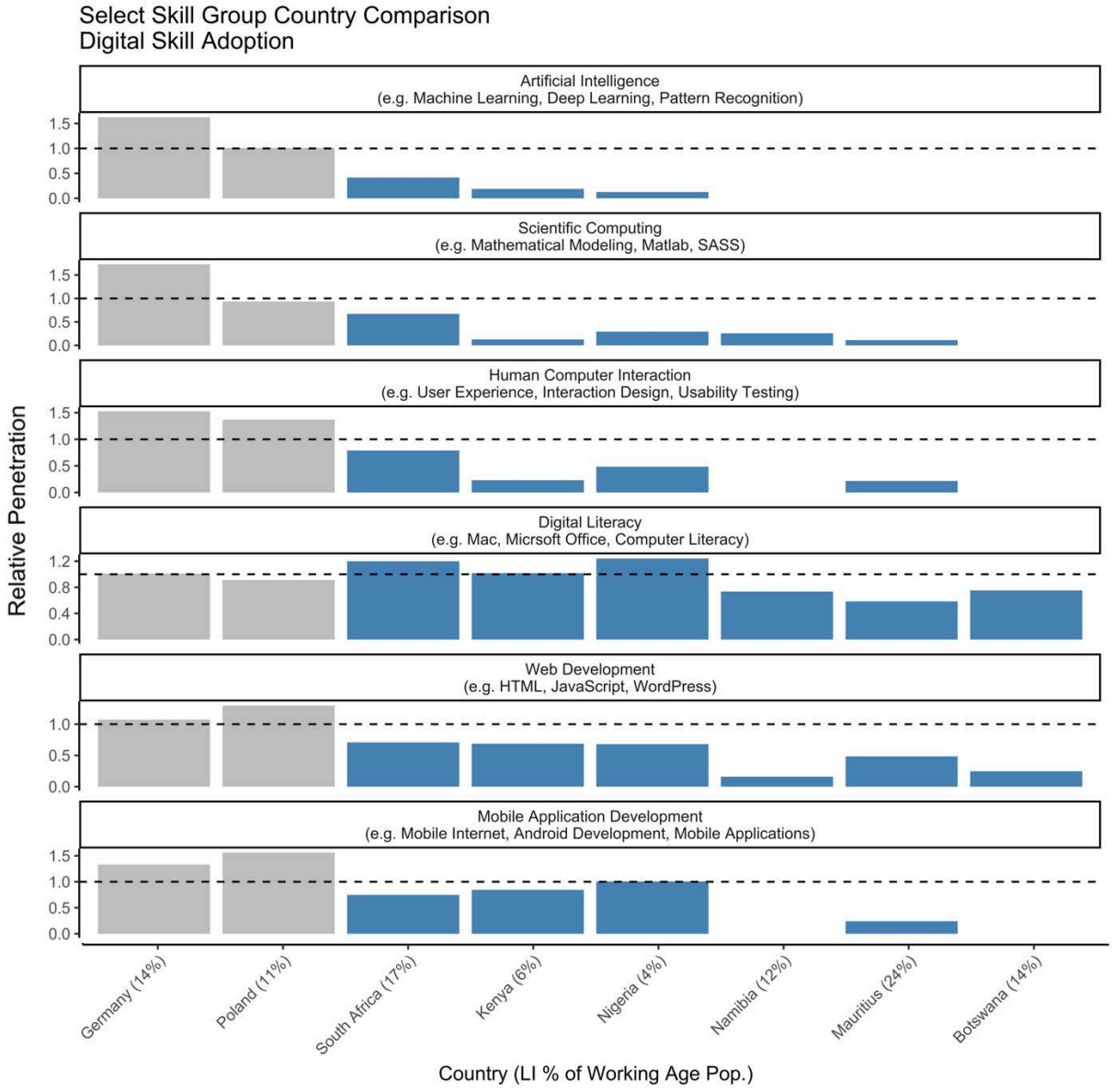


Source: Staff calculations using Linkedin data.

To improve cross-country comparability, figure 1.9 shows the comparison of specific digital skills among selected countries in Sub-Saharan Africa and Europe with similar ratios of LinkedIn users to labor force: South Africa, Namibia, Botswana, and Mauritius in Sub-Saharan Africa, and Poland and Germany in Europe. Figure 1.10 illustrates a comparison with Nigeria and Kenya, two large Sub-Saharan African economies. Certain of the selected Sub-Saharan African countries, South Africa, Mauritius, Nigeria, and Kenya, show relatively high levels of skills, reflecting increasing reliance on digital technologies, particularly mobile cellular and internet, such as digital literacy, web development, and mobile application development, which is consistent with the findings reported in Etzo and Collender (2010). However, these countries lag in other advanced skills (for example, artificial intelligence, scientific computing, and human-computer interaction).

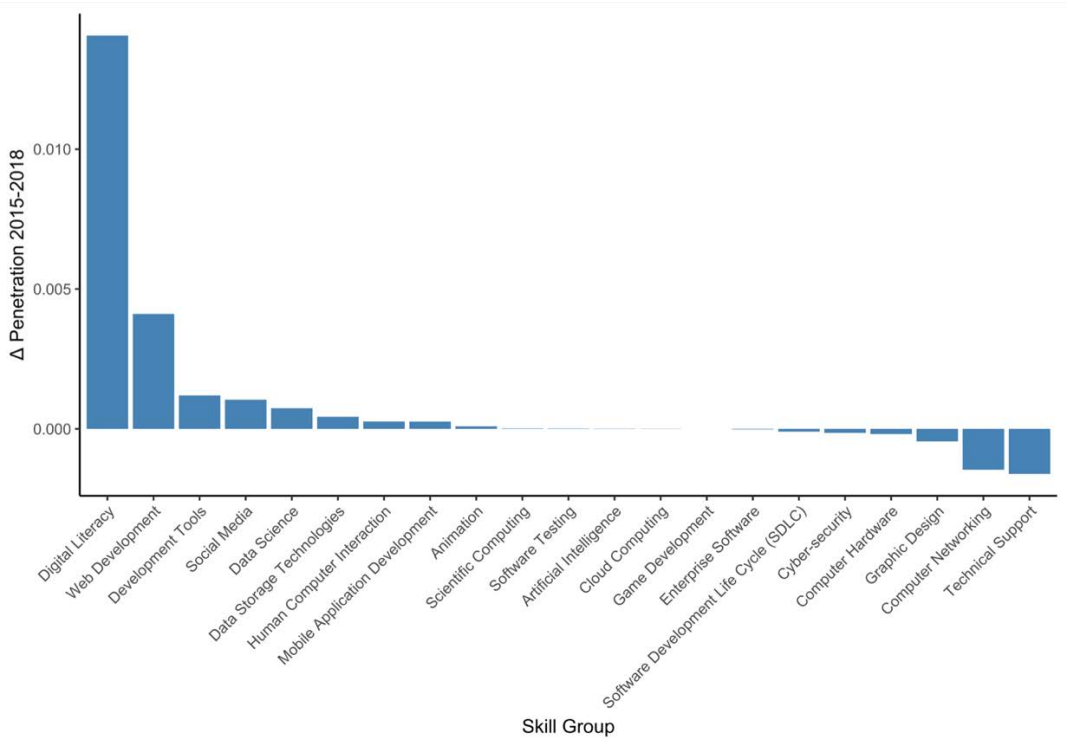
Over the past three years, Sub-Saharan African countries have shown higher growth in more transferable tech digital skills, such as digital literacy, web development, development tools, and data science, than in more traditional digital skills, such as technical support and computer networking, which are declining (figure 1.10). This tendency is in line with global trends and the increased availability of digital infrastructure in Sub-Saharan Africa for the same period.

Figure 1.9: Specific digital skills, digital literacy, and web and mobile app development in selected Sub-Saharan African countries are comparable to benchmark countries in other regions



Source: Staff calculations using Linkedin data.
Note: On the relative penetration axis, 1 represents the global average adoption of a skill. Benchmark countries were selected based on the ratio of the LinkedIn member percentage of the working age population that is similar to that of selected Sub-Saharan African countries.

Figure 1.10: Digital skills, such as digital literacy and web development, are growing fast in Sub-Saharan Africa



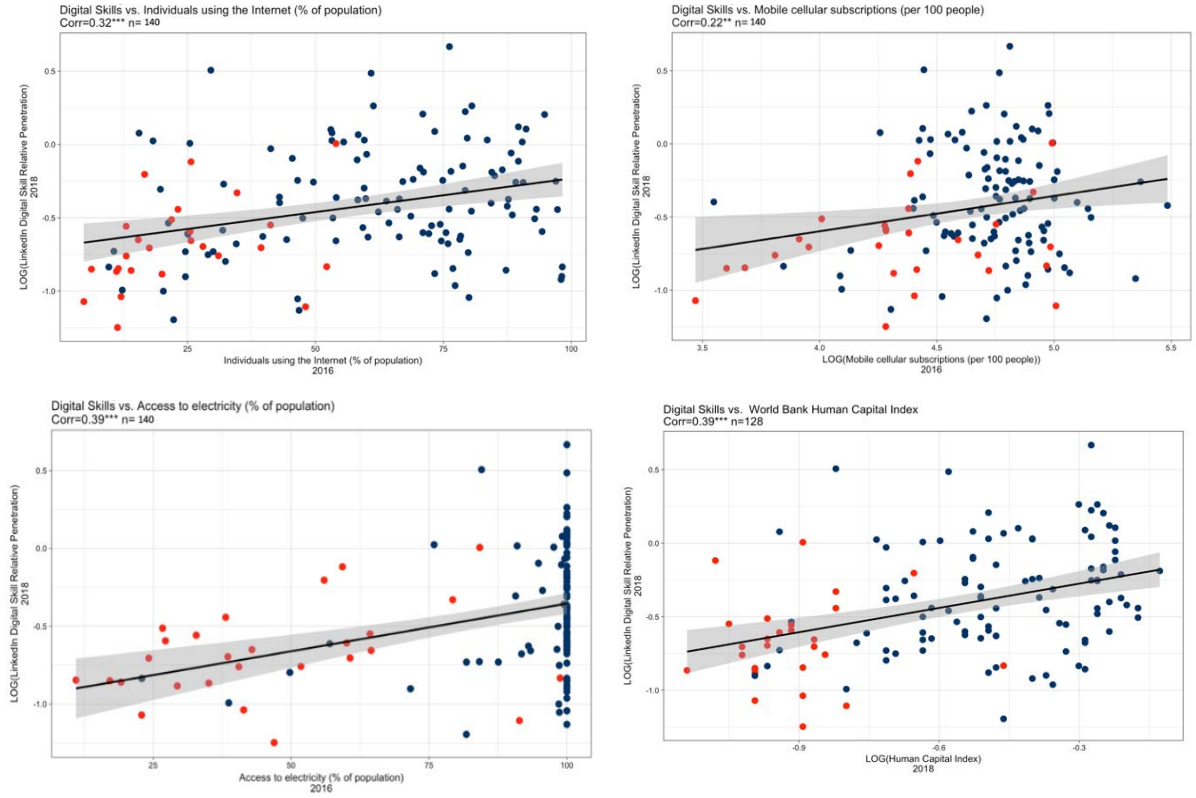
Source: Staff calculations using Linkedin data on 27 Sub-Saharan African countries with at least 100,000 LinkedIn members. *Note:* Penetration means the percentage of the top 30 specific skills belong to Digital Skills to highlight the types of skills that are growing/declining in SSA. A 0.010 increase in penetration in digital literacy between 2015 and 2018 means that the penetration of digital literacy has increased approximately three times faster than the second fastest growing digital skill, web development skill. Specifically, in SSA the digital literacy increased by ~0.014 (0.068- 0.054) compare to ECA with ~0.019 (0.052-0.032).

Note: On the Relative Penetration axis, 1 represents the global average adoption of a skill.

1.3.2 Determinants of digital skills

This section sets out correlations between digital skills and the availability of infrastructure, such as the internet, mobile voice telephony, and electricity. The correlations indicate that digital skills move in tandem with access to internet and electricity, but the relationship is less clear with mobile cellular subscriptions. Figure 1.11 shows the relationship between digital skills and complementary assets (World Development Indicators for access to internet, mobile cellular, and electricity) across countries, yielding positive correlations above .30 at the 99 percent confidence interval for internet access indicators and access to electricity. Mobile cellular (voice) subscriptions yield weaker correlation.

Figure 1.11: Digital skill adoption is correlated with the availability of complementary factors—internet, cellular, and electricity access as well as the Human Capital Index (Sub-Saharan African countries in red)



Source: Staff calculations using Linkedin data and World Development Indicators.
Note: Individuals using the internet (percent of population), fixed broadband subscriptions (per 100 people), mobile cellular subscriptions (per 100 people), and access to electricity (percent of population) are from World Development Indicators 2016. Digital skill is the average adoption (relative penetration) of digital skills in each country.

Internet access and electricity have the closest correlations with digital skills, while mobile voice subscriptions do not have a strong correlation with digital skills. These results may shed light on the impetus for robust integration of digital technologies in Sub-Saharan African economies. As emphasized by WDR 2019, broadband access is a prerequisite for business in the digital era: "mobile phone access is not enough; broadband technologies push down transaction costs further." This is consistent with the recent paper by Hjort and Paulsen (2019) showing that demand for high-skilled workers has increased in Sub-Saharan Africa in areas with access to undersea high-speed internet cables from Europe. This work challenges countries in the region to implement digital infrastructure to move beyond the initial, smaller benefits of slower internet connectivity and mobile phone subscriptions.

Digital skills show a positive and statistically significant correlation with the World Bank's Human Capital Index, a broader indicator of human capital across 128 countries (figure 1.11). The index measures what a child can expect to achieve in terms of full health (defined as no stunting and survival up to at least age 60) and completion of his/her educational potential (defined as 14 years of high-quality school by age 18), relative to other countries. Chapter 2 discusses the way forward on the human capital landscape and areas of prioritization to position the continent to take fuller advantage of the wide-ranging opportunities of digitization.

1.4 Technology and the global production base

WDR 2019 raises the concern that automation in advanced countries may mean that many African countries will not experience a "traditional" industrialization-led growth path. Automation occurs more quickly in locations with high labor costs, assuming the incentive to reduce labor costs exceeds other profit-related differences between locations.

This section examines whether the development of new labor-replacing technologies and their widespread adoption in advanced countries could challenge the traditional manufacturing-led growth model in Sub-Saharan Africa as the region's comparative advantage in labor costs becomes less salient. The section reviews the recent literature on the effects of new technologies on the location of production networks globally and assesses the empirical evidence for reshoring, the relocation of manufacturing to advanced economies. It also reviews trends in Africa's FDI and trade flows over the past decade, with a focus on the ability of countries in the region to attract market- and efficiency-seeking FDI and grow exports in manufactured goods and services.

1.4.1 Is reshoring happening?

It is widely assumed that automation will lead to a reshoring of industry back to North America, Japan, and Europe, and that the increasing complexity of production will exclude developing countries from new GVCs. The 2014 African Economic Outlook argues that "3D printing and smart robotics bear the potential of reducing this cost advantage far enough to kick off a shift toward reshoring of production activities towards the high wage headquarter economies." A report by Citibank and Oxford Martin School (2016) finds that 70 percent of Citibank's institutional clients surveyed believe automation and developments in 3D printing will encourage companies to move manufacturing closer to home, with North America seen as having the most to gain from this trend and China, the Association of Southeast Asian Nations, and Latin America having the most to lose. A well-known example is that of an Adidas shoe factory that has brought production from East Asia back to Germany. The company reports that it produces more quickly and at lower cost in its automated German factory featuring 3D printers, permitting it to adapt better to changing market and design demands (*Economist* 2017).

Theoretical rationales for reshoring include (i) the changing cost structure (notably, rising labor costs) in many developing and emerging economies; (ii) firms' underestimation of the full costs of offshoring; (iii) enabling the co-location of research and development, innovation, and production in a single jurisdiction; (iv) reducing threats to intellectual property from offshoring; (v) balancing cost savings and risk dispersion; (vi) potentially, closer proximity to markets, enabling greater flexibility; and (vii) supply risks posed by the length and complexity of contemporary GVCs (De Backer et al. 2016).

Box 1.3: Impact of automation in African countries

The impact of automation on labor markets may differ across countries with different comparative advantages and specializations. For instance, recent studies find heterogeneous impacts from automation between manufacturing and agriculture, although the impact of automation depends significantly on how exposure to automation is defined and measured (see Frey and Osborne 2013).

For developing countries, Hallward-Driemeier and Nayyar (2017) find that automation threatens between 2 and 8 percent of today's jobs. They group industries into clusters based on intensity of robots and the level of export concentration. Industries that are impacted by high levels of export concentration and automation, such as transport equipment, pharmaceuticals, or electronics, are likely to become increasingly less feasible as entry points for less developed countries. On the opposite end of the spectrum, industries such as wood, paper, and chemical products as well as basic metals are likely to see more limited impacts. As such, industries where the increased service content of output and new labor-saving technologies reduce the relevance of comparative advantage in labor costs may witness less viable production in developing countries, including in Sub-Saharan Africa. In this context, the authors advise focusing on policies to promote competitiveness, capabilities, and connectedness. Most Sub-Saharan African countries rank near the bottom in all three categories and will need to invest to withstand pressures, to maintain their current export baskets and diversify into new products. Moreover, manufacturing is expected to have a less adverse impact in Africa than in some of East Asia's newly industrialized economies.

In this context, services hold a promise to drive productivity gains and development. For example, the wholesale and retail sector accounted for almost 50 percent of employment expansion in India between 1993–94 and 2004–05 (Nayyar 2011). But there is increasing evidence that elementary services occupations are among those with the lowest returns, with more productivity-enhancing sectors likely to be skill-biased. This informs the upcoming World Bank Group report "Services-Led Development: Myth or Reality" (World Bank forthcoming), which focuses on whether services can support productivity growth and large-scale job creation and addresses what is needed for a productivity-enhancing and inclusive services-led development strategy.

However, up to now, there is limited empirical evidence of reshoring and the risk of reshoring out of Sub-Saharan Africa is particularly low because the region's participation in GVCs has thus far been limited. Drawing on data from the "Reshoring Initiative," Banga and te Velde (2018) identify seven foreign companies in Africa that have re-shored over 2010–16 (the majority are in South Africa) compared with more than 1,100 firms returning production from Asia back to Organisation for Economic Co-operation and Development countries. Moreover, the effect of reshoring is not yet significant. For instance, De Backer et al. (2016) show that around 4 percent of sampled firms in 11 European countries have moved production activities back home, which is much lower than the 17 percent of firms that offshored activities in the preceding decade.

At the same time, there is mixed evidence that new technologies are having a significant impact on the location of production bases. Some technologies, such as robots, have been in widespread use in industry for four decades, although the pace of progress and reliability and relevance for modern production have been growing rapidly. Each of the technologies has different implications and influences the nature of production differently, depending on the respective sector.

Digital technologies such as the *internet and artificial intelligence* reduce the costs of (i) matching buyers and sellers across countries, allowing firms in developing countries to access global markets, and (ii) trade and coordination among fragmented trade partners globally. These digital technologies reduce the impact of physical distance and provide opportunities for geographically disadvantaged countries (such as landlocked and small island nations) and rural businesses in all countries to be integrated into global markets. One example is the recent introduction of Spanish and English machine translation on eBay that contributed to a significant increase in users' exports to Latin America (Brynjolfsson, Hui, and Liu 2018). Large multinational and/or online firms are increasingly relying on big data and machine learning to investigate consumer behavior and manage their supply chains.

Robotics, more broadly automation, has thus far had an ambiguous impact on production location. Earlier models predicted that industrial robotics would reinforce agglomeration, since they require large-scale complementary expenditures on safety barriers, sensors, and system implementation (World Bank 2019d). About 75 percent of industrial robots are in five countries, China, Germany, Japan, the Republic of Korea, and the United States. Robots primarily benefit a few industries, such as motor vehicles, transportation equipment, electronics, and machinery, that historically had been susceptible to fragmented production along GVCs. The complexity of these industries limits the ability of developing countries to participate in such GVCs (Citibank and Oxford Martin School 2016). Banga and te Velde (2018) use data from the furniture manufacturing industry to estimate when robots will become more competitive than workers in the production of furniture. They find the inflection point to be 2034 for Kenya, 11 years later than for the United States, on the basis of Kenya's low labor costs and higher operational costs for robots.

Meanwhile, there is growing evidence that automation in developed countries is associated with their larger imports of intermediate inputs from developing countries. Artuc, Bastos, and Rijkers (2018) show that robotization is concentrated in a few high-income countries and a few capital-intensive sectors, such as automotive, rubber and plastics, metals, and electronics, but limited in traditionally labor-intensive sectors such as textiles.[17] This implies that low-income countries still may have time to follow the traditional export-led industrialization path in these sectors.

The potential impact of additive manufacturing technologies, such as *3D printing*, on production location could be profound. Rehnberg and Ponte (2018) examine whether 3D printing functions as a complement or substitute for traditional manufacturing technologies. They conclude that 3D printing reduces the number and cost of GVC processes and allows new players to access GVCs more easily. 3D printing reduces the importance of economies of scale and can lead to more dispersed economic activity, that is, to a "micromanufacturing" model. Laplume et al. (2016) conclude that "diffusion of 3D printing technology in an industry is associated with development toward shorter and more dispersed GVCs." De Backer et al. (2016) argue that new technologies may just lead to a regionalization of GVCs rather than a full reshoring, because demographic factors and the growth of the middle class in many developing countries make them attractive consumer markets.

Dispersed GVCs (or regional value chains) driven by 3D printing technologies may present opportunities for many Sub-Saharan African countries that have small domestic markets and are not able to compete globally, by enabling them to produce manufactured goods for regional trade. Several regional trade agreements already exist in Sub-Saharan Africa, such as several tripartite agreements between parties to the Common Market for Eastern and Southern Africa, East African Community, and Southern African Development Community and the now-ratified African Continental Free Trade Agreement (AfCFTA). However, intraregional trade has been below its potential in Sub-Saharan Africa, due to the large cost differences between the most efficient members in the region and external producers, as well as product

complementarities between members of a regional trade agreement and continuing high non-tariff barriers in the region.

3D printing can have a substantial impact on trade in services. Service agreements have become more important because intermediary goods and goods-related activities are now being supplemented or even replaced by services. 3D printers build physical objects from 3D computer-aided design data and replace certain transportation of goods by transmission of data. At the level of the General Agreement on Trade in Services, this may result in debates about what constitutes a good and a service in World Trade Organization (WTO) legislation and, in turn, some WTO rules may need to be revisited. 3D printing can also substitute for trade in services (through the payment of license fees and royalties for designs) for the goods trade and provides opportunities for countries with restrictive policies toward trade in services (Lodefalk, 2015; Kommerskollegium 2016; World Bank, forthcoming). Service trade regulations in Sub-Saharan Africa are no more restrictive than in other regions, measured by the World Bank's Service Trade Restrictiveness Index, but existing de jure restrictions are often compounded by many additional de facto barriers and/or the non-implementation of existing agreements (Heuser and Mattoo 2017). Although some African regional economic communities have agreed to liberalize services, negotiations in this area have moved at a glacial pace, and services are not currently part of the AfCFTA framework.

In summary, the potential effects of new technologies on global production networks and employment remain speculative; for now, the available information provides ambiguous results. Although it is widely assumed that new technologies will lead to reshoring of industries back to North America, Japan, and Europe, the evidence reveals that the demise of offshoring appears exaggerated for now and the foreseeable future. So far, robotization in developed countries is concentrated in a few technology intensive sectors, such as automotive, rubber and plastics, metals, and electronics; it has been limited in labor-intensive sectors such as textiles. Further, increased automation in richer countries can enhance productivity and income; thus, it can raise demand for intermediate inputs and other goods from developed countries. At the same time, new digital technologies such as 3D printing could provide opportunities for Sub-Saharan Africa by developing regional value chains and enhancing manufacturing-service linkages. The upcoming World Bank Industrialization for Jobs report will provide in-depth discussion about structural transformation and trade integration issues for Sub-Saharan African economies. The following section provides a short review of the current position of Sub-Saharan Africa in GVC integration and as an FDI destination to inform policy discussions.

1.4.2 GVC integration and non-resource-seeking FDI

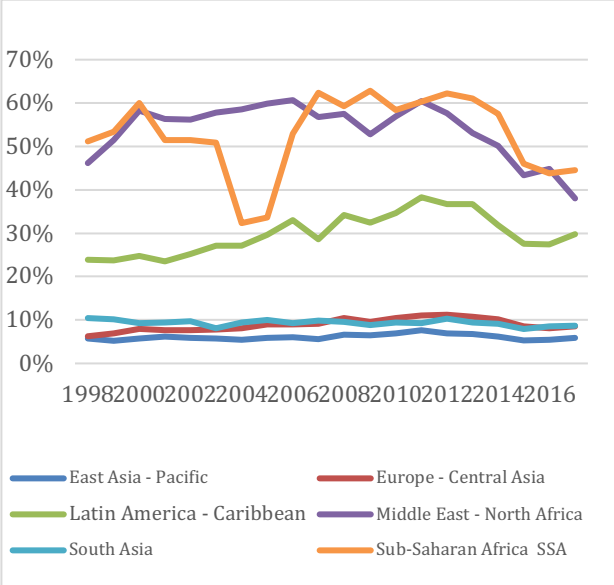
GVCs have become the building blocks of an increasingly integrated global economy. They allow countries to trade know-how and make things together, with each step in the process adding value to the final product. GVCs can create jobs through two main channels: (i) catalyzing the structural transformation of the economy and in turn increasing firm productivity; and (ii) spillovers from backward and forward linkages within the chains. A recent paper shows that among Ethiopian manufacturing firms, firms participating in GVCs tend to be more productive, and in turn provide higher wages and employ more workers than other firms (Choi, Fukase, and Zeufack 2019).

However, in Sub-Saharan Africa, GVC participation is limited. The majority of exports are in raw materials, with the region lagging all others in high-technology exports. Currently, Sub-Saharan African countries account for less than 3 percent of the world's trade and GDP, but 12 percent of its population (see figure 1.12). In key GVC sectors like apparel and automobiles, this share is even less (2.5 percent of final and 0.5

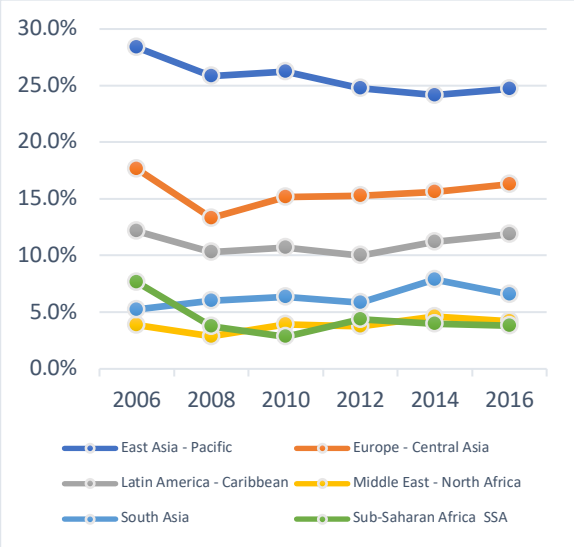
percent of intermediate apparel and footwear exports; 1.3 percent of final and 1 percent of intermediate vehicles). Among low-income Sub-Saharan African countries, development through engagement in GVCs in primarily limited to individual sectors such as textiles and apparel in Lesotho and Ethiopia and agribusiness and horticulture in several Southern and Eastern African countries (data source: World Development Indicators).

Figure 1.12: Export baskets are concentrated on raw material exports, with limited technology intensive products in Sub-Saharan Africa

a. Raw materials as a share of total exports



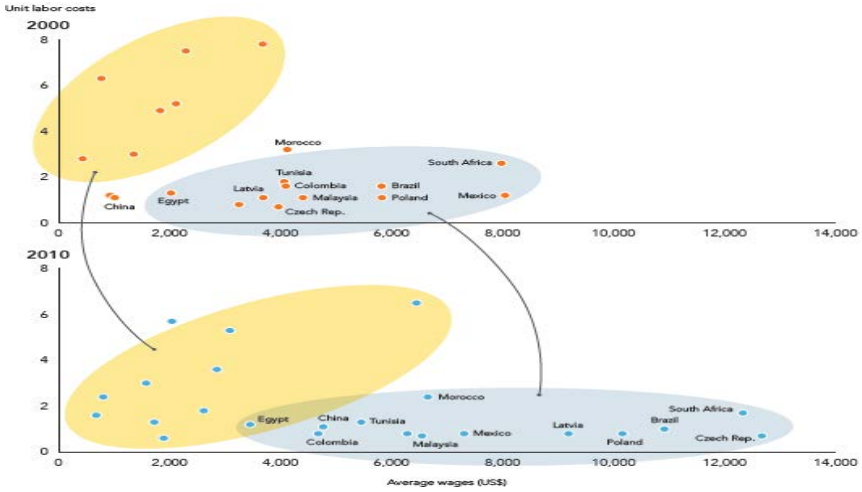
b. High-technology exports (% of manufactured exports)



Source: Comtrade 2019.

Developing countries that have managed substantial growth gains through GVCs note that a key determinant of their success is not low wages but rather low *unit labor costs*, the ratio of average wages to per capita GDP (Ahmad and Primi, 2017; Golub et al. 2018; Golub and Hayat, 2015; Malikane. 2015) (figure 1.13). This presents a challenge for low- and lower-middle-income countries in Sub-Saharan Africa that lack a comparative advantage in labor-intensive and capital-intensive tradables, relative to developing countries in other regions. For instance, some Sub-Saharan African countries not only have higher labor costs, but also a higher cost of capital than some Asian countries, with capital costs in Kenya more than nine times those in Bangladesh (Gelb et al. 2017). At the same time, the direction of change of labor costs among countries that show job growth in manufacturing sectors has been mixed (manufacturing sector wages and value added per worker have increased in Ethiopia, but declined in Côte d'Ivoire (Abreha et al. 2019)), while changes in unit labor costs should be further investigated.

Figure 1.13: Developing countries deeply involved in GVCs have low unit labor costs but not low wages



Source: Ahmad and Primi, 2017.

Empirical evidence highlights the importance of *complementary factors and policies* in facilitating GVC participation in such areas as standards, internet and physical connectivity, education, and skills (Farole and Winkler 2014; Kummritz, Taglioni, and Winkler 2017). Policies must be designed with consideration given to: (i) policy sequencing over time; (ii) coordination between different levels of government and across regions, so that, for example, policies are not set and undone at different levels and competition between regions does not erode the fiscal base; and (iii) minimization of implementation uncertainties that can erode good incentives by exposing firms to unnecessary risks (Mariscal and Taglioni 2017).

FDI is another channel for technology transfer. FDI can boost economic growth, reduce poverty, and help countries integrate into GVCs (Agrawal 2015; Alfaro et al. 2004; and Lall 2002). FDI has positive effects on the labor market in that it increases wages and employment (Blalock and Gertler 2008). In Sub-Saharan Africa, Ndikumana and Verick (2008) found that FDI crowds in domestic investment and benefits countries that improve their investment climate.

However, in Sub-Saharan Africa, most FDI is in low-technology sectors, with limited effects on technology transfer and employment. Among African regions, only East Africa saw a rise in FDI between 2005–08 and 2015–18. This exception could be partially explained by the recent increase in Chinese offshoring production in Ethiopia and other East African destinations. China has increased its FDI in Sub-Saharan Africa over the past decade and become one of the largest investors in the region (data source: fDi Markets). FDI in Sub-Saharan Africa is primarily market seeking, followed by natural resources–related and a negligible amount related to tourism. Especially resource-seeking FDI, which is more prevalent in Sub-Saharan Africa, has a lower impact on job creation (Abate and Engel, forthcoming).

A large body of FDI literature documents that the *business environment* is an important determinant of FDI flows in developing countries, including those in Sub-Saharan Africa. For example, Walsh and Yu (2010) analyze the impacts of macroeconomic and institutional determinants of FDI flows in emerging markets. They find that FDI flows in secondary and tertiary sectors (but not in primary sectors) are affected by the exchange rate, financial depth, school enrollment, and institutional factors such as judicial independence

and labor market flexibility. Reyes, Roberts, and Xu (2017) examine the role of the business environment at the subnational level, using indicators such as basic protection, access to finance, infrastructure, the existence of a strong agglomeration environment, human capital, labor regulations, taxes, and land access, using firm-level data covering 709 cities in 128 countries. Kariuki (2015) finds that infrastructure, trade openness, and stock market developments have a significantly positive impact on FDI flows, while factors such as high economic risk, political risk, and financial risk had negative impacts across 35 African economies during 1985–2010. Abate and Engel (forthcoming) find that access to finance, corruption, and taxes were important determinants of FDI flows to cities in 15 Southern African countries over 2010–16.

Perhaps most important in creating an appropriate business environment for Sub-Saharan African workers to reap the benefits of digital technology adoption and take full advantage of greater participation in GVCs and FDI is boosting the low levels of human capital across the region. The focus of the next chapter is therefore on human capital. The chapter argues that Sub-Saharan Africa needs to focus on "training the innovators" or building a critical mass of highly skilled inventors and entrepreneurs who will help position countries to take advantage of the opportunities provided by digital technologies and greater economic integration. With digital technologies adapted to local capabilities and needs, Sub-Saharan Africa's low-skill workers will be able to upgrade their skills as they use them.

In summary, although concern about reshoring may be exaggerated, a bigger concern for Sub-Saharan Africa is the current low level of integration with global markets through GVCs and FDI, which are commonly understood to be channels by which technology is transferred from more advanced foreign firms. GVCs have had only a limited impact on employment in Sub-Saharan Africa. To enhance GVC participation and attract FDI, countries in the region need to upgrade their productivity and improve the "analog" components of complementary factors and the business environment.

1.5 Policy implications and future research agenda

The following is a series of policy recommendations for moving toward a less zero-sum view of the emergent paradigm of industrial development in an age of digitization and globalized production networks.

- Closing the current gap in digital infrastructure and enhancing affordable broadband access with improved regulatory frameworks. Further regional harmonization, supported by increased regulatory capacity through regional hubs, should allow (i) more effective subsidization to support universal access and thereby boost poverty reduction, combined with (ii) more effective pro-competition regulation of digital infrastructure to create bigger markets. The positive interactions between subsidies (to boost demand) and lower costs (spurred by asset sharing and trading and greater economies of scale and scope) should allow larger markets to sustain more operators.
- *Accompanying complementary support for digital skills.* To enhance digital skill flows, policy support could include improving the quality of education through educational content focused on socio-emotional and entrepreneurial skills. To improve the digital skill stock, policy support could focus on measures to increase labor productivity by enabling workers to benefit from worker-enhancing technologies, through (i) retraining workers to adjust their skills to meet the changing demands of business, such as digital literacy and digital skills; (ii) supporting youth and enterprises working in technology intensive sectors, including the development of locally relevant digital content and supporting the scaling up of homegrown innovation; (iii) improving the overall ecosystem for businesses and startups; and (iv) facilitating low-skilled workers' adoption of worker-enhancing technologies.
- *Enhancing "analog" complementary assets and the business environment*. Complementary components, such as electricity, infrastructure, and human capital, are important determinants for expanding digital infrastructure and digital skills. The impact of the adoption of skill-biased digital technologies such as the internet is likely to boost the jobs of low-skilled workers only if there are sufficiently large output expansion effects, which in turn are facilitated by greater product market competition; more investments in transport and logistics; and regional integration, lower trade costs, and greater exports. The key is strengthening an environment that is conducive to diversification, innovation, and productivity in the era of digital innovation, working toward keeping the unit cost of labor low for labor-intensive and capital-intensive tradable products.
- *Facilitating regional integration.* Together with the business environment, trade and investment policies also play roles in supporting African firms' integration into GVCs and attracting market- and efficiency-seeking FDI, which has a higher employment multiplier than resource-seeking FDI. Given the relatively small market size of many of African countries, regional integration (and especially the AfCFTA) can be an important tool for boosting trade and FDI. At the same time, technological innovation could help Sub-Saharan Africa to benefit more from regional trade and manufacturing-services linkages.

Evidence-based solutions will be needed to support firms and individuals to benefit from digital technologies:

- Our knowledge is limited in the areas of: (i) newer and innovative technologies that could enhance access to and affordability of digital technologies (for example, lower cost low-Earth-orbiting satellites); (ii) rigorous evaluations of the effects of digital technologies on net job outcomes and the composition of skills in low-income economies; (iii) effective ways to support lower-skilled workers with technology adoption and development and diffusion of low-skilled-biased digital technologies; (iv) the effects of specific digital technologies on Sub-Saharan Africa's revealed comparative advantages; (v) how much time it would take for newer digital technologies to have larger growth and inclusion effects in Sub-Saharan Africa; and (vi) better utilization of nontraditional sources of data, such as big data supported by machine learning, to inform policy discussions in Sub-Saharan Africa.
- The upcoming Continent-wide Digital Economy for Africa flagship report could fill some of these knowledge gaps, including: (i) key barriers to the availability and adoption of digital technologies in Africa; (ii) better measures of the impact of adoption of digital technologies on productivity growth, output, and aggregate jobs outcomes; (iii) better measures of the impact of adoption of digital technologies on poverty reduction and inclusion outcomes; (iv) the benefits of regional digital infrastructure and spectrum regulation and policy suggestions to make such initiatives feasible; and (v) a forward-looking digital data agenda at the national, regional, and continental levels.

Annex 1A. Opportunities and caveats of using LinkedIn data

LinkedIn data, provided by the World Bank Group–LinkedIn collaboration, offer unique insights into the labor markets of some of the most dynamic industries globally. The data are derived from a web-based, nonrandom sample of labor market participants across more than 100 countries, offered in the structure of a single taxonomy optimized for cross-country/industry benchmarking and comparisons. These unconventional data capture real-time labor market sentiments through tracking employment and skill trends based on the self-reported information of LinkedIn users. The use of web-based labor market data sets for economic analysis has seen rising interest, driven by the ability to construct new indicators for answering questions that are not covered in traditional data sources (Hammer, Kostroch, and Quiros 2017). In recent years many applications of such data can be seen throughout the relevant literature (Antenucci et al. 2014; Askitas and Zimmermann 2009, 2015; Chancellor and Counts 2018; Guerrero and Lopez 2017; Gandomi and Haider 2015).

Using big data information is particularly useful in Sub-Saharan Africa where we know little about new types of skills, such as digital skills, due to the limited data. For instance, the World Bank's skill surveys have been conducted for 17 countries globally, but only two Sub-Saharan African countries, Kenya (Enterprise Survey) and Ghana (Household Survey) in 2017 and 2013, respectively. Although web-based data have been used for labor market analysis in other countries, mainly the United States, but also recently India (Nomura et al. 2017), to our knowledge, there are no published papers using such data for skill analysis in Sub-Saharan Africa. Applications of big data in Sub-Saharan Africa are limited to data-sharing initiatives that use telecom company data and mobile money data (M-PESA) to measure the impact of their use on personal finance (Mbiti and Weil 2016).

The usage of LinkedIn data, and other web-based big data, requires understanding its limitations and caveats. In addition to the LinkedIn data representing mostly white-collar, digitally savvy workers who are mainly employed in knowledge sector industries, several caveats arise in regional and cross-country comparisons. For example, differences in sample size and occupational distribution across countries are a concern. The metrics available in the data sets take steps to control for these differences; however, these potential sources of bias should be considered in the interpretation. When necessary, the analysis presented here highlights differences in member composition between comparison countries and regions. Detailed discussion of metrics and data representativeness is outlined in the World Bank–LinkedIn collaboration methodology paper (Zhu, Fritzler, and Orlowski 2018).

For a better understanding of how well the LinkedIn member base represents the workforce in Sub-Saharan Africa, we compare LinkedIn member data in Sub-Saharan Africa with International Labour Organization (ILO) labor force data.[18] On the one hand, we find that LinkedIn members in Sub-Saharan Africa have a solid presence in information and communications technology, financial and insurance activities, and professional scientific and technical activities. On the other hand, sectors such as agriculture, wholesale, and manufacturing have relatively poor coverage. In addition to validation exercises reported in the World Bank–LinkedIn collaboration report, we find that LinkedIn migration outflows from Sub-Saharan Africa are positively and significantly correlated with OECD 2016 migration outflow data.

Notes

[4] Digital technologies are all based to a greater or lesser extent on combinations of the digits 0 and 1, enabling immense amounts of information to be compressed, preserved and transmitted. Digital technologies reduce economic costs associated with search, replication, transportation, tracking, and verification and result in significant economies of scale and scope (through the production of multiple related products), network effects (where additional users enhance the value of the product to others), and feedback loops (Goldfarb and Tucker 2019).

[5] More empirical work is needed to understand the relative importance of these and other mechanisms that could help explain whether the adoption of digital technologies is more pro-inclusion in low-income Sub-Saharan African countries relative to higher-income countries.

[6] Data Source: World Development Indicators, 2019

[7] For instance, SSA countries' export products are less vulnerable to automation (IMF 2019, using Index of Countries' Export Vulnerability to Automation, suggested by Brynjolfsson, Mitchell, and Rock, 2018) and SSA countries demographic composition is opposite to developed economies where aging leads to greater (industrial) automation (Acemoglu and Restrepo. 2018).

[8] See box 3.1 in Dutz, Almeida, and Packard (2018). It summarizes the predictions of a model developed by Brambilla (2018) that extends Acemoglu and Autor's (2011) task-based model of digital technology adoption by realistically allowing firms to differ in their efficiency of production and allowing workers' wages to vary across firms.

[9] Bessen (2019) analyzes the productivity and jobs growth dynamics in the cotton cloth, steel, and motor vehicles industries in the United States, highlighting how, when demand was elastic and not yet relatively satiated for these products, large increases in productivity were accompanied by even larger increases in employment, followed by declines in employment in more recent stages of maturity. He interprets this pattern through a model of heterogeneous final demand that changes over time: price declines in the initial stages of productivity growth make formerly prohibitively expensive products affordable for mass consumption, yielding a large positive demand response. Once large unmet needs become saturated and demand becomes less elastic, further productivity gains in these industries may bring reduced employment.

[10] The data in this paragraph come from Africa's Pulse 2019, based on GSMA (2018) and ITU (2018) data.

[11] For example, several literatures explain digital technology investment and usage as a major driver of productivity and income growth in the United States relative to the European Union; see Bloom et al. (2010); Pilat and Lee (2001).

[12] For the methodology underlying these results, see World Bank (2019b , section 3.4 and annex 3B).

[13] More detailed information on these experimental designs is provided in Africa's Pulse (World Bank 2019b).

[14] As defined by LinkedIn, the digital skills considered are Animation, Artificial Intelligence, Cloud Computing, Computer Hardware, Computer Networking, Cyber-security, Data Science, Data Storage Technologies, Development Tools, Digital Literacy, Enterprise Software, Game Development, Graphic Design, Human Computer Interaction, Mobile Application Development, Scientific Computing, Social Media, Software Development Life Cycle (SDLC), Software Testing, Technical Support, and Web Development.

[15] UNESCO's digital literacy definition defines it as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life. It includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy.

[16] OECD's digital literacy definition states that to thrive in the digital economy, ICT skills will not be enough and other complementary skills will be needed, ranging from good literacy and numeracy skills through the right socio-emotional skills to work collaboratively and flexibly.

[17] They find that a 10 percent increase in robot density in developed economies' industries not only increases their exports to developing countries by 11.8 percent, but also induces a 6.1 percent increase in their imports from developing countries. They explain that robotization in developed countries lowers their production costs relative to foreign ones, and thus makes them more competitive. As a result, they expand their production and increase their imports of intermediate inputs from developing countries. Moreover, they measure robotization as the ratio between the average stock of robots and the number of working hours between 1993 and 2015, using the International Federation of Robotics data.

[18]LinkedIn member data by industry (2017) are compared with ILO industry-level employment data for 2015–17 and for Côte d'Ivoire, Ethiopia, Ghana, Madagascar, Mali, Mauritius, Mozambique, Namibia, Rwanda, Senegal, Tanzania, and Zimbabwe. The authors also explore the potential of comparing LinkedIn skills data in Kenya with the World Bank STEPS survey in Kenya (2016–17). Due to differing definition of occupations and measurement methods for skills, a fair comparison could not be made.

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CHAPTER 2: HUMAN CAPITAL

Moussa Blimpo and Solomon Owusu

Abstract

The level, quality, and composition of human capital will play a pivotal role in the future of work, more so in Sub-Saharan Africa because it has the most youthful and fastest growing population compared with anywhere else. As argued in World Development Report (WDR) 2019, specific types of skills will gain in importance, such as soft skills (socio-behavioral skills and adaptability skills) and high-end skills (advanced cognitive skills) in addition to foundational skills.

In recommending a focus on creating stable, formal private sector jobs for the poor, WDR 2019 emphasizes the role of infrastructure and the regulatory environment for the emergence of formal, newer firms that will create jobs for unproductive informal workers. However, the unique nature of the skills, labor force, jobs, and structure of production of the economies in the region requires additional targeted efforts to build human capital so that adequate opportunities are created for all.

Countries in the region are facing the future of work with a weak performance in human capital acquisition, a large stock of ill-equipped adults, and a significant share of workers and firms held back in the informal sector. This sets the continent on a different dynamic from much of the rest of the world in the policy tools required. As much as this is a challenge, it also provides opportunities for the region to harness the potential of these untapped human resources with proper leverage of digital technologies.

Among policy recommendations, first, the region needs to adhere to the strategy of building adequate human capital along the lines recommended by WDR 2019. Building basic foundational skills (such as literacy and numeracy) and digital skills must be prioritized to take fuller advantage of digital technology opportunities, given the continent's weak foundational skills base and differences in digital development. The region should also leverage digital technologies to speed up human capital acquisition and upgrading. Digital technologies have the potential to reinforce learning and learning outcomes by increasing access to education and offering access to high-quality materials in areas where there are no teachers with the needed skills, while making up for the shortage of health care workers in the region through increased efficiency and productivity of existing staff. Second, the region will have to leverage the opportunities of digital technologies to increase the productivity of workers in their existing occupations. Third, the region needs to create new, formal sector private jobs adapted to the current stock of skills of the region.

This chapter argues that although these three options offer opportunities that each country should attempt to seize, the overarching determinant for the realization of these options requires the presence of a critical mass of high-skilled inventors and entrepreneurs enabled to create jobs, to generate and adapt appropriate digital technologies. Africa is producing far fewer of these skills. Therefore, it needs to speed up the training of digital technology developers, software engineers, and entrepreneurs to help position countries in the region to take advantage of digital technology opportunities for faster growth and inclusion outcomes in the coming years.

2.0. Introduction

The era of digital technologies offers an opportunity to leverage human capital to create faster jobs growth and inclusion outcomes. Technology is changing the nature of jobs and affecting the labor market prospects of workers across different sets of skills. Labor's role as an indispensable factor of production is expected to change progressively in the face of continuous technological change, becoming a more skilled and complementary partner of machines. Digital technologies are creating newer opportunities, but also at the same time making certain skills obsolete more quickly, as old economy jobs are giving away to newer jobs (World Bank 2016a). The level, quality, and composition of human capital will play a more pivotal role in the future of work. Specific types of skills, such as soft skills, will gain in importance, as well as the high-end skills needed to generate and maintain a momentum of innovation. To this end, WDR 2019 proposes several areas on which policy should focus to manage the disruptions digital technologies create in the labor market and leverage digital technology opportunities so that their benefits are widely shared (World Bank 2019). The unique nature of the skills, labor force, jobs, and structure of production of countries in the region calls for additional analyses and recommendations to leverage digital technology opportunities.

WDR 2019 recommends focusing on creating stable, formal, private sector jobs for unproductive informal workers. Employment opportunities in the formal sector of most Sub-Saharan African economies are still limited. For most workers in the region, the informal sector seems the only pathway to generate income. The informal sector still functions as a key part of the structure of the region's economies, and the sector's unique attributes make it very resilient and slow to change. There is also a potentially large skills mismatch with the requisites of the formal sector, which may be difficult to address in the short to medium term. The issues pertaining to informality are examined in greater detail in the next chapter.

WDR 2019 recommends that policies focus on investing in human capital broadly, namely, in early childhood development, tertiary education, lifelong learning programs, advanced cognitive skills, and socio-behavioral and adaptability skills, in addition to foundational literacy and numeracy skills. Sub-Saharan Africa has long been lagging in building foundational skills, which continues to create bottlenecks for building and developing more advanced skills (see box 2.1). Therefore, while adhering to the recommendation of WDR 2019 to build adequate human capital along these broad lines in its long-term strategy, the region should prioritize addressing the challenge of building strong foundational skills as well as basic digital literacy. This is in line with an earlier WDR recommendation for emerging digital economies where the foundational skills base remains weak (World Bank 2016a, 258–72).

A more pressing and achievable challenge in the short to medium term is that the region has not adequately invested in tertiary education, particularly in fields related to STEM (science, technology, engineering, and mathematics). It also has failed to incorporate entrepreneurship in its mainstream educational curriculum to train and create the critical mass of inventors and entrepreneurs that are desperately needed across the region. For the region to keep up with the pace of innovation, be globally competitive in the fast-changing world, and leverage digital technologies to create newer, stable, formal private sector jobs for its masses and growing unskilled and unemployed labor force, it must correct this course. To this end, this chapter argues that additional strategies must be prioritized to take fuller advantage of digital technology opportunities. Since basic foundational skills, such as literacy and numeracy as well as digital skills, are needed to use digital technologies, speeding up human capital acquisition and upgrading should be prioritized. Technology can play a role in this process. Digital technologies also have the potential to reinforce learning and learning outcomes when they enable better interactions between learners and teachers (World Bank 2018), increase access to education, and offer access to high-quality material where there are no teachers

with the needed skills. And for health, digital technologies have the potential to make up for the shortage of health care workers in the region through increased efficiency and productivity of existing health care staff.

Additionally, with more than one-quarter of individuals currently using the internet, the region is growing more connected than before and digital development in the region is accelerating. This means that the region can leverage the opportunities of digital technologies to increase the productivity of workers in their existing occupations. It also needs to create more new, formal private sector jobs that are adapted to the current stock of skills in the region. This will gradually shift employment toward higher-productivity occupations across sectors. Since more than 60 percent of the labor force is made up of ill-equipped adults who need jobs (see box 2.2), enabling this stock of workers to access and use digital technologies will allow them to benefit from newer job creation opportunities in the formal sector (box 2.3). For this labor force, the use of context-adapted digital technologies and apps could compensate for lower skills and make it easier or less demanding of cognitive abilities to do low-skill production and service jobs. However, inventors and entrepreneurs are needed to design and create these context-adapted digital technologies, leading to the creation of new, formal private sector jobs or the conditions for such jobs to be created.

This will require smart and targeted investments and greater regional collaboration among universities, businesses, and international best practice partners to create a critical mass of highly skilled inventors and entrepreneurs in science, technology, and business. Other measures include investment in scholarship schemes that incentivize students to return home after completing their studies, as well as getting the diaspora more involved by tapping into their skills pool, especially for those trained in entrepreneurship and STEM-related fields. Finally, the region will have to address critical constraints, such as funding startups in their early stage, and ensure that there is sufficient investment in complementary assets (including available, reliable, and affordable electricity and broadband connectivity).

2.1. Human capital and the future of work: What is different in Africa?

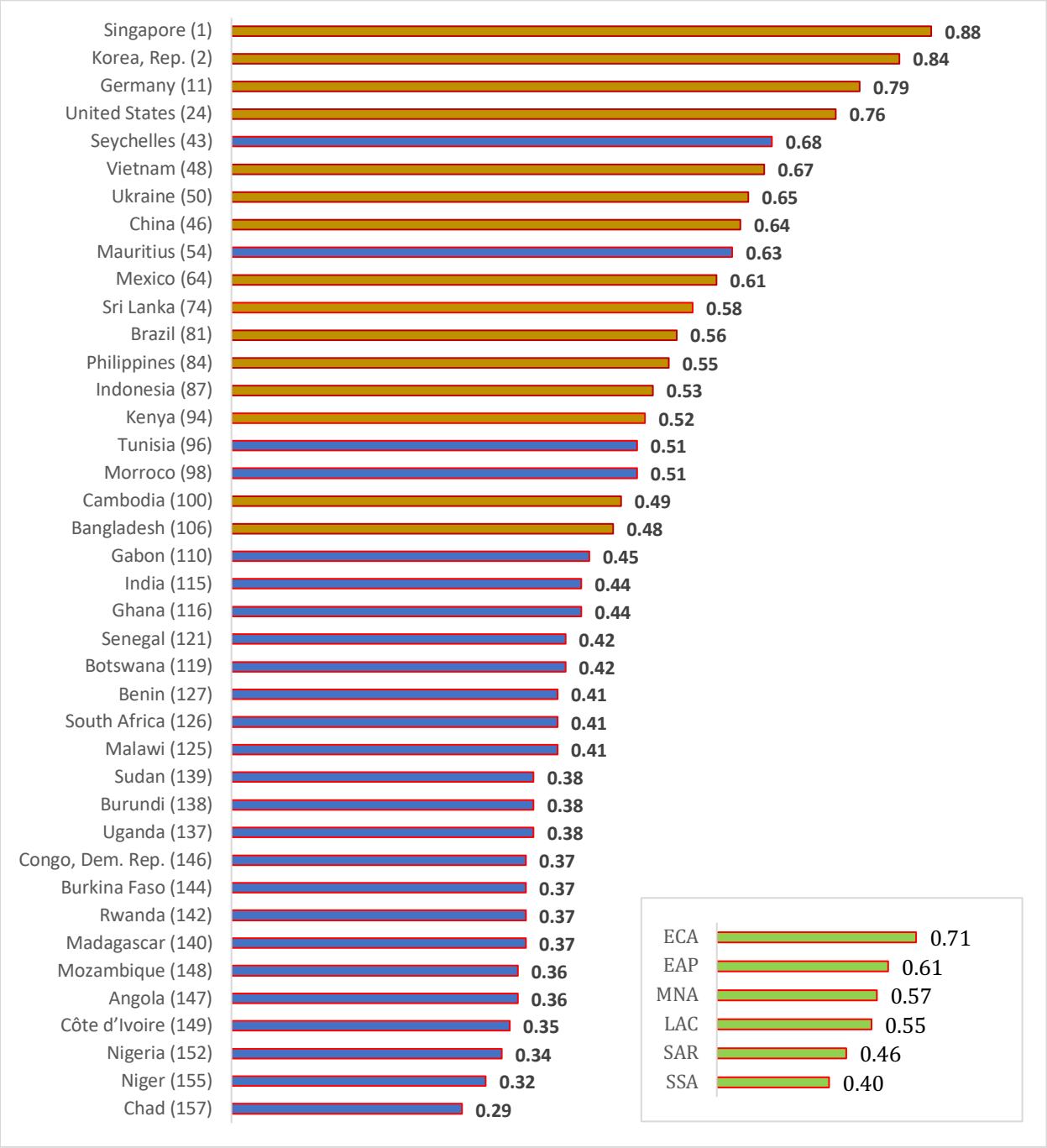
2.1.1 The promise of human capital for the future of work in Africa

The quality and composition of human capital will play a more pivotal role in the future of work. Specific types of skills, such as soft skills, will gain in importance, as will the high-end skills needed to maintain a momentum of innovation. In addition to these imperatives, the level of human capital in the region is low, making it even more important to make the best use of the current stock of skills and build stronger skills foundations going forward.

Sub-Saharan Africa is the region with the fastest-growing labor force yet the lowest levels of human capital (figure 2.1) and the largest stock of ill-equipped adults. Between 2017 and 2030, the labor supply in the region is estimated to increase by 198 million, with 11 million young women and men expected to enter the labor market each year for the next decade. In the wake of rapid growth in the working-age population, the number of unemployed people increased by more than one million between 2017 and 2018 (ILO 2018). The region has fared most poorly in the Human Capital Index, especially with respect to access to quality education, stunting, and maternal and child mortality (World Bank 2019)—all made worse by high fertility, which prevents sufficient income growth per person to escape poverty. This has partially contributed to an increase in the number of poor people, from 276 million in the 1990s to 413 million in 2015. The region's education system is in crisis, with 50 million children out of school, students learning very little in the early grades (figure 2.2), low secondary school completion rates, and weak learning outcomes. One in three children is stunted,[19] more than three times the rate in Latin America and the Caribbean. And maternal and under age five mortality rates in the region, although declining, are still the highest in the world.

Investment in human capital in the region remains a key priority for better preparing the labor force for the opportunities made possible by digital technologies. The growing potential of digital technologies as learning and health delivery tools means that many jobs, especially low-skill production and health service delivery jobs, may not necessarily require more advanced cognitive skills at the entry level. Rather, digital technologies (together with "analog complements") can compensate for lower skills. Similarly, digital technologies may enable a more equitable and effective deployment of high-skilled workers and high-end services in health and education within countries, especially in countries experiencing acute shortages of personnel in the human capital sector.

Figure 2.1: Sub-Saharan Africa has fared most poorly in the Human Capital Index, especially in access to quality education, stunting, and maternal and child mortality



Source: Staff , using data from World Bank 2019.

Box 2.1: Investment in early childhood development—A bottleneck to building human capital

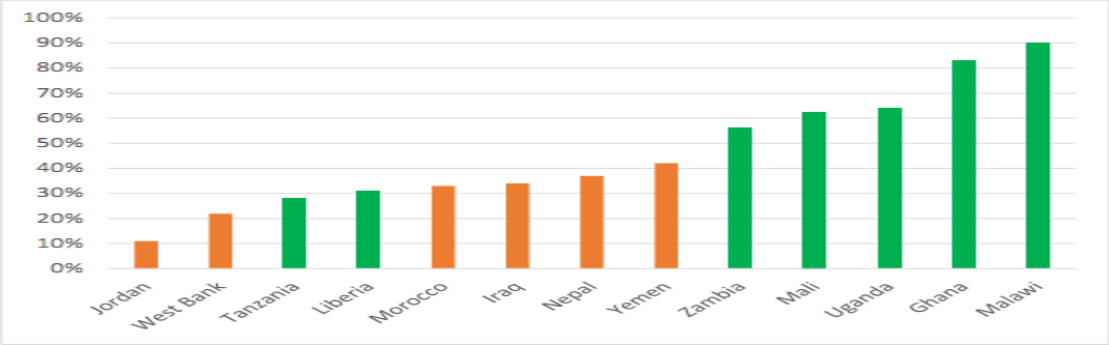
Africa is already lagging in building foundational skills, which is creating bottlenecks for building and developing future advanced skills. Nearly 130 million of children under age six live in the region. Every year, 27 million children are born, and 4.7 million of children under age five in the region die every year. About 17.5 million (65 percent) of the 27 million children born every year will experience poverty, 20 percent may never attend primary and lower secondary school, and 24 percent of those children who enroll are likely to drop out despite a continuous increase in primary and lower-secondary school completion rates. A paltry 12 percent of these children will enjoy preprimary school education, a figure that is far below the developing country average of 36 percent and global average of 50 percent (Garcia, Pence, and Evans 2008; Bashir et al. 2018; Evans, Arias, and Santos,2019). This is perhaps not surprising. Despite efforts to increase total education expenditures in the last decade, the share of the education budget allocated to preprimary school was a paltry 0.3 percent in 2012, compared with 8.8 percent spent by North America and Western Europe in 2012 (World Bank 2019).

The quality of education at the primary and lower-secondary education levels is abysmally low. Countries in the region on average perform lower than other countries in all internationally comparable assessments on lower-secondary mathematics and science knowledge skills (the Trends in International Mathematics and Science Study) (Bashir et al. 2018). Additionally, results from four international assessment programs show that upper primary (grades 4 to 6) students in the region remain challenged by foundational literacy and numeracy tasks. The figures are sometimes staggering. In 6 of 10 countries in the region, nearly 40 percent of the students, by the time they reach grade 4, cannot read a single letter, 70 percent cannot read a paragraph, a staggering 90 percent cannot read a complete paragraph, and only 5 percent can solve a mathematical word problem. And poor people in the region are further disadvantaged, recording the lowest performance among an already low performing sample.

Teachers overall teach too little at the foundational level, and even when they do teach, they lack the pedagogical knowledge and skills to teach effectively. On average, about 6 percent of teachers possess 80 percent of the knowledge equivalent to a fourth grader and only a paltry 7 percent possess the minimum requisite knowledge for teaching, based on a survey of teachers in primary schools in seven countries in the region (representing 40 percent of the region's population). Only 11 percent of the teachers surveyed could interpret data in a graph, and only 15 percent could solve a difficult math story problem. Additionally, only 31 percent of the teachers surveyed understand Venn diagrams, and only 35 percent can solve algebra. Although gross enrollment in primary education is rapidly expanding, the primary education sector, largely public sector managed, is weakly governed and so the quality remains poor (Bold et al. 2017).

The region's inability to build strong foundational skills has affected the skills of working adults. The average reading proficiency levels of urban working adults ages 25 to 64 in Ghana and Kenya are lower than equivalent counterparts in other regions' low- and middle-income countries (based on STEPS data). Eighty-two percent of the working-age adults in Ghana, and 65 percent in Kenya that surveyed in the study performed at level 1 or below on the STEP reading proficiency test, possessing only basic reading skill.

Figure 2.2: Students in many Sub-Saharan African countries are learning very little in the early grades: Large proportions of second grade pupils cannot read a single word of connected text



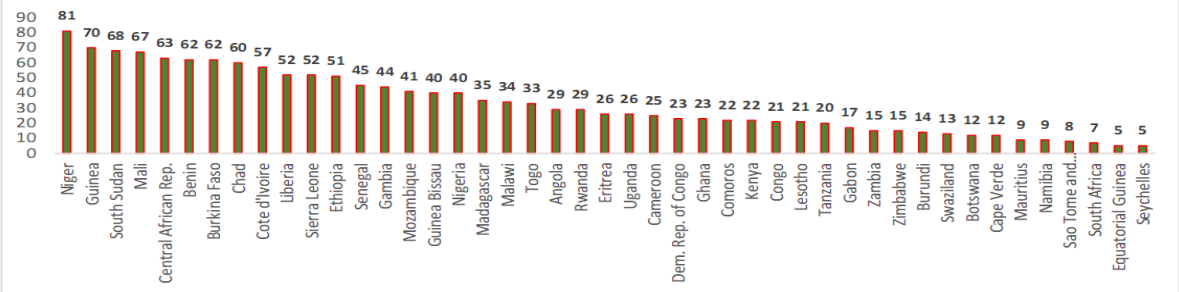
Source: Evans, Arias, and Santos, 2019

Box 2.2: Adult illiteracy

There is a large stock and a continuing large flow into adult illiteracy in the region due to low-quality education. This stock will persist for several years. In addition to using digital technologies to increase the productivity of this group in their current occupations, building their skills to access and use digital technologies will help them adjust and adapt to the changing nature of work. It will open them up as a new market that can benefit from newer and more productive job creation opportunities made possible by digital technologies. But this will require digital skills training and efficient lifelong learning programs to build their skills.

Globally, about 2.1 billion working-age adults (ages 15-64) have low reading proficiency and 16 percent are illiterate (WDR 2019; Soares, Rocha, and Ponczek 2011). In most countries in the region, a significant share of the adult population is illiterate (figure B2.2.1). About 61 percent of working-age adults are not proficient in reading, and 19.5 percent of adults ages 15 and older are illiterate and can neither read nor write (UIL 2017). Adult learning and education programs (ALE) are important in equipping illiterate adults with basic education and basic skills. Given the positive impact of lifelong learning programs in promoting labor productivity, employability, social cohesion, citizen engagement, and sustainable economic growth, ALEs remain a major priority of a majority of countries in the region—with 26 countries having laws, regulations, or other public policy initiatives that primarily focus on supporting adult literacy (UIL 2013a), and 18 countries having enacted new ALE policies since 2009 (UIL 2016).

Figure B2.2.1: In most Sub-Saharan African countries, a large share of adults ages 15+ are illiterate

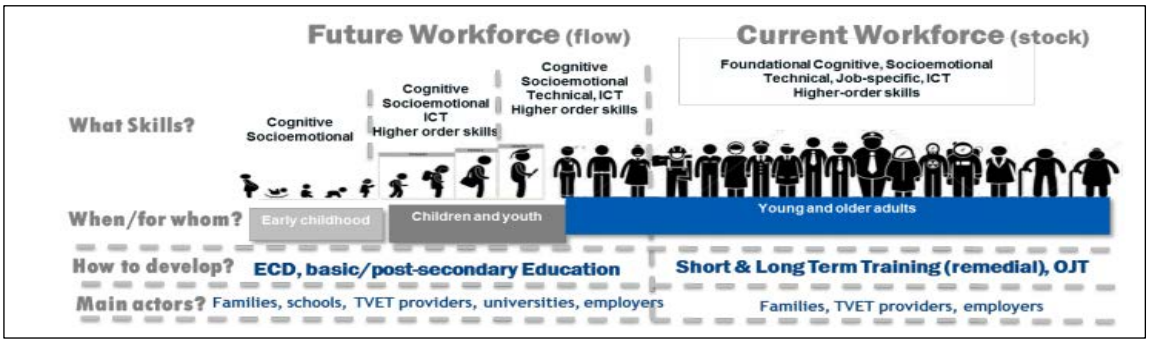


Source: Staff using data from UIL, 2017

Box 2.3: Leveraging digital opportunities: Investing in the skills needed in the modern economy

A recent World Bank report establishes that, to manage the disruptions and opportunities that digital technologies may create in the labor market, there is a need to adopt policies that build strong foundational cognitive and socioemotional skills and promote basic digital skills and lifelong learning (World Bank 2016). The region will have to do this through strategic investment in the right skills needed at the right stages of life of its population, given the region's fundamental skills base and digital development needs (Evans, Arias, and Santos 2019).

Figure B2.3.1: Focusing on skills development over the lifecycle in Sub-Saharan Africa for the future of work



Source: Evans, Arias, and Santos 2019.

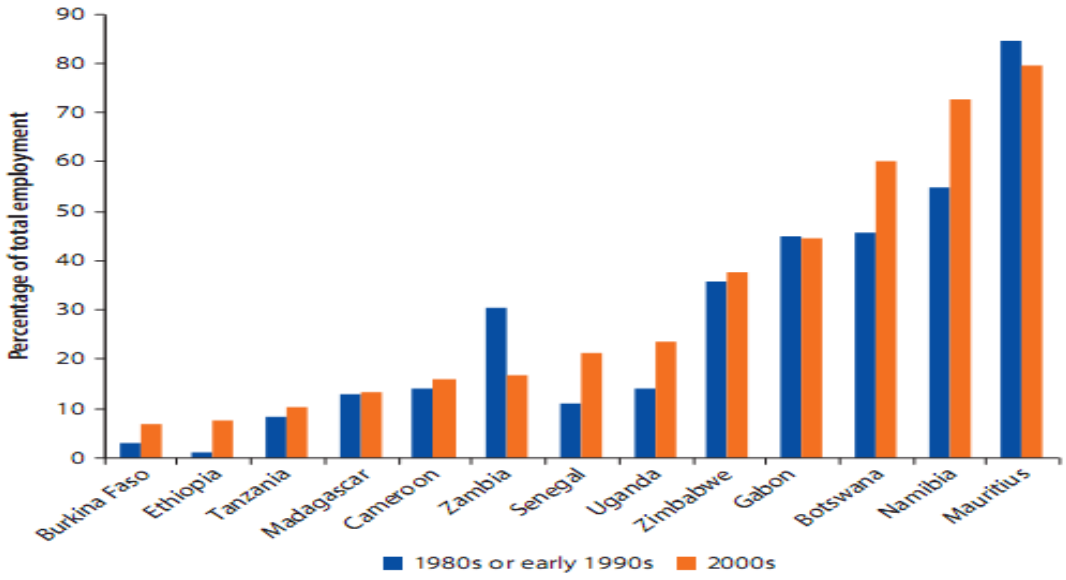
For the region to address the skills gap problem and produce a versatile, productive, inclusive, and adaptable workforce that is better prepared for the future of work, investments in foundational cognitive and socioemotional skills are essential at the early childhood development (ECD) stage. An evaluation of a preschool program in Mozambique reports the importance of preschool in building strong foundational and socio-behavioral/socio-emotional skills at the ECD stage. Participants of the program reported being better than nonparticipants when interacting with others. Additionally, participants of the program became better at managing their emotions, were better at dealing with stress, and could follow instructions (World Bank 2019). For children and youth, the recommended strategy is to invest to build these skills. In addition, they need to build ICT skills, higher-order skills (complex problem-solving skills such as critical thinking and ability to comprehend things of higher-order abstraction), and technical skills. For young and older adults, the recommended strategy is to invest in all these skills, with additional investments in technical (Technical and Vocational Education and Training and apprenticeship programs) and job-specific skills (on-the-job training, e-entrepreneurship, and business training programs), together with digital literacy training.

For the stock of adult population who had no education at all due to lack of access or early dropouts or who received an education of poor quality and subsequently ended up with little or no foundational skills, the recommended strategy is to give them a second chance to build their foundational and basic digital skills. This must be done with due diligence, due to the special nature of these groups of people, particularly, in building their skills to adjust, adapt, and fit into the changing nature of work. Beyond providing education that builds foundational skills, special educational programs with customized pedagogies that take into consideration the specific constraints these adults face and that link learning to employment opportunities should be offered, to improve and increase their chances of making it in the labor market. Governments must lead and coordinate the activities of all stakeholders involved in this process to ensure effective and efficient execution of any such strategies, to realize optimal returns for the targeted population and the region.

2.1.2 Focus on formal jobs: Africa cannot afford to ignore the low-skill informal sector

WDR 2019 recommends a focus on stable and formal jobs. However, the informal sector remains large and persistent in the region (figure 2.3). The sector consists of a large stock of low-skilled people with skills that are often inadequate for modern formal jobs (figures 2.4 and 2.5). Employment opportunities in the formal sector of most economies in the region are limited; for the majority of the labor force, working in the informal sector is the only pathway to generate income, in the absence of opportunities for wage employment—as discussed in greater detail in the next chapter. Wage employment accounts for less than 20 percent of total employment in countries such as Burkina Faso, Cameroon, Ethiopia, Madagascar, Tanzania, and Zambia (Adams, Johansson de Silva, and Razmara 2013; DPRU 2016; Benjamin and Mbaye 2012; Böhme and Thiele 2012; McKenzie and Sakho 2010).

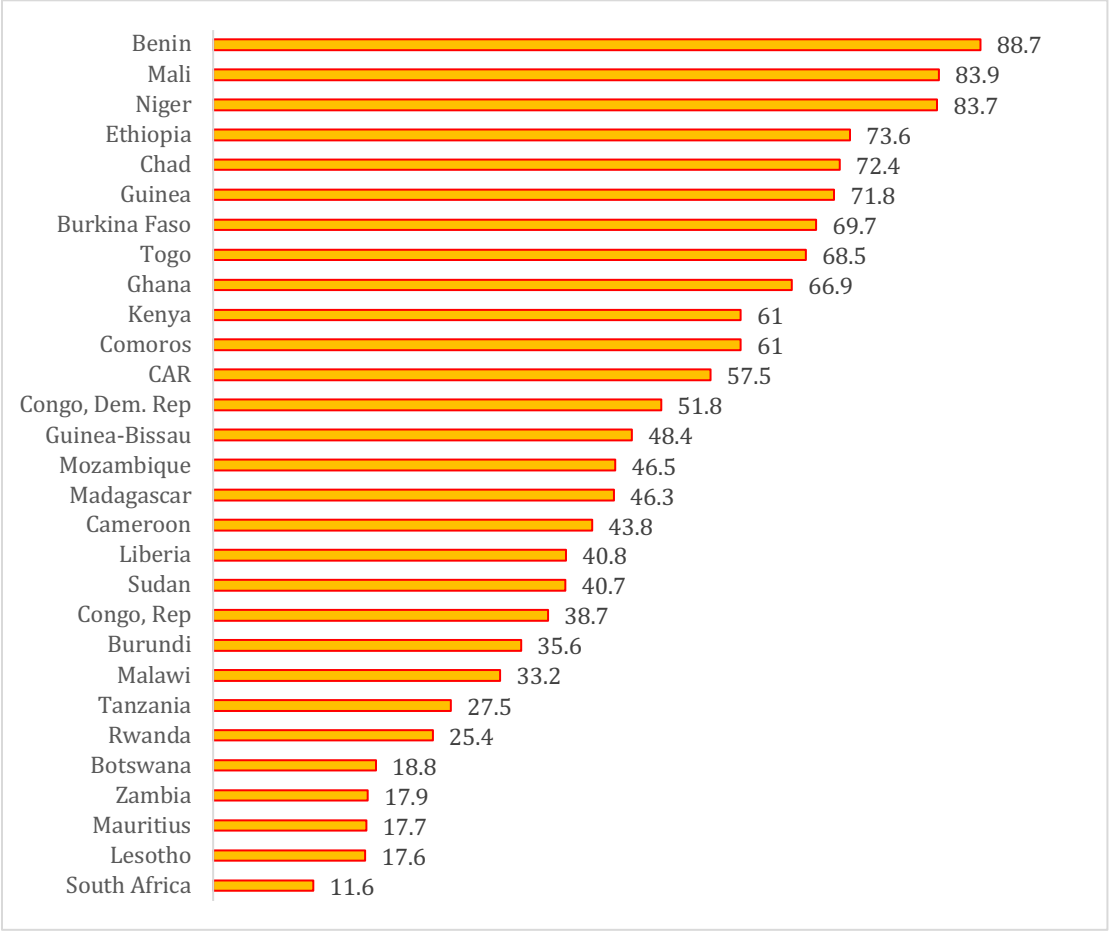
Figure 2.3: Wage-earning employment only makes up a small portion of the labor force in Sub-Saharan Africa



Source: Adams, Johansson de Silva, and Razmara 2013; World Bank.

Despite a steady increase in wage and salaried employment in the region (figure 2.3), the scope and size of self-employment will continue to persist (figure 2.4). Therefore, a short-term strategy to improve welfare in the sector must recognize this and focus on skill formation strategies and policies using digital technologies to boost productivity.

Figure 2.4: Even when restricted to nonfarm employment, self-employment has remained a large share of the labor force in most Sub-Saharan African countries



Source: Staff, using data from Adams, Johansson de Silva, and Razmara 2013.

The conditions for the creation of formal jobs in high productivity sectors such as manufacturing and tradable services are increasingly becoming more difficult. Non-tradable services often associated with high levels of informality, low-paid jobs, and low-skilled and low productivity tasks have grown relatively rapidly, absorbing surplus labor released from the agriculture sector, at the expense of tradable services and manufacturing. This trend will continue to persist.[20] Using digital technologies to improve the productivity of the massive workforce absorbed in these sectors should be given priority (box 2.4).

The highest annual job creation in the region is in agriculture and non-tradable services, which are mostly informal with low productivity growth. Although currently declining, nearly half of annual job creation in the region continues to take place in agriculture, the sector with the lowest productivity growth since independence. In the service sector, the lowest average annual job creation rate is in business services (made up of financial, insurance, real estate, and other business services) compared with the more informal trade (wholesale and retail) services. The skilled labor and capital intensive nature of business services makes it difficult for the sector to absorb labor released from other sectors. Annual average employment creation in the manufacturing sector remains relatively small compared with the other two sectors, despite its relatively higher productivity growth (figure 2.5) (Mensah et al. 2018).

Further to this and more generally, there seems to be a consensus in the literature that the industrialization-led growth model faces more problems today than it did in the past. Starting from 1990, the manufacturing sector, which used to be very important for growth at early stages of development, is becoming a more difficult road to growth than it was in the past. Technological demands of the sector today have made it more capital and skill intensive , and this has reduced the sector's scope of labor absorption and therefore "late industrializers and countries at the intermediate level of development may no longer benefit from manufacturing the same way as early industrializers did" (Fagerberg and Verspagen 2002; Szirmai and Verspagen 2015, 58). And although the hike in labor costs in China could open offshoring opportunities for economies in the region, the region could still miss out, on the one hand, due to lack of complementary foundational infrastructure, a good working environment, and efficient institutions, and on the other hand, due to the success of other emerging Southeast Asian economies as alternative investment destinations (Rodrik 2016; Cadot et al. 2016; Gelb, Meyer, and Ramachandran 2013).

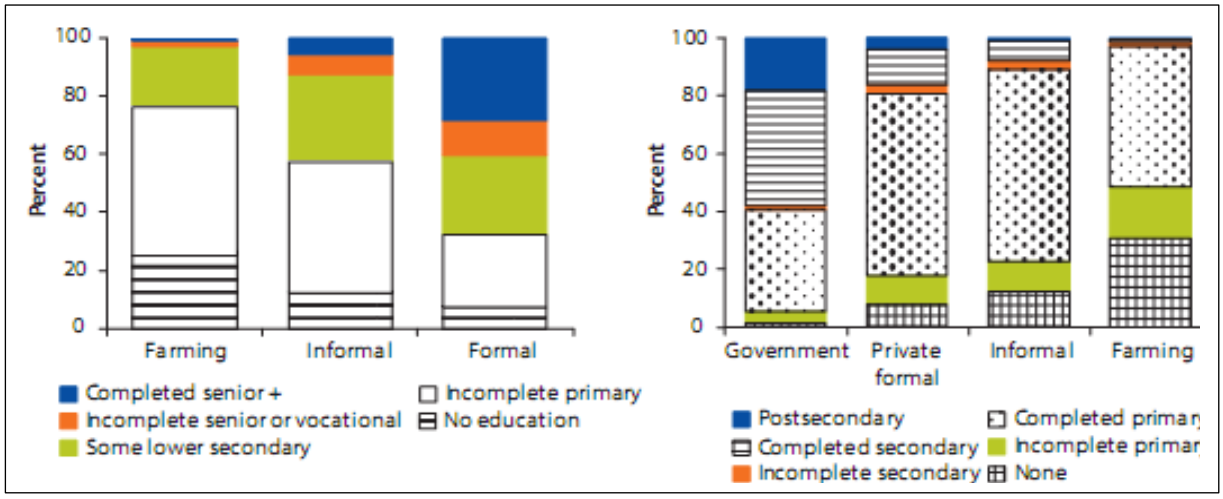
Figure 2.5: In Sub-Saharan Africa, the highest job growth has happened in agriculture and low-paid informal services, leading to persistently slower productivity growth

Source: Staff calculations, using data from Mensah et al. 2018.
Note: Sectoral average annual job creation rate (1960s–2015) is plotted against sectoral productivity growth weighted by sectoral employment shares (as of 2015), indicated by the size of the circle.

Box 2.4: Pathways to developing skills in the informal sector

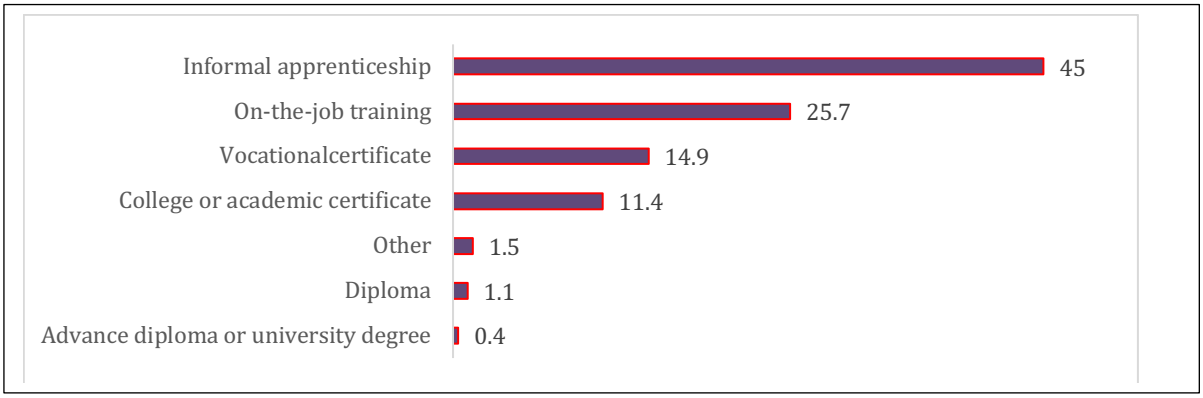
The skills level in the informal sector remains low (figure B2.4.1), and the most frequent form of skills training in the informal sector is acquired through traditional apprenticeships (figure B2.4.2), concentrated in Western and Central Africa. It is estimated that about 70 percent of urban informal sector workers have been trained through the traditional apprenticeship system. In Tanzania, 45 percent of the informal sector workers acquired skills through informal apprenticeship training. In this set up, the master craftsperson commits to the parents or youth and provides training for a specified period in exchange for small fees or the apprentice's labor. Informal apprenticeship training is usually flexible and affordable and has lower entry standards—few participants pass beyond lower-secondary education and the majority do not complete primary education. In addition to this, the training's direct connection with future employment makes it an attractive source of skills (Adams et al. 2013).

Figure B2.4.1: Workforce, by highest level of education: Traditional apprenticeships are the most frequent form of skills training in the informal sector



Sources: Adams et al.; 2013, World Bank.

Figure B2.4.2: Informal apprenticeship is the dominant source of skills training in the informal sector in Tanzania, 2006

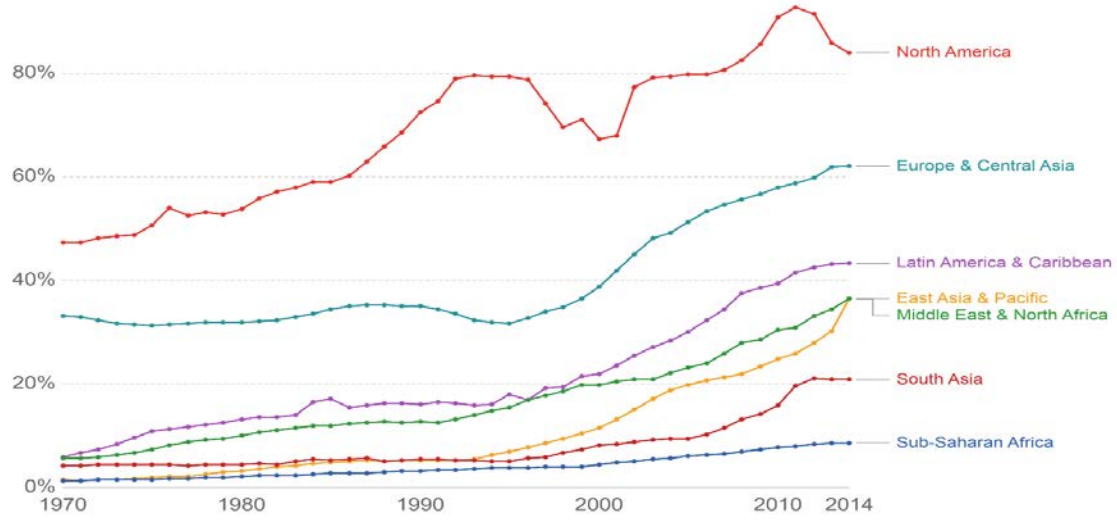


Source: Staff, using data from Adams et al. 2013; World Bank.

invested in tertiary education. No long-term sustainable innovation is possible without correcting this course. At a time when other parts of the world are rethinking their tertiary education systems, the region must move away from the early independence higher institutions that focused disproportionately on teaching and much less on research and entrepreneurship.

Tertiary education enrollment in the region is very low. Although it has been growing in recent years, the pace of growth is not enough to catch up with the rest of the world, given that the region has historically lagged global experience (figure 2.6). The average gross enrollment rate in tertiary education in the region is 10 percent, 10.4 percent for men and 8.8 percent for women. The average gross enrollment rate in tertiary education is only 5 percent for more than a third of the countries in the region. In countries such as Malawi and Niger, the average gross enrollment in tertiary education is 2 percent, in contrast to being very high in Botswana and Mauritius, at 30 percent and above (Evans, Arias, and Santos n.d.).

Figure 2.6: The share of the population with completed tertiary education in Sub-Saharan Africa remains very low compared with other regions of the world



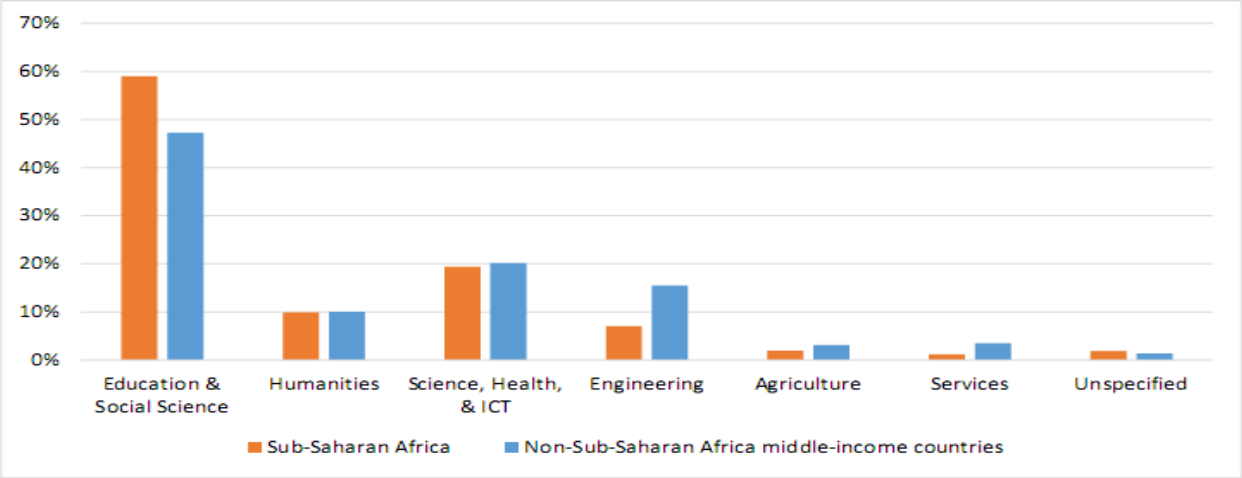
Source: World Bank, One World in Data, https://ourworldindata.org/tertiary-education (September 4, 2019).

Gross enrollment in tertiary education in the region is not only low, but enrollment of students in STEM fields is even lower. On average, about 19 percent of the students enrolled in tertiary education are enrolled in STEM-related programs (figure 2.7). In Benin, only about 16 percent of tertiary students are enrolled in STEM fields, 21 percent in Mali and below 25 percent in Ghana despite years of effort to increase enrollment in STEM-related programs in the country. It is highest in Niger and Gambia, at 23 percent. Currently low in supply, STEM skills are critical in the region's pursuit of innovation and knowledge production to exploit opportunities offered by digitization to create conditions for job creation and expansion.

Technology creates jobs. It requires quality education, particularly in STEM fields. And it requires investment in specialized high-end skilled inventors to design technologies that create conditions for jobs. At the moment, this is not happening in the region. With the exception of South Africa, which is currently the region's technological hub and home to world-class academic and research institutions that attract young talent from across the region, all other countries are ranked low in terms of the quality of university education, innovation performance, and knowledge production. Consistently six of the top ten universities in Africa are based in South Africa, according to the Times Higher Education and QS rankings. In addition,

in 2017, South Africa was ranked as the most innovative country in Africa, in the 57th position globally (Cornell University, INSEAD, and WIPO 2017). Of the total number of patents granted to countries in the region (133,534) between 1990 and 2017, South Africa recorded the highest number (124,581) and share (93.3 percent) (WIPO). And while most countries in the region on average spend less than 1 percent of their gross domestic product on research and development (R&D), South Africa still spends more on R&D than all the other countries despite that it is still less than 1 percent.

Figure 2.7: The majority of tertiary education enrollment in Sub-Saharan Africa is in non-STEM fields



Source: Evans, Arias, and Santos 2019.

Filling the gap: in the medium and long term, the region will have to build poles of excellence to promote regional collaboration among universities and international best practice partners, to increase the production of quality STEM field graduates and professionals (box 2.5). The World Bank in collaboration with West and Central African countries in 2014 launched the African Center of Excellence (ACE) initiative. Through an open, rigorous, transparent, and merit-based assessment procedure, ACE selects and invests in beneficiary well-performing universities' "Centers of Excellence" in disciplines related to STEM, agriculture, and health. ACE seeks to increase the quality and quantity of STEM graduates by establishing high-quality specialized, well-resourced centers in selected universities to train students in STEM-related fields (applied mathematics in Benin; information and communications technology (ICT) in Cameroon; statistics in Côte d'Ivoire; mathematics, informatics, and ICT in Senegal, and so forth) to increase knowledge production that will create knowledge-based competitive advantages. By 2018, about 8,100 students had been enrolled under the ACE project, of which 25 percent 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.

Another initiative launched in the region to increase the production of qualified professionals in STEM-related programs is the Partnership for Skills in Applied Sciences, Engineering and Technology (PASET). Launched in 2013 with the World Bank, and currently led by five countries in the region (Ethiopia, Kenya, Côte d'Ivoire, Rwanda, and Senegal), PASET recognizes that the region is not producing enough skills and scientists in STEM fields. The region currently contributes 1.1 percent to the global share of scientific researchers. By bringing together governments, universities offering ASET disciplines, the private sector, donors, and other partners and sharing best practices from China, Japan, the Republic of Korea, Brazil, and India through faculty and student exchanges, PASET seeks to strengthen the region's scientific and

technological capacity by building skills in research, innovation, and technology to create a critical mass of highly skilled science and technology professionals who can exploit the opportunities of technology to create conditions for job creation that will boost growth and development. About 26 countries in the region have participated in PASET activities so far, and it is hoped that more countries will join in the coming years.[21]

Box 2.5: Canadian Networks of Centres of Excellence: Success and lessons for Africa

Canada has one of the most successful and long-standing experiences with centers of excellence. Prior to the launch of the country's Networks of Centres of Excellence (NCEs) model in 1989, it was realized that the "vast majority of academic research groups in Canada were relatively small, without critical mass and formal structures for knowledge translation and technology transfer" (Halliwell 2012, 10) despite the country's science and technology policy and strategic research grants policy to promote knowledge production. Prior to the launch of NCEs, the nature of most academic research in the country was curiosity driven basic research. Researchers were not under any requirement to demonstrate the social or economic benefits of their research for Canada before securing research grants. And there was little consideration for the creation of centers of critical mass. Creating a critical mass of experts in areas of importance to Canada became a national goal, namely, to enhance and support a few large-scale research initiatives that would put Canada on the world research map. This led the country to come up with the new NCE initiative.

NCEs are large-scale, academically-led virtual research networks. They bring together partners from academia, industry, government, and not-for-profit organizations distributed across the country. The goal is to collaborate on common research problems to generate research outcomes that socially and economically benefit the country, according to the priorities laid down in the country's science and technology policy that frame the operations of the NCEs. Funded NCEs are selected through a competitive process based on five criteria—the excellence of the research program, the development of highly qualified personnel, networking and partnerships, knowledge/technology exchange, and exploitation and governance/management of the network. They are monitored and evaluated annually. Since 2007, NCEs receive funding for a five-year period. They are given the possibility to renew for up to two further cycles of five years.

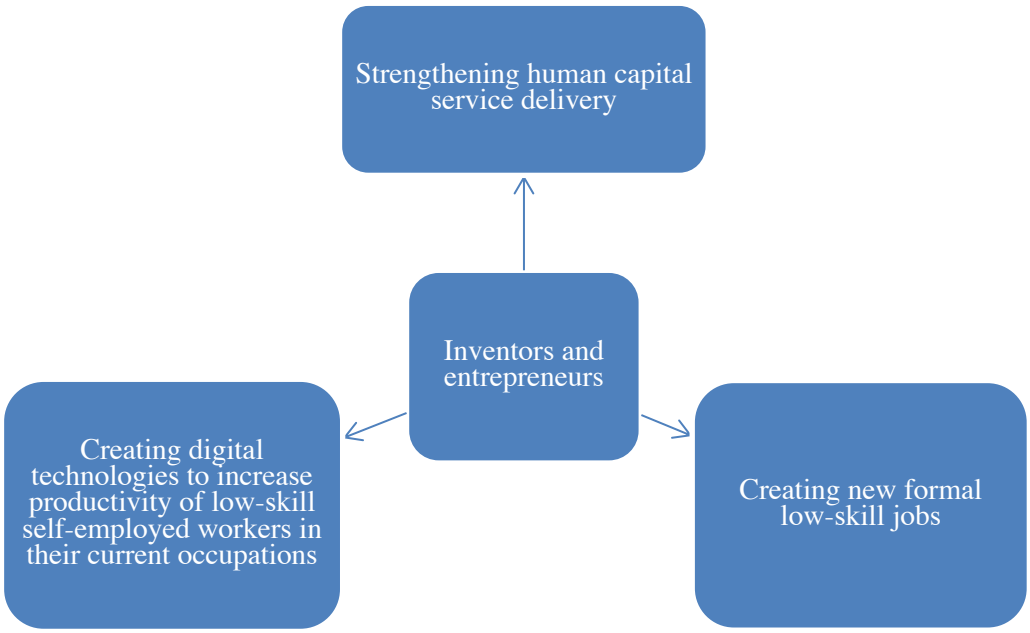
Impact evaluations of the program's impact on the country's research system in 2002, 2007, and 2008 reveal that the program has been transformative. The program has enabled institutions in the country to attract and retain world-class researchers who have significantly contributed to the country's research excellence. This has helped the NCEs to publish an average of more than 4,000 publications in referenced journals each year. The program has also helped create groups of critical mass in areas of strategic importance to Canada—such as in prion science and others. The program has further helped build partnerships between academe and industry, yielding tangible outcomes such as patents and spin-off companies. It is reported that between 100 and 130 patents have been applied for and/or granted to the NCEs. Between 2003 and 2011, NCE-related research led to the formation of 50 spin-off companies, creating new jobs and other market opportunities for the country. The program has helped foster strong international collaborations and partnerships. It is reported that on average around 400 non-Canadian organizational entities are involved each year in the NCEs.

2.2 From digital technologies to jobs through adequate human capital

Enabling the enablers: in light of the diagnostics in section 2.1, human capital will play a prominent role in determining the options available to many countries in the region going forward. Digital technologies can

be leveraged to (i) increase the productivity of the region's stock of low-skilled labor in their current jobs and (ii) create new and more productive jobs adapted to the current stock of skills. Additionally, (iii) digital technologies can offer opportunities to speed up the human capital acquisition process across health and education services. The overarching human capital prerequisite for all these options is high-skilled inventors (to create the various appropriate digital technologies needed) and entrepreneurs (to commercialize the innovations and thereby create many more jobs) (figure 2.8). Training and enabling these inventors and entrepreneurs must thus be a first-order priority for all countries in the region.

Figure 2.8: Inventors and entrepreneurs are central to creating the conditions for the region to reap the benefits of digital technologies



Source: Staff elaborations

2.2.1 Digital technologies, human capital, and productivity of the low-skill labor force

Adequate digital technologies can increase the productivity of low-skill adults in their current occupations. Some may require complementary training (for example, adult and digital literacy), which could also be delivered better through digital technologies (box 2.6). Coming up with adequate, context-specific solutions is paramount.

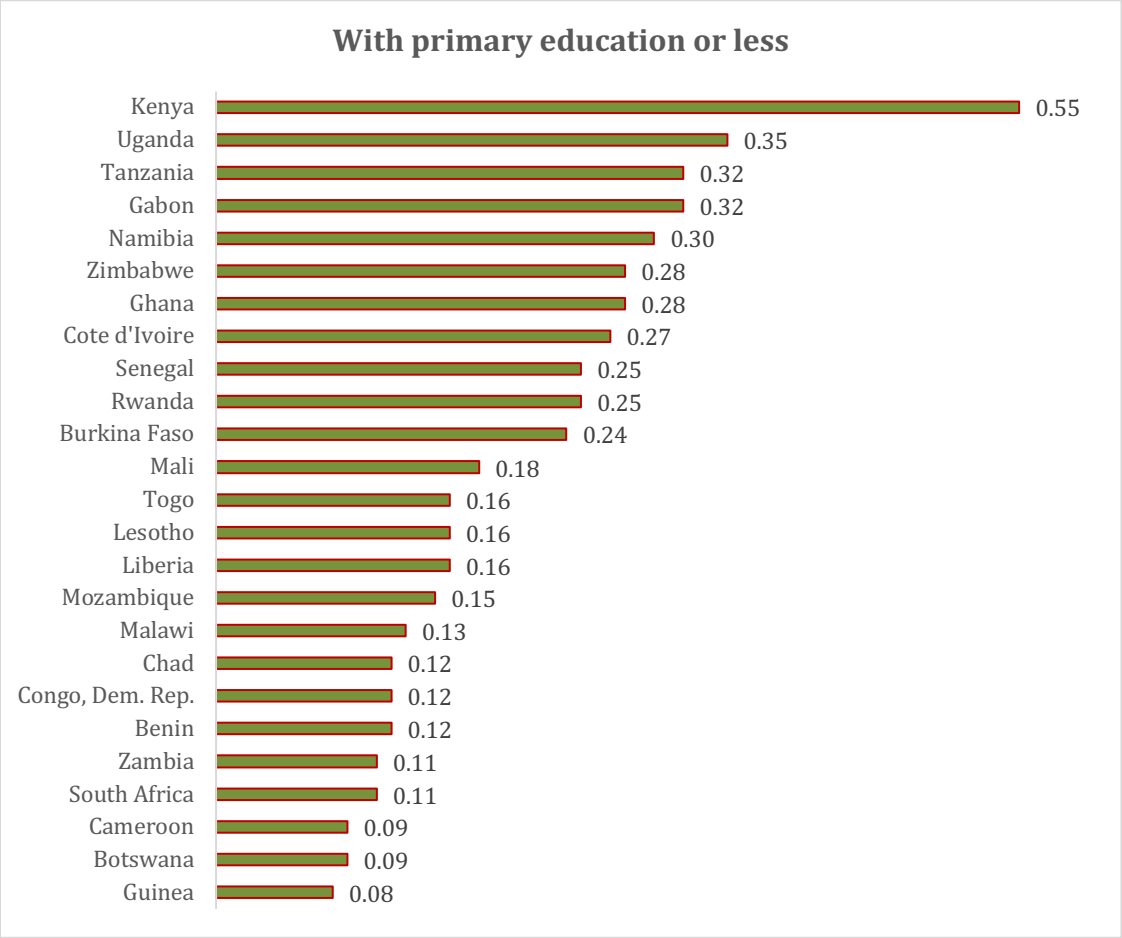
In Ghana and other countries in the region, companies like Farmerline are leveraging digital technologies to boost the productivity of farmers. Established in 2013, Farmerline is transforming farmers into successful entrepreneurs by increasing their access to information, inputs, and resources to increase productivity by providing an online platform that connects and communicates with small-scale farmers in their native languages through innovative mobile technology. About 200,000 farmers across 11 countries have spent more than 300,000 minutes learning best agricultural practices on the platform (on weather, market prices, and inputs). The platform also collects information for buyers, governments, and other partners. Last year, the company launched its new product, "CocoaLink Services," a free mobile app that enables smartphone-empowered farmers to acquire actionable knowledge on how to run a profitable agribusiness and succeed

as entrepreneurs, while making agriculture an attractive, entrepreneurial, and profit-making profession for youth in the region (World Bank 2019).[22]

In Kenya, the World Bank Group and the Korean World Bank Facility, together with other development partners, are investing in mentoring and providing financial support to create an innovation ecosystem of new startups and entrepreneurs/innovators in agri tech. The aim is to connect a million Kenyan farmers to disruptive agricultural digital technologies and scale up the impact of these digital technologies to boost the productivity, market linkages, and financial inclusion of smallholders and women farmers. The program also aims to increase the scale and speed of agricultural transformation in Kenya.[23] *Digi Cow,* a digital technology from Kenyan Farmingtech Solutions Ltd., is providing a mobile-based service delivery platform that is linking small livestock owners to veterinary and artificial insemination services, feed suppliers, and business enterprises. It is resulting in a significant increase in milk productivity in the country. Other digital technologies, such as *Digital Green, Farmers Pride, Precision Agriculture for Development*, and *SunCulture*, are being used to reach large numbers of smallholder farmers with agricultural extension advisory services, personalized agricultural advice through video-enabled approaches and mobile phones, and smart irrigation systems to increase crop productivity. In addition to this, digital technologies such as *M-Shamba, Tru Trade Africa, Tulaa, ACRE Africa, Agri-Wallet*, and *Arifu* are being used to address the market failure problems that smallholder farmers face, by providing them with linkages to markets and fair prices for their produce, loans/finance, and index insurance to safeguard farmers from weather shocks.[24]

For the usage of many types of digital technologies, the level of skills required may be low. Potential users and beneficiaries often find ways to adapt and use the technologies once they deem them useful (figure 2.9). The potential benefits or advantages that consumers receive from adopting digital technologies could serve as a driver of adoption and diffusion. Consumers will always find ways to learn to adapt and use new technologies once they deem them useful. An illustration is the rapid adoption and diffusion of (smart) mobile phones despite no complementary large publicly supported projects to provide cell phone skills to use them.

Figure 2.9: Appropriate digital technologies may not require significant skills upgrading for end users if the apparent benefit to them is important, as exemplified by the large share of 15 years+ population that have used mobile phone/internet to access financial account despite with low education and no structured skill upgrading



Source: Staff, using data from the Global Findex database, 2017.

Box 2.6: Adult literacy programs, skills, and employment: What the evidence shows

Adult literacy programs (ALE) have until now been used as a route to fill the adult skill gap in many developing countries, to boost the productivity and employability of unskilled adults. About 61 percent of working-age adults in the region are low-skilled. This has a negative impact on career prospects, job quality, and productivity growth. Adult workers with low skills tend to have fewer job opportunities and opportunities to improve their skills and when they have jobs, and they contribute less to aggregate productivity growth (Saane and Baker 2018). The reported growth in participation in ALE in the region is welcome news, as out-of-school adults, early dropouts, adults with no access to education, and adults who received education but of poor quality could be given a second opportunity to benefit from basic and specialized education programs, to adjust and adapt to the changing nature of work.

However, the evidence shows that ALEs have had only minimal impacts on improving business knowledge and the productivity of beneficiaries, and none on massive employment creation. In Peru, a female adult entrepreneurship program that aimed at training female entrepreneurs was hugely successful in improving the business skills of participants, but the program had no significant impact in increasing employment among the participants of the program (UIL 2017; World Bank 2019). In Brazil, ALEs significantly increased the earnings of participants. The program also increased the probability of being employed but had no effect on actual employment (Soares, Rocha, and Ponczek 2011). In the Dominican Republic, a youth and employment program rolled out in the country was successful at improving non-cognitive skills and job formality for beneficiaries of the program but did not increase employment. In Turkey, vocational training had no significant impacts on overall employment. And although the program improved employment quality, this effect was short-lived, as it faded away in the long term.

2.2.2 Digital technologies for new and more productive low-skill jobs

Digital technologies can help generate new formal private sector jobs adapted to the current stock of skills. This pathway is similar to the generation of new activities observed in the rest of the world, especially in developed countries. This too will require a massive drive to invest and create a critical mass of potential digital entrepreneurs and address critical constraints such as the funding of startups at their early stages.

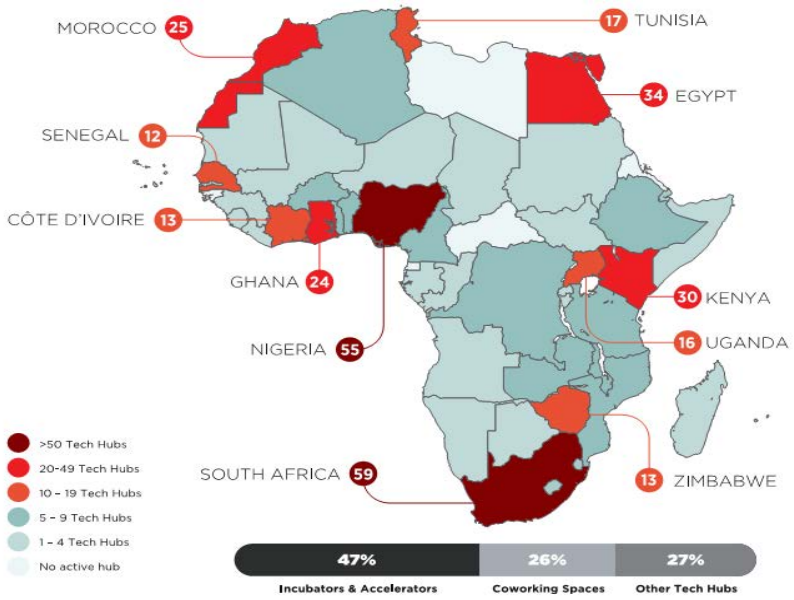
Innovation in digital technologies has often been based on a complex platform allowing, for example, millions to make a living by only knowing how to drive a car and follow instructions on the screen or accept a booking request online and opening their doors to host guests for a fee (for example, Uber, Airbnb, and similar platforms). Launched in the region in 2013, the San Francisco–based Uber has created thousands of driver jobs (12,000 driver jobs in South Africa, 7,000 in Nigeria, 5,000 in Kenya, 3,000 in Ghana, and 1,000 in Tanzania and Uganda) and served about 1.8 million riders in the region. Ride-sharing companies like Taxify (now rebranded as Bolt) have joined the ride-sharing market to compete with Uber in the region by offering lower commissions to the drivers (15 percent compared with Uber's 25 percent commission).[25] In South Africa, Airbnb reported generating an estimated US$678 million for the South African economy, creating 22,000 jobs and an estimated US$260 million for hosts across the country.[26] In Nigeria, e-commerce leader "Jumia" employs about 3,000 workers across the region, and 100,000 more workers who help customers make orders (CGD 2018).[27] Some of these jobs may be short-term, but these digital technologies help create jobs for a significant share of low-skilled workers in the region, helping them to save and later use these savings to start their own firms, mostly formal firms. A typical example of this is when MTN

Ghana introduced the credit transfer technology that allowed people to buy a SIM card, load it with money (credit), and sell smaller units to customers. Over time, many credit sellers were able to save and transform their businesses into larger, formal telecommunication support businesses, sometimes even selling mobile phones.

Unlocking technological entrepreneurship in Sub-Saharan Africa: the rise of tech startups, tech hubs, and innovation ecosystems. Tech hubs in the region have grown by over 50 percent, from 314 in 2016 to 442 in 2018. The technology investment ecosystem across the region is also attracting more capital and expertise. Not only has the volume of funding raised by tech startups across the continent soared, but also new ecosystem cities, such as Accra in Ghana and Abidjan in Côte d'Ivoire, have joined traditional frontrunner tech hub and ecosystem cities such as Cape Town in South Africa, Lagos in Nigeria, and Nairobi in Kenya as internationally attractive technology centers.[28] Top tier countries remain the premier tech investment destinations on the continent in 2018 (map 2.1). Nigeria surpassed South Africa to emerge as a premier investment destination with 55 active tech hubs raising a total of US$ 94.9 million, while South Africa raised US$60.0 million with 59 active startups. Overall, the region's tech startups attracted around US$334.5 million in tech investment in 2018 (GSMA 2018; Disrupt-Africa 2018).[29]

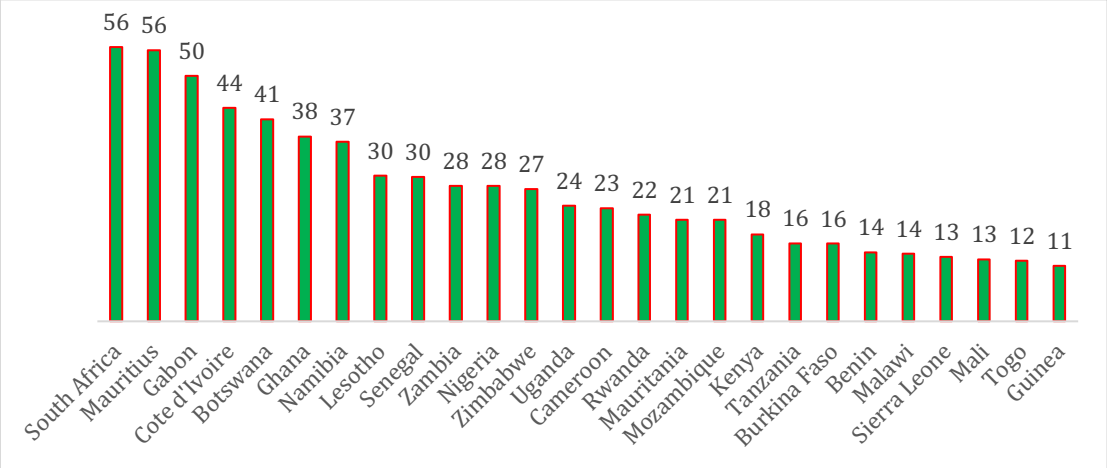
A host of other countries in the region are also showing signs of joining and becoming internationally attractive tech centers. Kigali is one of such cities. The Kigali Innovation City is gradually positioning itself as an attractive tech investment destination with the government's US$1.9 billion digitalization project that aims to build a vibrant tech ecosystem of technology clusters of universities and industries. Further to this, the country is hosting major regional tech events such as the African Tech Summit in 2020. Rwanda has also introduced entrepreneurship in its secondary school teaching curriculum that will better prepare its youth to improve their livelihoods through work while addressing the country's youth unemployment problems.[30] Other countries, such as Zimbabwe and Zambia, have recorded sizable growth in active tech hubs over the years, from six to 13 in Zimbabwe and from two to 6 six in Zambia from 2016 to 2018. And countries where tech hubs were nonexistent (Chad, Cabo Verde, Mauritania, Eswatini, and Djibouti) can boast of at least one active tech hub. With increasing government support, and the region's tech ecosystem showing signs of maturity (leading tech hubs in the region have an average half a decade of activity) and growing synergy between investors, industry, and universities, the future looks promising for the region's technology ecosystem. This is timely, but the region needs to speed up its connectivity to take full advantage of digital technologies (figure 2.10).

Map 2.1: Africa's tech hubs landscape is growing; new ecosystem cities are joining traditional frontrunners; and countries where tech hubs were nonexistent can boast at least one active tech hub today



Source: GSMA 2018.

Figure 2.10: The percentage of individuals using the internet in Sub-Saharan Africa has grown, but the level has remained low for most countries



Source: Staff, using data from ITU 2017.

2.2.3 Digital technologies, human capital formation, and jobs in the human capital sectors

Health workers play an all-important role in the provision and delivery of health services. However, the global distribution of health workers is unequally distributed between and within countries. Fewer health workers are found in poorer countries and areas where health needs are most severe. Their numbers remain insufficient to meet the health needs of the region, which has only 2 percent of the world's doctors.[31] In Malawi, for instance, a country that has consistently recorded one of the worst health worker-to-population ratios, the average number of physicians for 100,000 people is 2.2 and about 50 percent of the country's nursing posts are unfilled. Most countries in the region are understaffed with health human resources to provide quality health care. And, more often than not, lower level staffs take the responsibility to perform high-skill functions. A combination of factors are cited to have contributed to this, including but not limited to: low pay and poor staff benefits for government health workers, the poaching of government health workers to work in private health facilities, and migration of health workers to seek greener pastures in countries where the payoff for their services is comparably higher (Liese and Dussault 2004; WHO 2006).

Digital technologies can help make up for the shortage of health care workers through increased efficiency and productivity of the health staff. Given the low supply of health human resources and that many people in the region must travel a long distance to receive healthcare, digital technologies will have a more enabling and gap-filling effect than being a disrupter. In most cases, digital technologies will not significantly increase employment in the health sector but will affect the nature of the execution of jobs in the sector and help increase the efficiency and productivity of the employed health staff. Remote diagnostics and telemedicine have been estimated to be able to address 80 percent of health issues of patients in the rural parts of the region, where the majority of understaffed health posts in the region are found (MGI 2013). Digital technologies can also help centralize and synchronize the public and private health system through proper patient electronic record keeping, thereby making centralized digitalized patient admissions and treatments possible with a less heavy workforce. Health care wastage could also be reduced. For instance, having access to proper patient electronic records, the use and scale-up of mobile health services could allow the few health practitioners in the region to work with clients from remote locations, review clients' medical histories, and write prescriptions.

In Ghana, the Novartis Foundation and its partners have developed a telemedicine system to expand the reach of medical expertise to deprived communities through the use of digital technologies. Started as a pilot project in 2011 in one district in Ghana covering 30 communities of around 35,000 people, the Ghana Health Service has selected the telemedicine system for implementation across the nation, given the project's success. The telemedicine system uses digital technologies to connect community health workers (with relatively less knowledge, experience, and expertise) to medical specialists via 24-hour teleconsultation centers. The medical specialists (made up of doctors, nurses and midwives) in the teleconsultation centers "provide coaching services to the community health workers and advise on the treatment of their patients, helping them manage emergency cases that are beyond their capacity and avoiding unnecessary referrals, reducing transport times and cost while improving the quality of health care."[32]

In South Africa, the messaging platforms *MomConnect* and *NurseConnect*, an initiative of the South African National Department of Health, are being used to support and deliver better maternal and child health care through the use of cell phone–based technologies. All pregnant women can voluntarily register electronically in the public health system at the very early stage of the pregnancy to receive targeted health promotion messages that will improve their health and that of their children. The platform also allows pregnant women to provide feedback on the quality of services received. *NurseConnect*, an extension of

MomConnect, supports nurses and midwives in their daily work by allowing them access to targeted support messages, in-depth information, and advice on maternal and child health.[33] It is reported that about 466,000 users have adopted the *MomConnect* service and 19,524 had registered to use *NurseConnect* by 2017.[34]

In Uganda, the *mTrac* digital technology initiated by the government is being used to digitalize the transfer of Health Management Information System data via mobile phones. The *mTrac* digital technology is being used to track the stock of medicine across the country, disease outbreaks, and health care delivery challenges, while empowering district health teams by providing timely information for action.[35] Around 27,000 government health workers in Uganda are using *mTrac*.[36]

Digital technologies have the potential to reinforce learning, increase access to education, offer access to high-quality materials where there are no teachers with the needed skills, and deliver high-quality education and learning outcomes in the region. The availability of quality and sufficient supply of teaching staff at all levels of education is fundamental for human capital development. Having an oversized class or lecture room limits the ability of teachers to provide proper and equal attention to all students. Much worse is the case when there is an oversized, poorly resourced class or lecture room run by less qualified teaching staff. Class size is an important determinant of student performance. A high pupil-teacher ratio will harm not only children's test scores in the short run, but also their long-run human capital formation (Schanzenbach 2014). The size and quality of teaching staff should be one of the most important areas to pay attention to when designing and implementing policies to increase access to quality education. Unfortunately, the pupil-teacher ratio in Cameroon is 52/1 at the tertiary level, 43/1 in Mauritania, 33/1 in Togo and Kenya, and as low as 9/1 in Cabo Verde. At the primary education level, the pupil-teacher ratio is 58/1 in Rwanda, 52/1 in Mozambique, 50/1 in Angola and Burundi, and as low as 14/1 in the Seychelles.[37] Many countries in the region have oversized classrooms.

Just as in the health sector, digital technologies have the potential to be an enabler rather than a disrupter in the education sector, creating new jobs in the sector. However, the impact on overall employment in the sector is likely to be marginal and the levels of teacher-student ratios is likely to remain unchanged at least in the next few years. Significant effects of digital technologies are expected on the efficiency of the delivery of teaching and learning. In many ways, digital technologies are providing a way for learning models to become increasingly personalized. It is expected that adaptive learning software will increasingly replace textbooks and other learning materials in the classroom. The future of schools will be an education system that trains students to study and learn on their own with computer-assisted programs that assist their needs. The use of digital technologies to teach will create an agency in the classroom, students will assume more responsibility for their own learning, and this will improve and increase student's motivation toward learning. Digital technologies will offer access to high-quality materials where students often need to develop skills that their teachers lack or do not teach. In Uruguay, evidence shows that video conferencing with English speakers from the Philippines helped improve learning among first graders in the country. In Mumbai, grade four children are reported to have benefited from the Khan Academy's independent learning approach to math teaching (World Bank 2016a).

But all this will still require the important role of teachers, namely, a technology-saturated teacher workforce to make it work (Perera and Aboal 2019). By giving appropriate ICT skills training to teachers on how to use digital technologies in the delivery of teaching, creating computer-assisted learning platforms for teachers and students, and addressing logistical and infrastructure constraints, teachers could assist students in oversized and poorly resourced classrooms with few textbooks, to use e-books, affordable tablets, and computerized learning platforms to learn in the classroom and at home. But these innovations

can only reach the classrooms across the continent if governments, the private sector, nongovernmental organizations, parents, and other stakeholders work together to pool resources to make it work (MGI 2013).

A recent study in Uruguay examined the impact of the "Mathematics Adaptive Platform" (PAM), a digital technology learning tool, on students' performance based on mathematics test scores for beneficiary primary school students of the country's One Laptop per Child program. The PAM platform offers a variety of teaching-learning activities that give personalized assistance to each student and teacher user by adapting to their level of knowledge and skill. Students who use the platform get immediate feedback on completed exercises and are corrected with solutions for exercises they get wrong. The results show a positive and significant impact of PAM on students' math test scores. The results also show that the higher is the use of PAM in the class, the higher are the gains students obtain in the math test scores, suggesting the crucial role of teachers and group learning strategies (matching students with the similar skill level to work together) in ensuring the success of the program (Perera and Aboal 2019). Finland, which is one of the most connected and best performing countries in educational testing, uses very little technology in the classroom but instead invests in improving the quality of teachers. To this end, it is proposed that technology be used for closely guiding teaching, only as a second best option to improve learning outcomes at a modest cost where teacher training is unlikely to improve quickly (World Bank 2016a, 32).

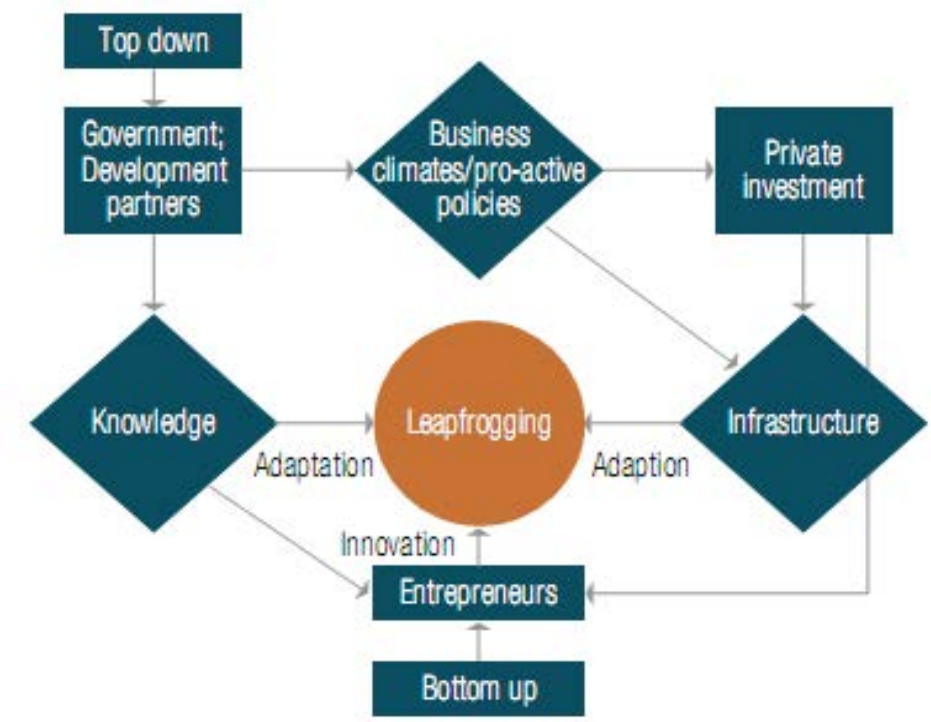
In Africa, companies such as *Eneza* education in Kenya, Tanzania's social enterprise *Ubongo,* Togo's *OkpaBac*, and *Obani* in South Afric*,* are all using digital platforms to promote the development of education infrastructure. However, aside from anecdotal reports of the success of these digital platforms in improving the educational performance of beneficiary students, there is no proper evidence of their comparative effectiveness in generating learning and the other social skills that schooling is meant to provide (World Bank 2016a, 260).

Overall, digital technology is an enabler that holds the potential for positive and significant transformation and revolutionizing the region's health care and educational systems by addressing the acute shortage of health and educational human resources. Digital technology also affects the nature of work of health and educational workers in the region, making them more efficient and productive. This can only be possible with the right complementary incentives and resources in place.

2.3 Discussion: The importance of grassroots and bottom-up innovation

Countries in the region need to adopt a bottom-up approach to unlock the power of technological entrepreneurship (figure 2.11).

Figure 2.11: Top-down and bottom-up framework for Sub-Saharan Africa's innovation ecosystem—the bottom-up initiatives have often been neglected and yet they are a key complement for success



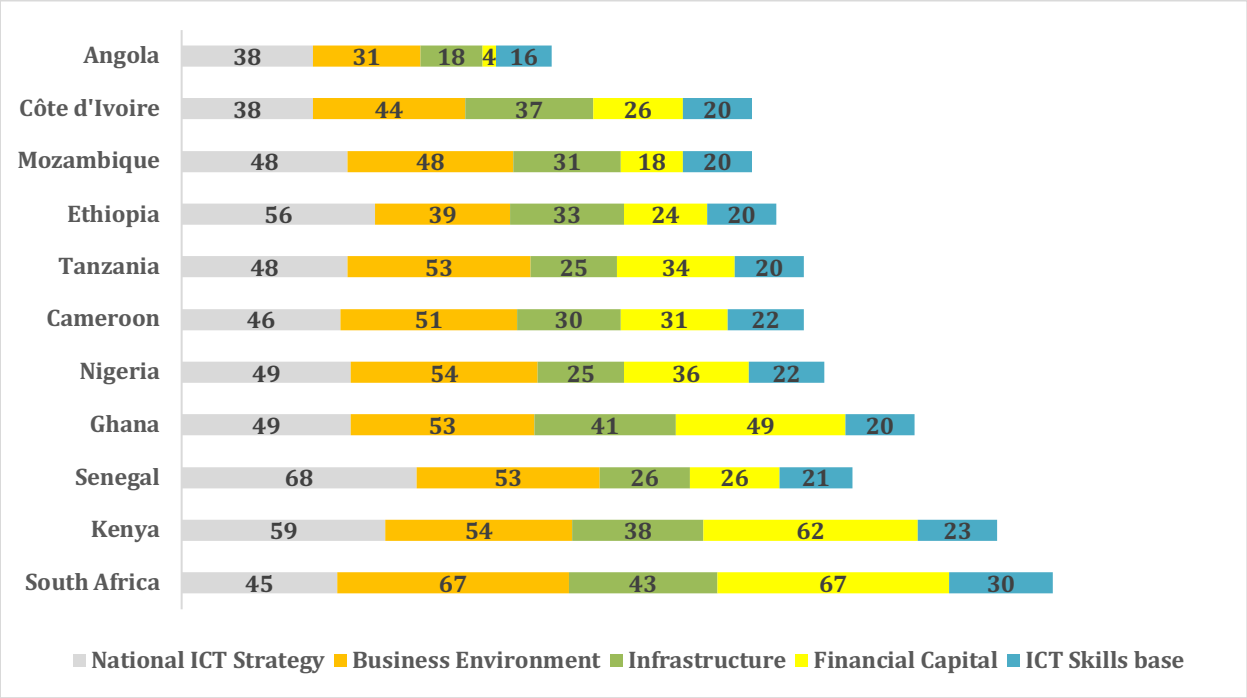
Source: World Bank Group 2017.

The region is growing more connected and digital development is accelerating. As of 2013, 13 percent of the population in the region used the internet, compared with 36 percent globally (Hjort and Poulsen 2019). By 2018, this number reached almost 30 percent (and 24 percent in terms of unique users, counting only one user for those with multiple connections) at the end of 2018 (GSMA 2018, 2019). This presents a unique opportunity to explore opportunities offered by the increasing digitization of the region to create conditions for new jobs. This will require critical interventions, starting with a coherent, pragmatic national ICT strategy, building infrastructure that supports the digital economy, and most importantly producing a strong and large pool of digital entrepreneurs and high-skilled youth with a strong ICT skills base. Presently, countries in the region rank low in ICT-related human capital and in an ICT skills base, primarily as a result of low quality and quantity of human capital at the tertiary education level in STEM-related programs. It will take a workforce of qualified high-end skilled professionals in science, technology, and business to make this happen. However, developing this workforce depends on factors such as the quality and quantity of math, science, and business education and enrollment rates in these fields at the tertiary level (MGI 2013).

In line with this, a study was conducted to examine the readiness of countries in the region to exploit the opportunities offered by the internet (Internet Foundation Index-i5F) using five pillars, namely, national

ICT strategy, business environment, infrastructure, financial capital, and ICT skills base. The findings of the study show that most countries in the region do not have the capacity of an ICT skills base ready to utilize and reap the benefits of the internet. All countries in the region except South Africa scored below 30 percent on their ICT skills base readiness to leverage the opportunities of the internet. The score for the ICT skill base variable was the lowest among all the variables used in constructing the index (figure 2.12).[38] More recent data from the International Telecommunication Union (ITU) and World Economic Forum[39] further confirm this. The ITU ICT Development Index ranks the majority of countries in the region at the bottom of the global ICT skills base distribution. Of the 176 countries that are ranked, except Haiti, which occupies the 163rd position, positions 153 to 176 are occupied by countries in the region.[40] A combination of factors has contributed to the region's low scores on its ICT skills base, but more important is the low quality and quantity of math and science education, low tertiary enrollment in these fields, and inadequate availability of scientists and engineers.

Figure 2.12: Most countries in Sub-Saharan Africa do not have the capacity of an ICT skills base that is ready to utilize and reap the benefits of the internet



Source: Staff, using data from McKinsey Global Institute (MGI) 2013.

Table 2.1: Investment in high-skilled youth and professionals has the potential to produce the knowledge (technology) needed to create jobs and conditions for new jobs in Sub-Saharan Africa

	Patent	R&D
Patent	1.00	
R&D	0.88***	1.00
Secondary school enrollment	0.69***	0.51***
Tertiary school enrollment	0.44***	0.42***
Job creation		
Services	0.19*	0.48***
Manufacturing	-0.05	0.25*
Mining, utilities, and construction	0.47***	0.55***
Employment		
Services	0.41***	0.76***
Manufacturing	0.48***	0.72***
Mining, utilities, and construction	0.83***	0.80***

Source: Staff calculations using data from World Intellectual Property Organization, World Bank World Development Indicators, Penn World Table 9.0, and EASD 2018.

Note: Job creation by sector: $JC_{gt} = EW_{gt}\ (\Delta P_{gt}^{\cdot} / \overline{l_{gt}})$; where JC_{gt} is the job creation effect of sector g in year t, $\Delta PE_{gt}^{\cdot}$ is the sum of positive employment changes in an expanding sector over time, $\overline{l_{gt}}$ is the sector's average employment over time and is given by $\overline{l_{gt}}$ =0.5 $(l_{gT} + l_{g0})$, and EW_{gt} is the sector employment weight and is given by the average employment of sector g divided by the average employment of the economy (Haltiwanger et al. 2014; Haltiwanger, Scarpetta, and Schweiger 2014; Bartelsman, 2013).

*** Significant at 1%, ** Significant at 5%, * Significant at 10%.

The analysis in table 2.1 shows a positive and significant correlation between expenditures on R&D, skills (proxied by enrollment in higher levels of education), knowledge production (proxied by patents), employment, and job creation. Of particular interest is the knowledge production generated by residents of countries in the region (resident patents) that is used in this analysis. The results show a strong positive correlation between R&D investment and knowledge production (0.88), skills production and knowledge production (0.69, 0.44). Knowledge production is positively and significantly associated with job creation in services (0.19) and in Mining, utilities, and construction (0.47). Knowledge production is also positive and significantly associated with employment in services (0.41), manufacturing (0.48) and Mining, utilities, and construction (0.83). What these results suggest is that investments in high-end skilled have the potential to produce the knowledge (technology) needed to create the conditions for new jobs in the region (box 2.7).

The result is in line with recent findings that show that fast internet, a product of investment in knowledge production, has a large and positive effect on employment rates in the region for the highly skilled and the less educated. More importantly, the study finds that the arrival of fast internet in the region reduced employment inequality by generating comparable magnitudes of positive employment effects for all educational attainment levels (primary, secondary, and tertiary). The large positive employment effects from the arrival of fast internet are generated through a substantial increase in the entry of new firms that use ICT extensively, and through increases in the productivity of existing firms and exports (Hjort and Poulsen 2019).

Results from the econometric analysis further corroborate these findings . On average, a one percentage point increase in R&D expenditures leads to a 7.6 percent increase in knowledge production, all other things being equal. To show why the increase in investment in high-end skills is critical for the creation of knowledge for job creation, R&D is interacted with the tertiary school enrollment rate (proxy for skill provision). On average, increasing R&D investments in high-end skilled workers by one percentage point leads to a 0.3 percent increase in knowledge production, ceteris paribus.

Box 2.7: Pathways to better job creation: The role of human capital in developing countries

In 2018, a World Bank jobs diagnostics study explored the various pathways to better job creation that can drive inclusive growth and development in International Development Association countries (Moretto, Weber, and Aterido 2018). In terms of job creation, there are four key stylized facts. First, few numbers of large firms account for large number of jobs and sales (figure B2.7.2). Second, most businesses in developing countries are made up of micro firms that persist but cannot expand employment (figure B2.7.1). They usually cannot grow beyond 10 workers. Third, employment growth is negatively correlated with firm age. And fourth, new and young firms are the primary source of jobs. However, they tend to be smaller, and smaller firms tend to face a lower survival rate (figure B2.7.3). The findings of the study suggest that going forward, Africa will have to grow more large firms that will create the large number of jobs that will absorb a sizable amount of the region's labor force. Presently, the majority of businesses in the region are micro firms that cannot grow jobs. Human capital should therefore focus on producing high-end skilled digital entrepreneurs that will create the technology that will create the large firms.

Figure B2.7.1: Most firms in Sub-Saharan Africa are large number micro firms (%)

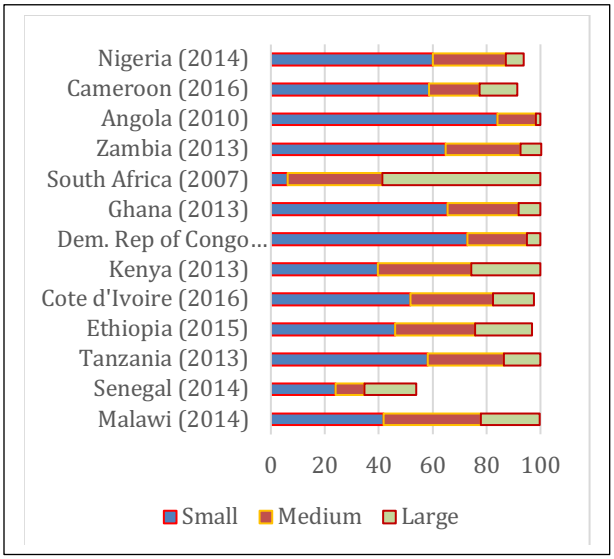


Figure B2.7.2: Few large firms account for a of jobs in Sub-Saharan Africa (%)

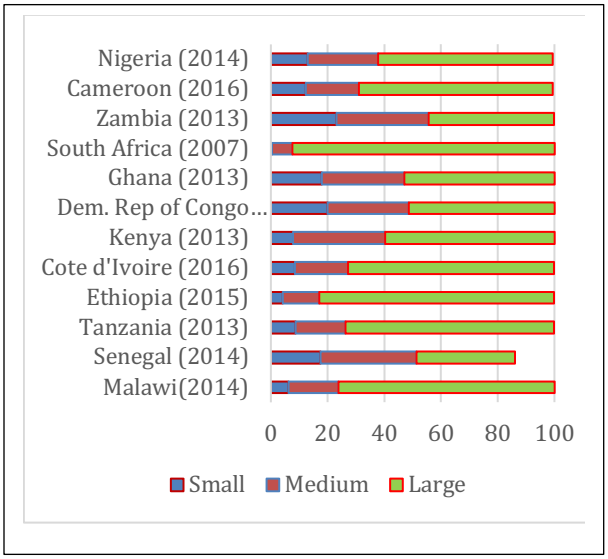
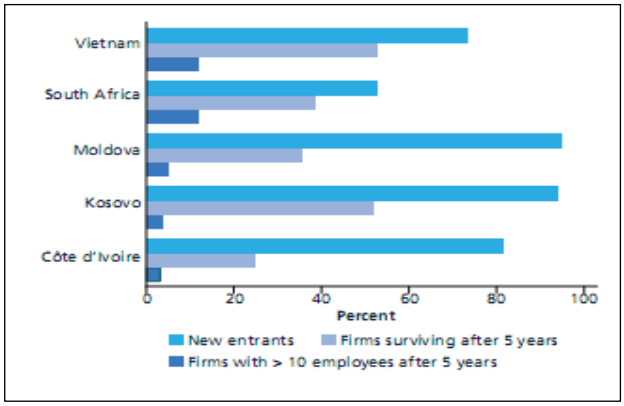


Figure B2.7.3: Smaller firms tend to face a lower survival rate



Source: Staff calculations using data from World Bank Enterprise Surveys.

Note: Micro/small firms, < 20 workers; medium firms, 20-100 workers; large firms, 100 or more workers.

2.4 Policy implications and future research agenda

In addition to investing in physical infrastructure expansion and improvements in the regulatory environment, as recommended by WDR 2019 to create the conditions for formal private sector jobs creation, Sub-Saharan Africa must act fast to create the human capital conditions that are needed to leverage the opportunities of digital technologies for job creation in the region. The centerpiece of the strategy is to train and enable a critical mass of inventors and entrepreneurs to develop and scale digital technologies to boost the productivity of all workers, especially low-skilled workers in current and new occupations, and to strengthen the delivery of education and health services. The current supply of STEM graduates in the region falls short of the numbers needed to generate the momentum for innovation. Evidence shows that it costs students in the region about 20-30 percent more to enroll in STEM-related programs at universities than in other fields such as humanities and social sciences. And, not surprisingly, the majority of the tertiary enrollment is recorded in non-STEM fields. The cost of STEM field education is not only high for students. At the university level, running a quality STEM program requires a huge investment in resourcing lecture rooms, libraries, laboratories, and above all recruiting highly skilled experts in the field with the capacity to teach STEM programs to the level that meets recognized international standards. This will require huge and expensive capital investment by governments and other stakeholders. And governments will have to bear part of the financial burden of students who enroll in STEM-related programs. Given the limited fiscal space in the tertiary educational budgets of most countries in the region, and the inadequate supply of human capital resources to develop quality STEM field education across the region, investments will have to be strategic and targeted.

Evidence and experience from around the world offer some avenues to address this issue. For example, the region could learn from the success of Brazil's targeted tertiary STEM expansion program. In the short term, policies could focus on developing small, high-quality STEM programs at the tertiary level, establishing high-quality STEM research centers and technological hubs, and targeting investment that will enhance the potential of the exceptionally bright STEM students. In the medium to long term, a scaling up is desirable to cover other students enrolled in STEM-related programs, while paying attention to equity in the distribution and building foundational skills, the lack of which often acts as a deterrent to many students in enrolling in STEM-related programs at the tertiary level. Governments in the region will also have to design attractive incentive packages (such as higher remuneration, better conditions of work, research grants, and grants for international research collaboration) to attract and retain STEM field experts and professors with the capacity to teach STEM programs to the level that meets international standards.

Certain scholarship schemes can incentivize students to return home after completing their studies and help tap into the diaspora skills pool. Initiatives such as "The Returning Experts Program" run by the German Development Cooperation and the Centre for International Migration and Development encourage students to return to their home country after their studies, by offering support (including a monthly income allowance to help students settle in while back home) and working in development-related capacity.[41] Governments will have to partner with such organizations to share the cost of such programs. In South Africa, "Homecoming Revolution"[42] recruits and places globally experienced talent with reputable organizations working in various sectors, including technology, media, telecommunication, education, and health care. Established in 2003 and launched in 2004, Homecoming Revolution was initially aimed at encouraging South African expats abroad to return home, in an attempt to reverse the country's brain drain problem. Homecoming Revolution has now been expanded across other countries in the region to bring the region's top skills back home—including Kenya, Ghana, Uganda, and Tanzania. Between 2009 and 2013, about 400,000 professional South Africans returned home through the initiative. Homecoming

Revolution is now a full-fledged pan-Africa recruitment firm, serving as a leader on skills repatriation. The region needs more such initiatives. It will also need to get the diaspora involved by tapping into the diaspora skills pool, especially those trained in STEM-related fields. Highly skilled migrants have been found to exhibit high return rates (OECD 2008). However, for the region to harness the potential and tap into the diaspora skills and reap the benefits thereof will require policies that encourage and make efficient use of returnees' skills, supported by proper labor market re-integration programs.

Finally, the region must address critical constraints such as the funding of startups at their early stage and incorporate entrepreneurship in the mainstream educational curriculum. Mainstreaming entrepreneurship education holds a key to job creation, but this is not happening in the region, except in a few countries. And even in those countries where it is happening, the program has yet to produce "entrepreneurs that can succeed in enterprise creation that yields proportionate returns in expected areas such as job creation."[43] A study examined entrepreneurship education programs in secondary and tertiary education institutions in three countries in the region, namely, Botswana, Kenya, and Uganda, and found that students who completed the program could not start their own business immediately after completion. Unlike technical and vocational education programs whose graduates are more likely to start their own businesses within a few years after graduation (Farstad 2002), the low-quality nature of entrepreneurship programs in the region means that after completing the program, students must still go through the traditional route to self-employment, starting with an initial period of apprenticeship or wage employment to gain practical experience and build professional self-confidence before setting out to start a new business (Adams, Johansson de Silva, and Razmara 2013). Quality entrepreneurship education needs more space in the region's education curriculum. This will require a well-planned, structured, and systematic change of existing school curricula to groom students to become successful job-creating entrepreneurs.

Going forward, additional knowledge is needed on several questions to help guide policies. First, there is a need for better understanding how to identify, empower, and train transformational inventors and entrepreneurs, especially those with high talents and low incomes. Second, although digital technologies can promote access to human capital services, a better understanding is needed of the extent of the impact of digital technologies on the quality of human capital service delivery. Would digital technologies mainly complement already high-performing human capital workers to perform better, or can they improve the performance of the low-performing? Finally, adequate measurements are needed on many fronts, including better measures of the quality of education, innovator and entrepreneurial skills, and worker skills, especially soft skills and skills for adaptation. As highlighted as a limitation in the computation of the human capital index, the test scores that are used in constructing the quality of education measure, for instance, are only measured infrequently and available for few countries. Additionally, the test scores must be harmonized into common units of learning outcomes, because they are based on different international testing programs. There is also the issue of the sample representation of test takers, including whether their numbers are sufficient to represent all students in respective countries, their ages, and the subjects covered, which vary across testing programs. The combination of all these makes it difficult to do accurate cross-country comparisons of the quality of educational systems based on these test scores.

This chapter focused above all on the importance of building a critical mass of high-skilled inventors and entrepreneurs to help the large stock of low-skilled people in the region to take advantage of the opportunities provided by digital technologies. Given that most people in the region earn their incomes in the informal economy, the next chapter explores the challenges and productivity potential of informal enterprises in greater detail.

Notes

[19] In 10 countries in the region, more than 30 percent of children under age five are stunted—Botswana, Cameroon, Guinea, Lesotho, Liberia, Malawi, Rwanda, South Sudan, Sudan, and Tanzania. In Burundi, the figure is more than 50 percent, and it is over 40 percent in Niger and Nigeria (World Bank 2019).
[20] There may be some additional learning on the job, which will contribute to closing the productivity gaps, as workers are reallocated across sectors and we by no means ignore that. However, and as shown in extant literatures, it is difficult to isolate the single contribution of additional learning to the productivity change in structural decomposition exercises that explore the contribution of within and between effects to productivity change. Intuitively, the contribution of additional learning to productivity change is assumed to be captured in the within effect (see, for instance, Mensah et al. 2018).
[21]See http://www.worldbank.org/en/news/video/2017/09/22/creating-a-critical-mass-of-highly-skilled-science-and-technology-professionals-in-africa (7/ 3/ 2019).
[22] See https://farmerline.co/2018/05/24/farmerline-launches-new-cocoalink-service-a-free-mobile-app-that-puts-the-power-of-mobile-technology-in-farmers-hands/ 9/4/2019.
[23] See https://www.worldbank.org/en/events/2019/04/05/disruptive-agricultural-technology-challenge-and-conference 24/4/2019.
[24] See http://www.farmlinkkenya.com/program-launched-to-help-kenyan-farmers-access-agri-tech-by-2022/ 24/4/2019.
[25] See link : https://qz.com/africa/1090738/uber-is-marking-four-years-in-africa/10/4/2019.
[26] See link : https://www.iol.co.za/business-report/companies/airbnb-supports-22-000-jobs-across-south-africa-17029508 10/4/2019.
[27] See link : https://www.cgdev.org/blog/can-africa-show-how-gig-workers-get-fair-share-digital-economy 7/19/2018.
[28] GSMA 2018., https://www.gsma.com/mobilefordevelopment/blog-2/africa-a-look-at-the-442-active-tech-hubs-of-the-continent/7/19/2019..
[29] Disrupt-Africa 2018. http://disrupt-africa.com/funding-report/10/4/2019.
[30] See https://www.poverty-action.org/study/teacher-training-and-entrepreneurship-education-evidence-curriculum-reform-rwanda 4/10/2019.
[31] World Economic Forum (2017): https://www.weforum.org/agenda/2017/10/digital-paths-for-better-healthcare-in-sub-saharan-africa/ 26/4/2019.
[32] See https://www.novartisfoundation.org/our-work/reimagining-healthcare-through-digital-technology/ghana-telemedicine 26/4/2019.
[33] See http://www.health.gov.za/index.php/mom-connect 26/4/2019.
[34] See https://www.weforum.org/agenda/2017/10/digital-paths-for-better-healthcare-in-sub-saharan-africa/ 26/4/2019.
[35] http://www.mtrac.ug/ 26/4/2019.
[36] https://www.weforum.org/agenda/2017/10/digital-paths-for-better-healthcare-in-sub-saharan-africa/ 26/4/2019.
[37] UNESCO Institute of Statistics (UIS). Current available year (2012–17) data are used each country.
[38] MGI (2013).
[39] See http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/ 2/5/2019.
[40] See https://www.itu.int/net4/itu-d/idi/2017/index.html 2/5/2019.
[41] See https://www.alumniportal-deutschland.org/en/study-continuing-education/programmes/returnees-from-abroad/ 7/3/2019.
[42] See http://homecomingrevolution.com/about-us/ 7/3/2019.
[43]See https://www.forbesafrica.com/entrepreneurs/2019/03/27/african-curricula-that-mean business/ 4/10/2019.

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CHAPTER 3: INFORMALITY

Pierre Nguimkeu and Cedric Okou

Abstract

In many developed countries, the adoption of automation and other (high) skill-biased technologies has stoked fears of job losses by less-skilled workers. In Sub-Saharan Africa, by contrast, the adoption by informal firms and farms of low-skill-biased digital technologies that are complementary to less sophisticated workers offers the potential of a poverty-reducing trajectory by enabling them to learn, access credit, and perform higher-skill tasks, increasing the incomes of existing workers and creating more job opportunities. World Development Report 2019 broadly discusses these issues for developing countries; yet, further contextualization is useful to account for the specific circumstances in Sub-Saharan Africa. The informal sector accounts for a sizable proportion of employment and output in African economies. Building pathways to full formalization in Africa has had limited success to date. It may better be viewed as a long-term policy goal. Short- to medium-term policies should realistically focus more on upgrading the skills of workers and the productivity of firms in the informal sector. Indeed, targeted policies can help, in the short to medium run, to boost the productivity of informal firms and enhance the skills of informal workers. Moreover, benefiting from a conducive business environment, with proper regulations and incentives, more productive informal firms will likely seek to formalize as they grow and perceive a positive trade-off between the gains of being formal, including increased market access, eased funding conditions, and additional support services, and the costs such as taxation, associated licensing costs, and registration of employees. Digital technologies are also likely to increase the gains and reduce the costs of formalization. This chapter emphasizes the role of digital technologies as catalysts for productivity enhancement, job creation, access to credit, and financial inclusion in the informal sector, although digital technologies also are useful for formal enterprises. The chapter documents key challenges faced by governments in harnessing the benefits of digitization for the informal sector in Sub-Saharan Africa. Finally, policy options are discussed.

3.0 Introduction

Eighty-two percent of Sub-Saharan Africa's poor people still live in rural areas, earning their living primarily in farming. The informal labor market and the number of informal enterprises are the largest and have been most prevalent in Sub-Saharan Africa. In most Sub-Saharan African countries, around 89 percent of total employment from 2000 to 2016 was in informal work, with Senegal at 89 percent, Chad at 81 percent, and Togo at 63 percent. Entrepreneurship remains predominantly informal, at about 90 percent of all businesses; according to the latest 2016 enterprise census, 97 percent of enterprises are informal in Senegal.[44] The sheer size of the informal economy implies several challenges. Farms, firms, and workers in the informal sector, with poor access to information on input, knowledge, and output markets, suffer from lower productivity and have limited revenues. To tackle the challenges of informality, World Development Report (WDR) 2019 advocates for the creation of stable, formal sector private jobs for the poor. This recommendation, made from a global and long-term perspective, has had limited success and may not fully account for the immediate needs and challenges of informal firms and workers in Africa.

Against this backdrop, this chapter aims to address the following questions:

- What are the specific features of the informal economy in Sub-Saharan Africa compared with other regions?
- How can informality-related policies better focus on Sub-Saharan African circumstances, beyond the longer-term pro-formalization reforms articulated in WDR 2019?
- How can digital technologies be leveraged to address the challenges and harness the potential of informal firms and workers in Sub-Saharan Africa?

The chapter complements and contextualizes the policies presented in WDR 2019. In addressing the challenges of informality in Sub-Saharan Africa, the analysis takes a multiple time-horizon perspective. It distinguishes between formalization policies aimed at inducing the transition of informal firms and workers into the formal economy, which have had limited success so far, and short- to medium-term policies focused on upgrading the productivity of small firms, farms, and unskilled workers in the informal sector. Implementing productivity-enhancing policies in the informal sector appears more realistic in the short to medium term. In the long run, more productive informal firms will likely seek to formalize as they grow and perceive the benefits of becoming formal.

WDR 2019 broadly discusses the creation of stable jobs in the formal sector and formalization policies, including reducing registration costs, streamlining taxation, nurturing human capital, investing in training, and using e-payroll, as solutions to the issues of the shadow economy. The primary goal of common pro-formalization reforms is to achieve the transition of informal labor and production units to the formal sector using a range of incentives and enforcement tools. Nonetheless, the empirical evidence suggests that formalization policies that were implemented, in developing countries in general and in Sub-Saharan Africa in particular, delivered only modest beneficial impacts at best relative to their costs. For instance, one-stop-shop formalization reforms led to, at most, a 5 percent increase in business registrations in Mexico and Colombia, whereas these formalization policies reduced the number of firms registering in Brazil (Bruhn and McKenzie 2014). In a recent randomized experiment study, Benhassine et al. (2018) document that a full formalization package—including registration incentives, business advisory and training, and tax and banking support—raised the formalization rate in Benin by a modest 16.3 percent relative to prohibitively high intervention costs.

To understand the rather limited success of formalization reforms, formalization should be viewed as a gradual process rather than a one-off experiment. Many formalization actions are reversible, as firms and workers constantly weigh the trade-off between formalization gains/incentives in terms of increased market access; eased funding conditions; and additional support services relative to their costs/deterrents, namely, taxation, associated licensing costs, and registration of employees. The informal sector in Sub-Saharan Africa is comprised of small and large firms that operate informally. In this regard, formalization will probably take time to materialize in Sub-Saharan Africa and might not be broad-based, although for large informal firms it can be effective even in the medium term, as documented by Benjamin and Mbaye (2012a). Therefore, a key development question is what actionable policies can be implemented meanwhile, that is, in the short to medium term? Given the ubiquity of informality in Sub-Saharan Africa and the roadblocks to formalization, this chapter takes the view that policy interventions that are more focused on leveraging low-productivity units are likely to be more successful at unlocking the potential of the informal economy. In the short to medium run, pro-productivity policy interventions can help boost the productivity of informal firms, in addition to policies to enhance the skills of workers, as covered in chapter 2. Moreover, better enforcement can stimulate the transition of large informal firms to the formal sector. In the long run, a supportive business environment and even-handed enforcement will likely help some productive informal firms to grow and ultimately become formal, as they perceive a beneficial trade-off between the gains and the costs of operating formally (Grimm, Knorringa, and Lay 2012).

WDR 2019 does not thoroughly discuss the barriers to credit that small businesses in Sub-Saharan Africa typically face, or how digital technologies can be leveraged to circumvent these hurdles. Digital technologies are inherently disruptive, and they are heralded as a key to catalyzing economic growth. The adoption of digital technologies offers a potentially very different trajectory in high-income and emerging countries where the population is fully literate with at least minimum numeracy skills, in contrast to low-income Sub-Saharan African countries where a significant share of the population is still functionally illiterate, with low or no numeracy skills.

The digital economy offers Sub-Saharan African businesses and workers, including those in informal sectors, an opportunity to realign markets by minimizing information asymmetry, which has multidimensional benefits, including making formalization easier. By connecting more informal businesses with consumers, digital technologies can strengthen the backbone of Sub-Saharan African economies. In low-income environments, low-skill-biased digital technologies, through instructional videos, voice-activated tactile screens, and simple-to-use applications, can empower low-skilled informal workers to perform higher-skilled tasks and learn as they work. Such technologies can enable workers without any collateral but with the ability to make small savings to access credit and insurance products based on their recorded savings and purchase histories, and to be matched to better jobs over time. Digitization is already creating new opportunities for the smallest-size informal entrepreneurial firms and farms to access larger networks and markets. In Kenya, women working informally are getting mobile credit, buying food products to resell in the local markets from a wider network of farmers, and thus investing and saving more. The use of social media platforms, such as Instagram, Twitter, and WhatsApp, to advertise goods and services to a wider range of customers at minimal cost relative to brick and mortar shops is another example.

To complement the long-term policy target of formalization, this chapter explores other pathways that, in the short to medium term, can realistically focus more on upgrading the productivity of workers and firms in the informal sector. The investigation is anchored in the digital economy, which can unleash substantial productivity gains. The chapter provides an overview of labor and business markets in Sub-Saharan Africa that are characterized by a large informal sector, highlighting the barriers and opportunities. It documents

the key trends of the demand and supply sides of the labor market amid high informality in the region. This refines our understanding of the role of digital technologies in increasing the productivity of informal firms. The chapter explores how digitization can unlock the entrepreneurial potential of informal units, fostering sustainable and inclusive growth in Africa. Given that access to credit is one of the key barriers to entrepreneurship in Africa, the chapter examines how the adoption and diffusion of digital technologies, such as mobile phones, mobile money, and accounting apps, can enable subsistence workers without any collateral, but with the ability to make small savings, to access credit and insurance products. These workers can rely on their recorded savings and purchase histories to get small loans and grow their businesses or be matched to better jobs over time. In addition, the chapter discusses the importance of mutually reinforcing policies in enhancing productivity while mitigating new labor market risks. Indeed, although digitization may facilitate the creation of new formal technology-driven firms (for example, YouTube/Instagram bloggers who earn their income by advertising other firms' products), it brings new challenges to governments in low-income African countries to their ability to harness the tax base for such jobs. The rest of the chapter is organized as follows. Section 3.1 provides an overview of informal firms and farms in Africa. Section 3.2 discusses the role of digital technologies for the future of informal work in Africa. Finally, section 3.3 discusses recommended related policy interventions and concludes.

3.1 Overview of formal and informal farms and firms

This section summarizes the recent literature and documents stylized facts related to the roots and challenges of informality in Sub-Saharan Africa. It provides a portrait of the informal economy by highlighting the salient characteristics that shape the productivity of informal workers, firms, and farms. Box 3.1 reviews the potential sources of informality, explores various correlates, and discusses the interactions between the formal sector and the informal economy.[45]

Box 3.1: What do we know about informality?

Definition and sources of informality. Informality is a multi-faceted and subtle concept. Broadly, it refers to the production of legal goods and services by firms and workers that do not comply with business or labor market regulations. Various definitions or typologies of informality exist along different dimensions, such as participation motives (survival, evasion, exclusion) and margins (firms, workers). There are three major views on the sources of informality (Loayza 1996; Kanbur 2017; Boly 2018; World Bank 2019a). First, low-productivity firms may be forced to operate informally as a survival strategy (La Porta and Shleifer 2014). "Survivors" encompass low-skilled individuals and subsistence entrepreneurs who would be best allocated as workers in growing firms if such an option were available. Second, heavy-handed regulations may push potentially productive firms to hide from the regulators (de Soto 1989). These "held-back establishments" are hampered by high costs of entry and other regulations. Third, firms can also choose to operate in the shadow economy based on a rational profit maximizing assessment of compliance (de Mel, McKenzie, and Woodruff 2011). These "free-riders" could be as productive as formal firms but choose not to formalize to save on regulation costs and taxes. Ulyssea (2018) shows how these complementary views reflect heterogeneous firms' responses to their institutional environment, in a model where formal firms can decide to pay (or not) for formalization and may choose how many employees to report or leave "off the books." Against this backdrop, this box addresses the following questions:

- Which criteria are commonly used to define informality?
- How is the informal sector connected to the formal economy?
- What are the salient dimensions of the informal sector in Africa?

Measures and correlates. There is no unique definition for informal activities. A generally accepted way to define it is by considering employees and firms that engage in activities that are not taxed or registered by the government. For instance, World Development Report 2019 defines an informal worker as a person who "does not have a contract, social security and health insurance, and is not a member of a labor union." In contrast, the International Conference of Labour Statisticians (ICLS) recommends a sharper definition of informal employment as "all remunerative work (both self-employment and wage employment) that is not registered, regulated or protected by existing legal or regulatory frameworks, as well as non-remunerative work undertaken in an income-producing enterprise." In addition, ICLS defines informal firms as production units comprised of unincorporated enterprises owned by households, including informal own-account enterprises and enterprises of informal employers (typically small and nonregistered enterprises). Overall, the informal economy encompasses worker and enterprise perspectives, as shown in Table B3.1.1.

Table B3.1.1: Conceptual framework: The informal economy includes different types of workers and enterprises (ILO 2013)

Production units by type	Jobs by status in employment								
	Own-account workers		Employers		Contributing family workers	Employees		Members of producers' cooperatives	
	Informal	Formal	Informal	Formal	Informal	Informal	Formal	Informal	Formal
Formal sector enterprises					1	2			
Informal sector enterprises[b]	3		4		5	6	7	8	
Households[c]	9					10			

Notes
(a) Cells shaded in dark grey refer to jobs, which by definition do not exist in the type of production unit in question. Cells shaded in light grey refer to formal jobs. Unshaded cells represent the various types of informal jobs.
(b) As defined by the 15th ICLS resolution (excluding households employing paid domestic workers).
(c) Households producing goods exclusively for their own final use and households employing paid domestic workers.
Informal employment: Cells 1to 6 and 8 to 10.
Employment in the informal sector: Cells 3 to 8.
Informal employment outside the informal sector: Cells 1, 2, 9 and 10.

In the context of Sub-Saharan Africa, relevant criteria to define formal firms may include one or more of:

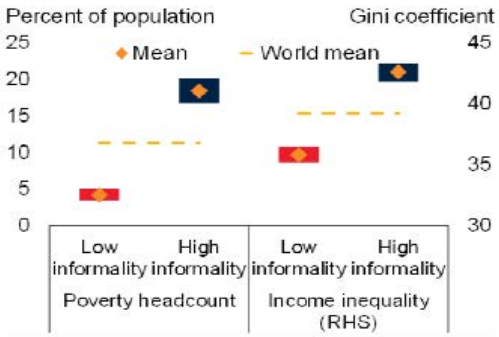
- Registration with the national or local business registry
- Registration with the national tax authorities (having a tax ID)
- Compliance with tax obligations
- Compliance with accounting standards (for example, OHADA regulations)
- Declaration of all employees with the relevant national or local authorities, and fulfilment of all related obligations.

Appraising the level of informality is challenging because it is an endogenous feature of the economy. On the one hand, informality can shape the growth path of developing economies—for instance, by absorbing a large share of unskilled labor or constraining the fiscal space. On the other hand, the level of economic development—growth, poverty, inequality—can also affect the size and composition of the informal sector (figure B3.1.1, panel a). In addition, trade policies and fiscal outcomes are key correlates of informality (figure B3.1.1, panel b). Trade reforms can shape the informal sector through competition. High levels of informality can also tilt fiscal policies toward trade-based taxation—rather than broader-based corporate and labor taxation. Institutional quality also matters, as a conducive business environment and balanced enforcement of regulations can help reduce the level of informality (figure B3.1.1, panel c). Moreover, the degree of informality can vary across firms (Perry et al. 2007). Some firms can operate fully informally in product markets and labor markets whereas other formally registered firms can employ, in part, informal labor. Thus, assessing the characteristics of the informal sector is often performed in a context-specific fashion, relying on correlations—rather than causal effects—and using model-based (Multiple Indicators Multiple Causes frameworks, Dynamic General Equilibrium models), survey-based (household surveys, labor force surveys), or perception-based indicators (World Bank Enterprise Survey, World Economic Forum index).

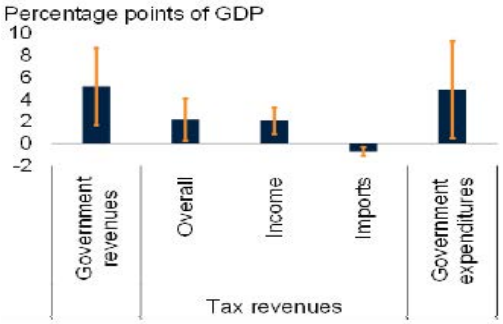
Interconnections between formal and informal sectors. Over economic cycles, formal and informal sectors may have intertwined dynamics driven by existing linkages. During economic contractions, the informal sector can grow while the formal economy contracts. In this regard, the shadow economy may serve as a buffer or a safety net to support poor households' incomes (Loayza and Rigolini 2011). An informal economy may also evolve pro-cyclically to support economic growth by providing more services and intermediate inputs to the formal economy during economic upturns. However, pro-cyclical behavior of the informal sector may amplify the adverse effects of economic downturns (Del' Anno 2008; Chen 2005; Meagher 2013). The short- and long-run dynamics of informality also matter. In the short run, informal activity can provide a safety net during business cycle fluctuations and labor market disruptions driven by major structural reforms such as trade liberalizations. Nonetheless, in the long term, the informal sector can impede development by potentially constraining the expansion of the tax base, thus limiting domestic resource mobilization for development (Docquier, Muller, and Naval 2017; Dix-Carneiro, Goldberg, and Meghir 2018). The synchronization—or lack thereof—of the co-movement between the formal and informal sectors varies substantially across countries and depends on the degree of integration of formal-informal activity, sectoral composition, market structures, and rigidities. Trade, tax, and other regulatory policies that—purposely or unintentionally—affect informality account for important sources and dynamics of the shadow economy. Ultimately, these polices should strike a balance between regulation enforcement, market flexibility, and protection of the vulnerable segments of the population.

Figure B3.1.1: Higher informality is associated with worse development outcomes

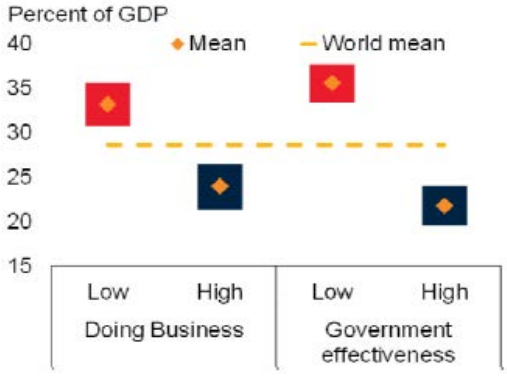
a. Informality and development outcomes



b. Informality and fiscal indicators



c. Informality and governance



Source: Global Economic Prospects, January 2019, World Bank.
Note: Unweighted averages of data spanning 1990 to 2016.
A. Group averages of dynamic general equilibrium (DGE)-based informal output in percent of official gross domestic product (GDP) in 2016 are presented in diamonds, with bars representing 95 percent confidence bands. The world average is shown by a

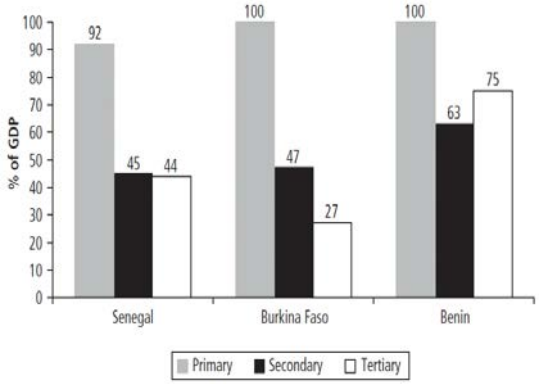
dashed line. "High" ("Low") indicates countries with above- (below-) median values in the following two measures: Doing Business distance-to-frontier and governance effectiveness (World Governance Indicators).
B. Data are for 1990–2016. Group means (diamonds) and 95 percent confidence intervals (bars) are shown for the poverty headcount ratio at $1.90 a day (2011 purchasing power parity, percent of population) and Gini coefficients. "High informality" ("Low informality") indicates countries with above- (below-) median informal output (DGE–based estimates).
C. Differences in the 2000–16 average fiscal indicators among the third of emerging markets and developing economies (EMDEs) with the highest and lowest informality (measured by the share of DGE–based informal output averaged during 2000–16). Vertical bars indicate 90 percent confidence intervals of the difference. The sample includes 70 non-energy-exporting EMDEs with populations above three million people.

Sectoral perspective of informality: case study of West African countries. Household survey-based estimates show that the share of the informal sector in gross domestic product has averaged 74, 49, and 54 percent since 2000 in Benin, Burkina Faso, and Senegal, respectively (Benjamin and Mbaye 2012a, 2012b). Informal activity is dominant in the primary sector across all three countries (figure B3.1.2, panel a). Secondary and tertiary sectors exhibit more heterogeneity. Nearly half of the value added in the secondary and tertiary sectors can be attributed to the shadow economy in Senegal. In Burkina Faso, the informal sector accounts for about half of secondary value-added but a quarter of tertiary output. In contrast, the informal sector produces more than 60 percent of secondary and tertiary output in Benin. Although there is substantial sectoral heterogeneity across countries, this evidence points to the large prevalence of informality in the primary and tertiary sectors. The secondary (manufacturing) sector is small or embryonic in many African economies. Looking at exports, it is clearly apparent that large, informal firms have comparable exports in percentage of total sales as formal firms (figure B3.1.2, panel b). However, large, informal firms have a very different export profile compared with small-scale informal firms (Benjamin and Mbaye 2012b).

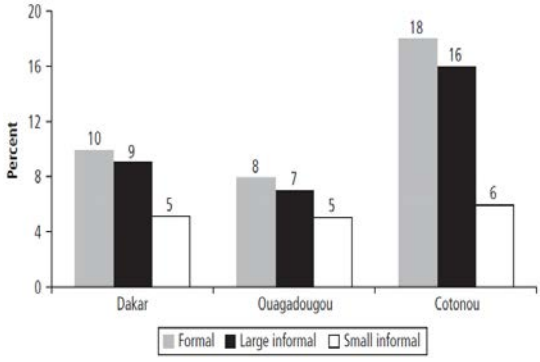
Figure B3.1.2: The share of informal activity varies widely across three West African economies

Informality accounts for more than 90, 45, and 27 percent of output in the primary, secondary, and tertiary sectors in Senegal, Burkina Faso, and Benin. Large, informal firms have comparable exports in percentage of total sales as formal firms.

a. Share of informal activity in GDP, by industrial sector



b. Share of exports in total sales in three capital, cities by sector



Source: Benjamin and Mbaye 2012a.
a. Informal activity as a percentage of gross domestic product (GDP) by industrial sector in Senegal, Burkina Faso, and Benin around 2009. b. Proportion of exports in total sales by firms' informality status in capital cities (Dakar, Ouagadougou, and Cotonou) in Senegal, Burkina Faso, and Benin.

3.1.1 Size and features of the informal sector

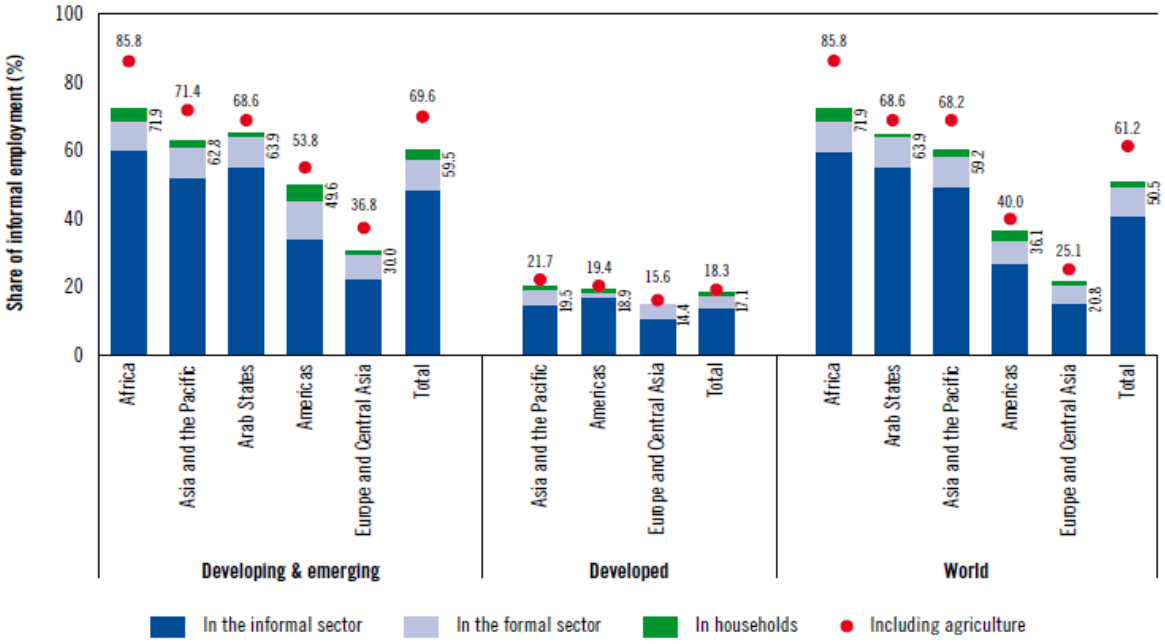
High level of informality. Informality is a salient feature of most developing countries, with far-reaching socioeconomic implications for poverty-reducing and welfare-enhancing policies. Informality tends to be more acute in low-income agrarian economies with a high share of unskilled workers (Sheinder and Enste 2002). Informal firms and farms absorb a substantial share of the unskilled labor force. Moreover, small startups often use the informal sector as an incubator to grow, become more productive, and eventually transition to the formal sector (Nguimkeu 2014). The informal sector is a key part of the fabric of many Sub-Saharan African countries and, as such, needs to be "fully" embraced in designing economic policies.

Portrait of informal employment in Sub-Saharan Africa. This section describes the labor supply side amid widespread informality. In the next two decades, Africa is projected to have more people entering the labor market than the rest of the world (IMF 2017). This entails a higher demand for jobs than what the formal sector is likely able to offer. In Sub-Saharan Africa, 89 percent of workers—about 20 percent higher than in emerging markets and developing economies (EMDEs)—are employed in the informal sector (figure 3.1, panels a and b). Informality is higher in West Africa, low-income countries, fragile states, and commodity exporters (figure 3.1, panels b and c). Moreover, young and older persons tend to face a higher level of informality. In Africa, 95 percent of young and older persons are informal workers (figure 3.1, panel d). This is much higher than the average for EMDEs (85 percent) and worldwide (77 percent). Education allows the acquisition of productive skills and, therefore, is key determinant of human capital, as elaborated in chapter 2. As expected, informality is negatively correlated to the level of education (World Bank 2019a). Workers with secondary and tertiary education are less likely to be informally employed compared with low-skilled workers who have no education or completed primary education. This evidence is more pronounced in Africa compared with other regions (ILO 2018). Clearly, the workforce in Sub-Saharan Africa is overwhelmingly informal (Fox et al. 2013).

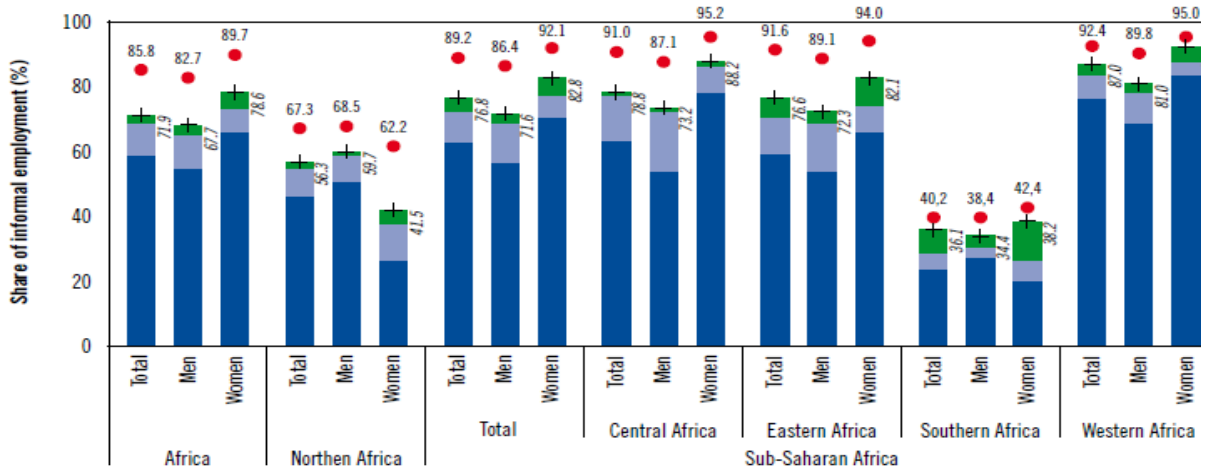
Figure 3.1: Pervasive informal labor

Informality accounts for nearly 86 percent of total employment in Africa, higher than in other regions. In Sub-Saharan Africa, 89 percent of employees work informally. Informality is higher in West Africa, low-income countries, fragile states, and commodity exporters. Informality is most prevalent among young people and elders. Informal jobs will still dominate the future distribution of employment in Sub-Saharan Africa.

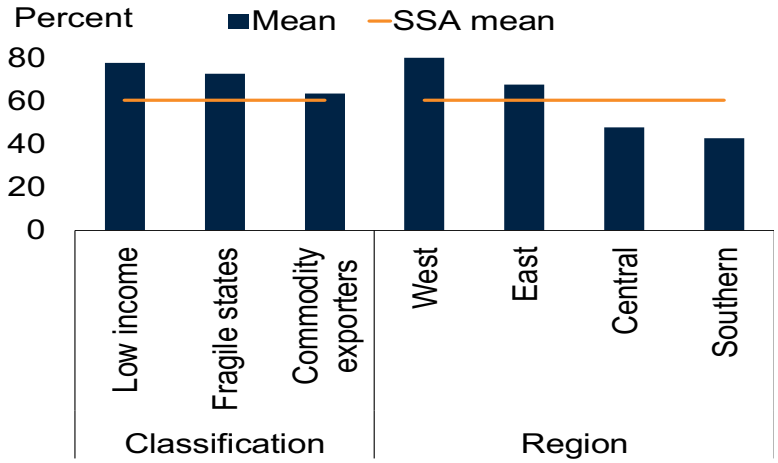
a. Africa has the highest share of informal employment (2016)



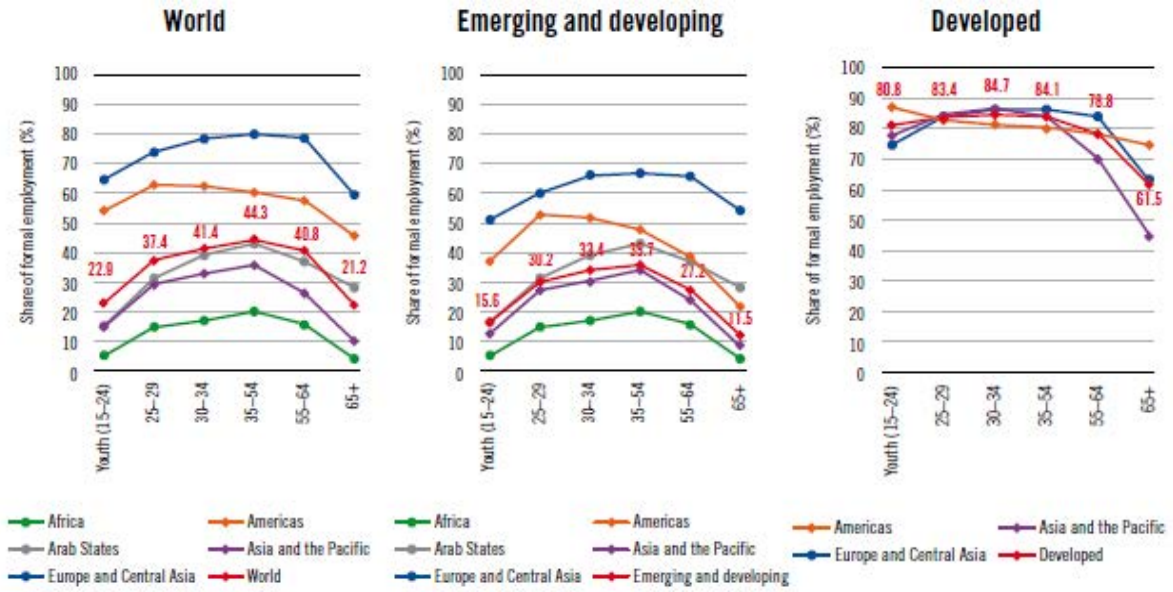
b. Sub-Saharan Africa has the highest share of informal employment on the continent (2016)



c. The share of self-employment is highest in low-income and West African countries (1990–2006)



d. Among youth and older workers, 95 percent are informal in Sub-Saharan Africa (2016)



Source: ILO 2018.
Note: In panel a, ILO's 2018 grouping for Africa includes Sub-Saharan African and Northern African countries (the Arab Republic of Egypt, Morocco, and Tunisia). Panel b shows regional estimates for Sub-Saharan African and Northern African countries. Panel c shows estimates from the Global Economic Prospects Report, January 2019, World Bank. World Bank country classifications. Data are for 1990–2016. In panel d, the proportion estimates are based on ILO household survey micro data. ILO = International Labour Organization.

Portrait of informal firms in Sub-Saharan Africa. Informal firms can be important engines of growth if they boost their productivity. Their estimated contribution to value-added is already sizable, given their large numbers, averaging about 40 percent of gross domestic product (GDP) in Sub-Saharan Africa over 2010–

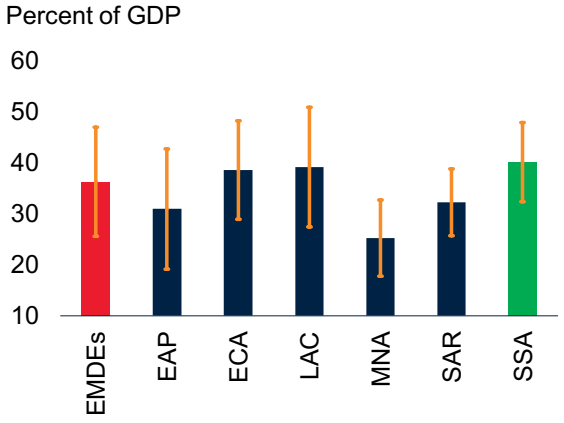
14 (figure 3.2, panel a). Typical informal firms, which account for 90 percent of all businesses in the region, commonly use unskilled labor, are financially constrained, have limited access to markets, and are relatively small (Xaba, Horn, and Motala 2002; Perry et al. 2007; Ali and Najman 2017). Informal employment or self-entrepreneurship is a common resort for unskilled or less educated people (Fox and Sohnesen 2012). Despite less conducive business conditions, it is interesting to notice that Sub-Saharan Africa can benefit from more dynamic entrepreneurial attitudes (figure 3.2, panels b and c). Thus, skills upgrading and improving access to resources can help informal firms become more productive.

The productivity gap between formal and informal firms is much smaller for East African countries than for Southern African countries, possibly due to a weaker institutional environment in East Africa.[46] Similar findings from Benjamin and Mbaye (2012a) corroborate the negative correlation between informality and productivity of firms in West Africa. The shadow economy in Africa also includes large firms that operate informally yet compete—in scale and sophistication—with large formal sector firms. These large informal establishments are fundamentally different from typical small informal firms, as they exploit complex networks linking seemingly isolated informal micro firms (Benjamin and Mbaye 2012a). The existence of large informal firms suggests that the size and contribution of the shadow economy may be underestimated in many surveyed data. There is also a sizable amount of informal cross-border trade (ICBT) in Africa, including smuggling and clandestine re-exports of goods to neighboring countries. Informal establishments involved in ICBT take advantage of cross-country differences in import taxes and quotas in the same subregion. The estimated ICBT flow vastly surpasses official cross-border trade figures. For instance, the ICBT estimate of domestically produced goods between Cameroon and Nigeria is US$240 million, six-fold the upper bound of officially recorded flows (Benjamin, Golub, and Mbaye 2015; Golub 2014).

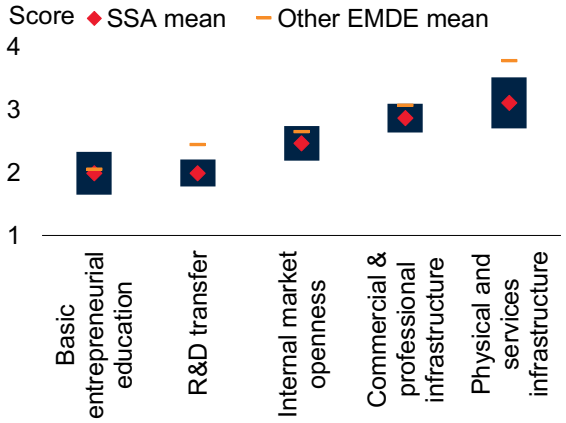
Figure 3.2: Informality is widespread and combined with low entrepreneurial dynamism

Informality accounts for about 40 percent of output in Sub-Saharan Africa. Despite less conducive business conditions, the region can benefit from more dynamic entrepreneurial attitudes.

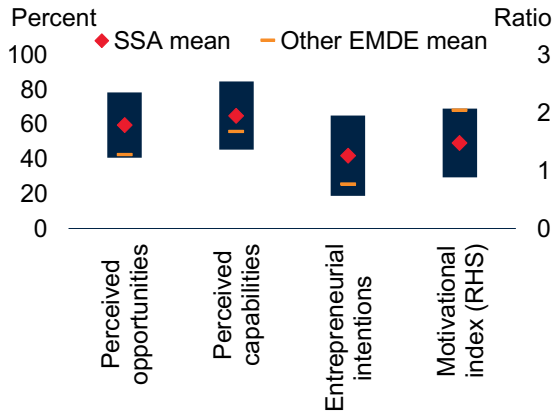
a. Informal sector as a percentage of total output, by region



b. Entrepreneurial environment



c. Entrepreneurial behavior



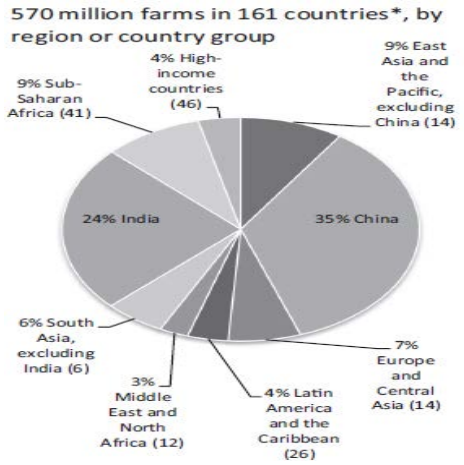
Source: Global Entrepreneurship Monitor, Global Economic Prospects Report, January 2019, World Bank.
Note: In panel a, multiple indicators multiple causes model (MIMIC) estimation of informal output. Red, blue, and green bars indicate group means for 2006–16, with orange vertical bars indicating +/-1 standard deviation. EMDEs = emerging markets and developing economies; EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; MNA = Middle East and North Africa; SAR = South Asia; SSA = Sub-Saharan Africa. In panel b, the score is based on the National Expert Survey of the Global Entrepreneurship Monitor. It ranges from 1 to 9. A higher score represents better perceived condition. Blue bars are +/- one standard deviation of the SSA mean. Other EMDE refers to all EMDEs except SSA countries. In panel c, data from the Adult Population Survey of the Global Entrepreneurship Monitor for 2001–16. Motivation index is the percentage of those who have recently started a business that are improvement-driven opportunity motivated divided by the percentage that is necessity-motivated. A lower ratio indicates a higher proportion that is necessity-driven. Blue bars are +/- one standard deviation of the SSA mean. Other EMDE refers to all EMDEs except SSA countries.

Portrait of informal farms in Sub-Saharan Africa. Agriculture-led economies in Africa are dominated by small, labor-intensive farms with limited mechanization (ILO 2018; Christiaensen and Demery 2018). Agriculture absorbs a large share of the labor force in most African economies. Fox and Sohnesen (2012) show that the agriculture sector is by far the largest source of employment in many (13) Sub-Saharan African countries, accounting for 72 percent of the primary employment. Many informal farms in Africa are small-scale and family-operated establishments. Using data from worldwide agriculture censuses, Lowder, Skoet, and Raney (2016) document that 9 percent of the estimated 570 million farms are located in Africa and have an average size of less than 2 hectares (figure 3.3, panels a and b). The amount of land allocated to crop cultivation is relatively small, partly due to fragmentation. In Ethiopia, for instance, the average household owns nearly 3 plots and the operated area per adult (household members ages 14 to 60 years) is less than half a hectare (figure 3.3, panel c). There is also substantial variation in the average daily return to family labor—a revenue-based proxy of farming productivity—ranging from US$1.20 in Uganda to US$2.20 in Malawi. Moreover, and contrary to common wisdom, labor and land markets for agricultural activities in Sub-Saharan Africa are relatively deep. Indeed, a large share of households operates in agricultural markets by transacting labor—hiring workers during the farming cycle—and land—renting or borrowing plots. In Uganda, for example, instead of just relying on household labor and owned land, 45 percent of households hire help for farming and 39 percent of farmers rent or borrow land (figure 3.3, panel d). The depth of agricultural labor and land markets coupled with the existence of disparities in land distribution and productivity offer a unique opportunity for Sub-Saharan African economies. Transactions on agricultural labor and land markets can help equalize endowments and boost the productivity of these economies. To this end, it is crucial to promote sustainable land management, foster efficiency-enhancing transfers, curb information asymmetries by facilitating access to clear and detailed records on land ownership, and ensure property rights that effectively hedge against the risk of land loss.

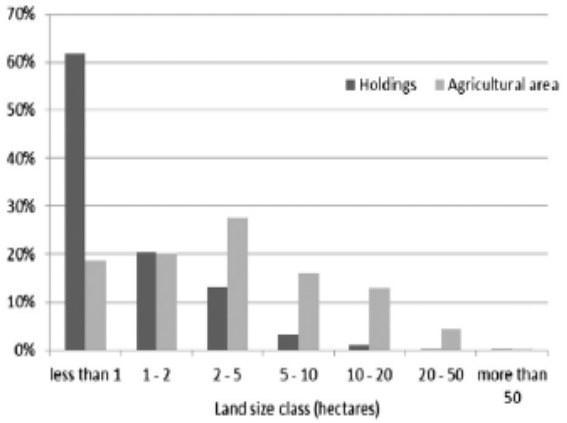
Figure 3.3: Most small-scale farms are operated in dynamic agricultural markets

A tenth of the farms operated worldwide are in Sub-Saharan Africa. These farms are small-scale establishments with an average size of less than 2 hectares. Labor and land markets for agricultural activities in the region are relatively deep, as a large share of households rents or borrows land and hires workers.

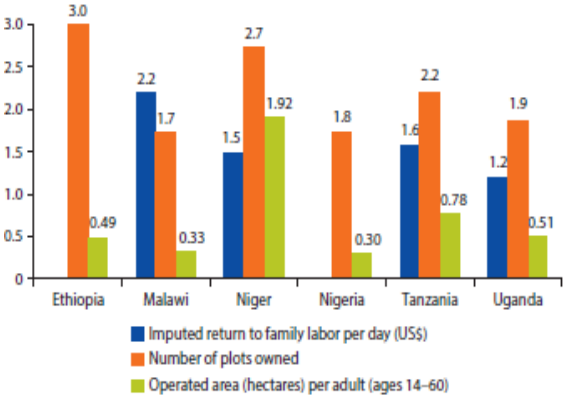
a. Distribution of farms, by region



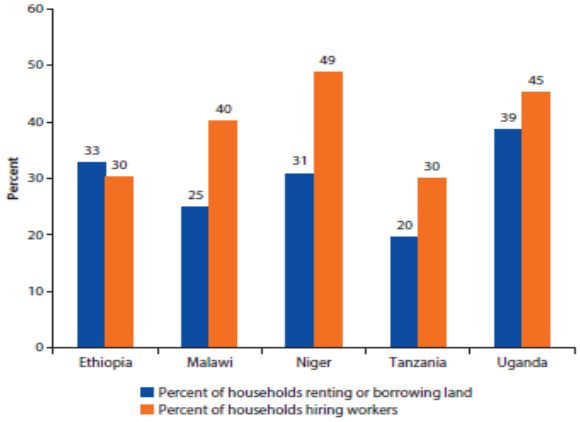
b. Distribution of farmland in Sub-Saharan Africa



c. Farm characteristics



d. Household transactions in land and labor markets



Source: Lowder, Skoet, and Raney 2016.
Note: Panel a shows the share of estimated farms worldwide by region. Panel b shows the distribution of farmland in Sub-Saharan African countries. Panel c shows variations in farm characteristics in some Sub-Saharan African countries. Panel d gives the proportion of rural households that transact in land and labor markets in some Sub-Saharan African countries.

Informality in urban and rural areas

Location matters in the analysis of informality patterns. In rural areas, informal activities are mainly related to agriculture and household work. By contrast, cities are typically economic hubs that offer agglomeration benefits: larger markets, better infrastructure to access markets and operate, a larger pool of workers, and greater technology spillovers (Rosenthal and Strange 2004; Duranton and Puga 2004). The urban informal sector serves as a receptacle of the flow of rural migrants (Mbaye and Benjamin 2015). In assessing the spatial dimension of informality in Uganda, Hobson and Kathage (2017) identify clusters of informal firms located in the vicinity of potential customers in the Greater Kampala area. This is corroborated by survey

data revealing that 97 percent of informal firms transact directly with individuals or households, while 84 percent of informal firms sell to customers within a 30-minute walk. Thus, informal firms tend to operate near densely populated areas for easy access to customers.

Moreover, urban informal activities typically take place on streets and in public places and are often seen as eyesores and undesirable activities by authorities. For instance, informal street vendors and transport providers are often criticized for exacerbating city congestion. African countries are experiencing rapid urbanization amid high informality. From a spatial perspective, authorities try to apply rules/regulations and keep their cities clean, whereas the urban informal sector activities need space. If not addressed, this situation may lead to tensions between local authorities, formal businesses, and informal operators. The urban informal sector is vital to provide livelihoods to poor households living in cities. As market accessibly emerges as a key determinant for the viability of informal firms, local governments can work closely with informal sector operators to zone land specifically for trading.

3.1.2 Challenges and opportunities of informality

Challenges of informality

High entry cost to the formal sector. Cumbersome regulation, excessive taxation, poor governance, lengthy procedures, and high registration costs are often cited as key culprits of informality in Africa (Djankov et al. 2002; Distinguin et al. 2016; World Bank 2019a). Although regulation is necessary for raising tax revenues and ensuring compliance with minimum labor, health, environmental, and quality standards, excessive regulation effectively increases the cost of entry and operation in the formal sector. This may contribute to the sheer size of the informal economy and raise important development issues. Table 3.1 presents the list of countries at the opposite ends of the 2019 Ease of Doing Business rankings. No African economy appears among the top-10 performers, whereas eight African countries are among the bottom-10 performers, along with the República Bolivariana de Venezuela and Haiti. Moreover, the average costs of regulation in registration costs, number of days and administrative procedures, and tax rates as a proportion of gross national income (GNI) per capita are considerably higher in Sub-Saharan Africa compared with other regions. For example, the entry cost in Sub-Saharan Africa is estimated at 225 percent of GNI, compared with 8 percent in Organisation for Economic Co-operation and Development countries, a ratio of 28 to 1, 45.4 percent in South Asia, 47.1 percent in East Asia and the Pacific, 51.2 percent in Middle East and North Africa, and 60.4 percent in Latin America and the Caribbean.

Heavy-handed regulations and the less-conducive business climate in Sub-Saharan Africa can impede the productivity of most firms, pushing them to operate informally. Nguimkeu (2016) analyzes the roles of skills, collateral-based lending, and institutional constraints—registration costs and taxation—on entrepreneurship and informality in Africa. He finds that barriers to entry incentivize less productive entrepreneurs to self-select into informality. The results also show that the likelihood to formalize is U-shaped in the entrepreneur's level of education. Informality is perceived as more profitable to less educated entrepreneurs, whereas only highly educated ones find formality increasingly attractive. This finding points to the importance of multi-pronged policies that bundle mutually reinforcing reforms. More research is needed to understand the types of contexts where digital technologies together with specific types of complementary support could help boost the productivity of informal enterprises, by overcoming interlocking state failures—high transaction costs for registration—and market failures—scarcity of information on credit worthiness and business banking history.

Table 3.1: Many Sub-Saharan African economies are at the bottom of the Ease of Doing Business rankings (2019)

Country	Ease of doing business rank	Starting a business	Dealing with construction permits	Getting electricity	Registering Property	Getting Credit	Protecting Minority Investors	Paying Taxes	Trading across Borders	Enforcing Contracts	Resolving Insolvency
Top-10 of the world											
New Zealand	1	1	6	45	1	1	2	10	60	21	31
Singapore	2	3	8	16	21	32	7	8	45	1	27
Denmark	3	42	4	21	11	44	38	9	1	14	6
Hong Kong SAR, China	4	5	1	3	53	32	11	1	27	30	44
Korea, Rep.	5	11	10	2	40	60	23	24	33	2	11
Georgia	6	2	27	39	4	12	2	16	43	8	60
Norway	7	22	22	19	13	85	15	30	22	3	5
United States	8	53	26	54	38	3	50	37	36	16	3
United Kingdom	9	19	17	7	42	32	15	23	30	32	14
Macedonia, FYR	10	47	13	57	46	12	7	31	29	37	30
Bottom-10 of the world											
Chad	181	186	153	177	134	144	161	188	172	153	154
Haiti	182	189	180	142	181	178	188	147	86	124	168
Central African Republic	183	181	181	184	172	144	149	187	163	183	154
Congo, Dem. Rep.	184	62	165	174	156	144	165	180	188	178	168
South Sudan	185	177	169	187	179	178	180	66	180	85	168
Libya	186	160	186	136	187	186	185	128	128	141	168
Yemen, Rep.	187	175	186	187	81	186	132	83	189	139	157
Venezuela, RB	188	190	152	186	138	124	180	189	187	148	165
Eritrea	189	187	186	187	180	186	174	152	189	103	168
Somalia	190	188	186	187	152	186	190	190	164	114	168

Sources: 2019 Doing Business; World Bank; International Finance Corporation.

Limited impact of formalization policies. Formalization reforms have had little success in curbing the prevalence of informality. Based on data from Brazil, Ulyssea shows that the majority (52.6 percent) of informal businesses are low-productivity survivors, which will likely remain informal even when the formal sector's entry costs are removed.[47] This observation echoes the evidence documented in the literature that maps the composition of the informal sector to the limited performance of formalization reforms in developing economies in general and in Africa in particular. Easing entry costs has had a very limited—or no—impact on the formalization of existing informal firms, especially for tax registration in Mexico, Brazil, Colombia, Sri Lanka, Peru, and Bangladesh (Alcázar, Andrade, and Jaramillo 2010; de Giorgi and Rahman 2013; de Mel, McKenzie, and Woodruff 2013; Bruhn and McKenzie 2014).

Focusing on Africa, Lince (2011) analyzes the "open-air market" formalization scheme for local vendors and fishers introduced in 2004 in Uganda. This reform promoted the transition of informal firms to the formal economy by highlighting the advantages of formalization—better prosperity for informal business owners and increased involvement in local governance. However, this reform led to adverse economic effects that deteriorated the welfare of the informal business owners. In a related work, Grimm, Knorringa, and Lay (2012) study the behavior informal firms facing the prospect of formalization across seven West African countries. The findings in Grimm, Knorringa, and Lay (2012) suggest that low-to-medium potential informal firms—combining "survivalists" and "constrained gazelles" —account for nearly 90 percent of the population of informal enterprises in those countries. However, less than 44 percent of these informal enterprises would consider formalizing.[48] Obviously, this represents an upper threshold, as the actual formalization rate is expected to be much lower.

In Malawi, Campos et al. (2015) show that focusing exclusively on information and assistance has limited impact on tax registration. Moreover, business registration—formalization—has no material effect on levers of firm productivity such as financial access and usage. Benhassine et al. (2018) conduct a randomized experiment based around the introduction of the "entreprenant" legal status in Benin. The authors use monthly administrative data on formalization to map out the effectiveness of three formalization schemes—basic, intermediate, and full package. Benhassine et al. (2018) find that a full formalization scheme bundling registration incentives, business advisory and training, and tax and banking support increased the formalization rate in Benin only by 16.3 percent, whereas the intervention costs were substantially high. The limited performance of pro-formalization schemes calls for a shift of paradigm for effectively addressing the challenges of the informal economy in Africa, by focusing more policy interventions on upgrading the productivity of firms in the informal sector.

Opportunities of informality in Africa: Beyond the formalization dichotomy

A paradigm shift in policy priorities is needed to harness the potential of the informal sector in Africa. The majority of policies addressing informality in the past two decades in Africa were intended to stimulate informal firms and workers to formalize. However, as alluded above, formalizing the informal sector may prove to be elusive as an objective, at least in the short run. The outcomes of several policy assessments show that despite a strong push for formalization reforms, the majority of the firms remain informal (Bruhn and McKenzie 2014). A range of reasons may explain the limits to formalization (Campos et al. 2018). Indeed, the formalization process is a gradual rather than a one-off experiment. It is reversible and implies potentially slow changes in institutional and business environments. Along the formalization path, businesses and workers constantly assess the trade-off between formalization incentives—increased market access, eased funding conditions, and additional support services—and deterrents—taxation, associated licensing costs, and registration of employees.

To some extent, pro-formalization policies take a "misallocation angle" by providing incentives for the reallocation of production factors from a "low-productivity informal sector" toward a "more productive formal sector." In this regard, formalization reforms reflect a "between" answer to the challenge of informality. In contrast, a "within" approach to informality focuses on raising informal firms' productivity, by upgrading their internal capabilities, including entrepreneurial mindset, managerial skill, technology absorption capability, workforce skill, and innovation capacity (Campos et al. 2017; Cusolito and Maloney 2018). A pathway to achieve this objective is to refocus policies and reforms on boosting the productivity of the majority of small-scale, low-productivity firms and enhancing the skills of informal workers. Targeted formalization and improved enforcement schemes can help large informal firms transition to the formal sector.

3.2 The future of informal work under the digital economy

This section discusses how digital technologies can shape the premium to different skills for people in the informal sector. We highlight the impact of digital technologies largely on informal labor markets, given that formal labor contracts only cover a small share of workers in Africa.

3.2.1 Technology acquisition, diffusion, and impact on informal labor markets

A summary of the latest examples of technology adoption by—and potential impact on—informal firms and farms is provided.

Putting the chart in its proper place: technology acquisition, typology, and usage. How do small and informal firms in Africa access and use new technologies? Although there is growing consensus on the role that digital technologies play in the enhancement of business activities and in economic development in general, there is still little evidence on the uptake and usage of these technologies by informal firms. Although evidence shows that mobile phones are widely used among informal businesses, little is known about the use of other information and communications technologies (ICTs). Dean-Swarray, Moyo, and Stork (2013) explore the use of mobile phone and related digital technologies, such as mobile internet, mobile money, and mobile applications, and examine how they can enhance the way informal businesses conduct their activities.

Table 3.2 displays mobile usage for four East African countries. It shows that mobile phones remain the most important and commonly used ICT device among informal businesses. This could therefore be a channel through which businesses can improve their growth and sustainability, although adoption of more sophisticated digital technologies may have increased since then.

Table 3.2: Limited productive usages of ICTs by informal businesses in selected East African countries (%)

ICT usage		Uganda	Tanzania	Rwanda	Kenya
Businesses ICT use	Mobile phones for business purposes	67.9	44.4	53.4	67.4
	Own computers	2.0	0.1	0.7	3.0
	Working internet connection	3.2	2.8	2.0	3.5
	Working fixed-line phone	6.9	1.0	1.3	0.1
Does the business use SMS or text messages	Sends	27.2	77.3	63.9	78.1
	Receives	18.1	37.4	33.3	55.3
Why businesses do not use mobile phones	Too expensive	37.1	41.7	55.3	5.5
	No need	48.7	55.8	33.1	20.2

Source: Dean-Swarrat et al. 2013, based on Research ICT Africa 2012.

Table 3.2 also shows that a major reason why informal businesses do not use mobile phones is that they find no need to do it. This would typically be the case for "subsistence" activities, which are very limited in their scope (for example, street vending) and/or activities that are not susceptible to automation, or activities for which the business owners are not skilled enough or aware of the services offered through a mobile phone and the potential benefits that could be achieved through this device. The introductory chapter gives detailed statistics on key digital technology developments and trends in Sub-Saharan Africa.

Impacts of digital technologies on informal businesses. Formalization of informal firms has always been one of the main objectives of governments (OECD 2016). Several policies to induce transition from informal to formal have been considered, such as simplifying business registration procedures while reducing taxes. However, these policies have shown limited success in many countries (Ulyssea 2010). Indeed, the process of formalization has not been successful in any of the economies in Africa and this is likely to remain the case. Moreover, many activities exist in Africa where business owners do not feel that registration or tax reforms will give them any clear advantage. One example is the case of African traditional spiritualists, whose activities are mainly confined to informality.[49] Unlike other types of informal activities, these businesses are not likely to enter the formal sector because of socio-cultural restrictions and the secrecy that surrounds their activities, not because they lack the resources or skills.

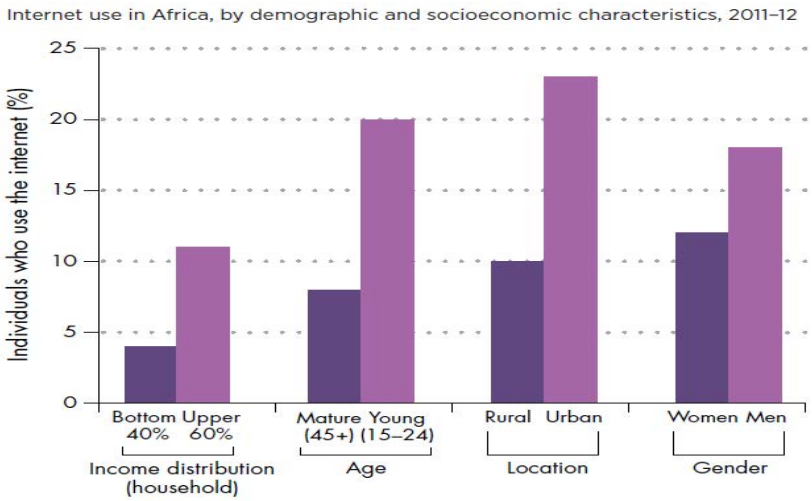
Drawing on Global Findex data, IMF (2019) investigates how digital financial services can encourage formalization of informal firms and discusses risk mitigation policies. IMF's (2019) describes the fintech landscape by documenting the evolution of the number of informal firm owners who make digital payments, use savings products, and borrow money, as well as informal firm owners' access to mobile phones and the internet. On the one hand, given the evidence that the informal sector is constantly using retail electronic payment systems, virtual savings, and virtual credit supply platforms, the digitization process (that involves easy payment platforms and accessibility to markets) could allow informal markets in Africa to join the realm of formal transactions. Therefore, inconsistent taxation of digital technologies (for example, over-the-top regulations in Uganda and Zimbabwe) has led to less access, which is detrimental for this process. For example, the Ugandan Communication Commission estimated that the number of internet users dropped by nearly 30 percent between March and September 2018, indicating severe consequences of the over-the-top tax imposed by the Ugandan government.[50] Moreover, it is predicted that the economic cost of the social media tax is likely to be a reduction of US$750 million in GDP growth and US$106 million in forgone taxes in Uganda (Stork and Esselaar 2018).

On the other hand, to the extent that formalization is associated with skills acquisition, greater access to multipurpose technologies may 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 these digital technologies that facilitate access to financial services can effectively increase compliance with formal business requirements. These findings therefore raise questions about whether formalizing the informal sector is not elusive as an explicit policy goal for Africa, given that it has been tried and failed in this region. A more realistic objective (which is also useful for formalization) may be to focus on boosting the productivity of informal enterprises across activities, given that firms will not formalize unless they grow. This could be achieved by adopting digital technologies that enable these businesses to overcome information constraints through social media and reach more customers, and to overcome financial constraints by adopting productivity-boosting technologies such as apps that facilitate access to mobile money.

Scaling up digital technologies in agriculture. Agricultural technologies have been emerging rapidly across the region, driven by lower costs, better connectivity, and advanced analytics.[51] Specifically, digital technologies appear to be currently at an inflection point where the falling cost is allowing scalable innovations. For instance, cellular subscriptions are skyrocketing—with 420 million unique mobile subscribers in Sub-Saharan Africa and mobile internet penetration reaching 240 million people (26 percent penetration) in 2016. Although cellular subscriptions and internet penetration have increased across the continent, they are constrained by digital access (figure 3.4). The rural penetration of internet is 10 percent in Africa, and it varies with age, gender, and income.

The rapid evolution of disruptive agricultural technologies caters to the characteristics of Africa's food system (box 3.2). One of the characteristics of Africa's food system is inequalities in access to technologies, information, skills, and markets. While digital access is a constraint, however, when useful digital technologies become available, age and digital literacy are no longer binding constraints for adoption. A wide array of technology models is being developed to deliver services to all types of farmers and specifically to farmers who lack resource and information access. For certain types of services, farmers are willing to pay if the digital technologies are customized to their needs and address their agricultural challenges. Digital agricultural information platforms or mobile solutions can level the playing field for marginalized groups, such as women, who traditionally have lower access to information and markets.

Figure 3.4: Use of internet is heterogeneous across socioeconomic groups, 2011–12



Source: World Bank 2019b.

Box 3.2: E-extension is increasing productivity for smallholders in Sub-Saharan Africa

The main objective of e-extension is to ensure that smallholders have real-time access to pertinent agronomic information for informed decision making. Smallholder farmers are often a low-skill user base with limited access to technology. The following are some innovations designed to cater to this segment:

- *8028 Farmer Hotline.* Agricultural Transformation Agency, in collaboration with the Ministry of Agriculture & Livestock Resources, Ethiopian Institute of Agricultural Research, and Ethio Telecom, offers a platform to deliver information directly to farmers through mobile phones. The technology used is an Interactive Voice Response and Short Message Service, which does not require data connectivity, only access to feature phones with simple instructions to follow.
- *Precision Agriculture for Development (PAD).* PAD is a development organization that operates in seven countries covering more than six million farmers. It focuses on sending Short Message Service to smallholders with agricultural advice to increase yields.
- *Farm.ink.* Farm.ink is based on a peer-to-peer learning platform and is supported by the CGIAR Research Program on Livestock. Farm.ink operates as an active online community through a mobile chatbot service where farmers can ask questions. Machine learning classifiers are used to provide tailored answers to smallholders' questions. The chatbot can work with a low-cost smartphone and basic internet connection.
- *Digital Green.* Digital Green's video-enabled approach is an adaptable, scalable, cost-effective solution to reach large numbers of smallholder farmers with agricultural extension advisory services. Partnering with existing extension providers has allowed Digital Green to tap into trusted networks operating in remote rural communities, enabling rapid scale-up. Extension providers produce, disseminate, and monitor the impact of short, locally relevant videos. These locally relevant videos are often customized based on farmers' needs and usability.

Source: World Bank 2019b.

3.3.1 Complementary benefits from digital technologies

The broader benefits of digital technologies are discussed in chapter 1. This section focuses on the benefits of digital technologies for informal sectors. Recent conceptual frameworks of skilled-biased technologies (Acemoglu 1998; Aghion 2002; Violante 2008) can be adapted to emphasize four types of complementary benefits of digital technologies that may be particularly important to improve growth and inclusion outcomes for farms and firms in the informal sector: complementary effects to existing capital, inclusion gains, efficiency gains, and innovation gains.

Complementary effects to existing capital. Technology adoption and diffusion has complementary effects to existing capital and helps alleviate credit constraints and improve financial inclusion. For example, that a large percentage of business owners have a mobile phone can be used as a way to enhance credit access. Indeed, one of the main barriers to credit is the asymmetry of information between informal businesses and financial institutions. With neither a business plan nor transaction history, banks have no means to assess the viability of an investment for which a loan is sought. It is therefore difficult for them to demonstrate the profitability of a business (McCormick 2012). Collateral is usually the alternative required to assess a loan application, which excludes initially poor (although possibly talented) entrepreneurs and creates significant frictions, as found by Nguimkeu (2014). The administration of micro credit creates other challenges that are well documented (Ivatury et al. 2009).[52] The increasing popularity of mobile money could provide a platform to address most of these issues, as it enables the movement of money between different parties. Since the technology is also used for payments in exchange of goods or services, these money transactions data generate an electronic trail (for example, amounts, frequencies, and reasons for transactions) that provides a rich data set that can be used for a wide range of financial analytics. Moreover, since operators have data linking transactions to actual user locations, the combination of mobile money transaction data with other operator data provides a powerful platform for tracking informal business behavior across time and space that can be used for better risk management within banks and to the benefit of both parties.

Inclusion gains. Inclusion benefits occur through overcoming information asymmetries to create, expand, and bring the excluded into larger and more transparent input and output markets (for example, greater arbitrage opportunities from more integrated input and output markets at the local, national, and global levels; more efficient coordination; and match-making). For example, a quasi-experimental study by Annan and Sanoh (2018)—that exploited the exogenous introduction of the 2013 national mandatory SIM registration reform in Niger—found that moving a household with mobile use activity to a no mobile use activity environment due to SIM deactivation resulted in roughly 33.1 percent points decline in the likelihood of engaging in non-agricultural business enterprises. Digital technologies such as digital payments and e-governance offer pathways to financial inclusion (box 3.3).

The impressive growth in financial inclusion in Sub-Saharan Africa over the past few years has been driven primarily by mobile money and agent banking. Money allows transactions between peers and between mobile devices and can store money, credit, and debit cards (Diniz 2011). This technology is perceived as a stepping-stone to financial inclusion of those who lack access to formal financial services like savings, credit, and insurance (for example, Comninos et al. 2009). As mobile money distribution expands beyond agents to include bank ATMs, cards, and online platforms for cash-in and cash-out transactions, there may be some form of interaction between using mobile money and subsequently having access to a bank account. Other detailed evidence of the role of digital access on financial inclusion in Africa can be found in IFC (2018). Specifically, working together with 14 microfinance institutions, banks, mobile network operators, and payment service providers across the continent, a joint initiative between the International Finance Corporation and the Mastercard Foundation to support the growth of digital finance in Africa has resulted

in 7.2 million new digital financial services users (that is, a 250 percent increase from the baseline), 45,000 new banking agents, and US$300 million in monthly transactions (IFC 2018). It is important to emphasize that digital transactions leave a footprint that provides information that can put firms on creditors' and regulators' radar screens. In the case of the former, this can help expand access to credit and increase financial inclusion. In the latter, it may expand the grey area where firms are not fully compliant with regulations and taxes because they can be tracked or regulated in some aspects of their transactions. This apparent trade-off calls for tailored and even-handed regulations that foster the gains but lower the perceived costs of digitization.

Box 3.3: Services increasing farmers' financial inclusion

The following are some innovations designed to increase financial inclusion among smallholder farmers.

- *Arifu.* Arifu provides financial literacy and interactive training to increase the uptake and usage of new savings and borrowing products among rural populations. Farmers in the rural areas are often unaware of the benefits of credit, savings, and insurance and the process of application. Arifu is a personalized learning platform catering to the needs and usability of the farmers.
- *Apollo Agriculture.* An average Apollo customer is a remote, rural farmer supporting a family of five to seven people by growing maize and other crops on about two acres of land. Apollo Agriculture builds credit profiles for unbanked smallholders using machine learning models that process large volumes of customer data, including satellite data of customers' fields. Satellite data allow the inference of characteristics, like yield, crop type, and evidence of livestock, and incorporate these insights into a credit assessment model. Apollo Agriculture has also built automated, digital processes for each step in the customer lifecycle, from customer acquisition, to training, to collecting repayment. Together, these innovations allow the delivery of proven agricultural tools to rural, remote smallholder farmers.

Source: World Bank (2019b).

Efficiency gains. Efficiency benefits occur through improving access to knowledge and thereby upgrading productivity within informal farms and firms (for example, better investment decisions, lower production costs, and higher quality facilitated by extension advice about better seeds and fertilizers appropriate for prevailing soil and weather conditions, access to better planting/harvesting/business process knowledge, and continuous learning from business management software and other productivity tools). For example, Cole and Fernando (2016) conduct a randomized controlled trial to examine how a mobile phone–based agricultural advice service provided to farmers affects agricultural productivity in India. Offering agricultural advice has helped change practices and increase yields of cumin (28 percent) and cotton (8.6 percent, for a subgroup receiving reminders). There are also a positive peer effects, as non-treated farmers learn better practices from treated peers and lose less to pest attacks. By the same token, Kirui, Okello, and Nyikal (2012) use a propensity score matching technique to gauge the impact of mobile money technology on households in rural areas in Kenya. They find that mobile transfer services markedly raise household farms' annual input use by US$42, agricultural commercialization by 37 percent, and incomes by US$224.

Clearly, mobile money technology helps alleviate agricultural market failures, boosts production outcomes, and improves welfare, especially in rural areas. A detailed review of the impact assessment of digitization on farmers' livelihoods in Sub-Saharan Africa can be found in Clark et al. (2015). Efficiency gains from digitization can be captured in terms of improved human capital and welfare. Vasilaky et al. (2016) examine the effectiveness of mediated video-based training on individuals' adoption rates of a new agricultural

technology. They find that the probability of adoption rate increases above and beyond standard training as a result of tailored and mediated videos (a 50 percent increase between treatment and control groups).

Innovation gains. Innovation benefits occur through enabling new processes and products, including lower-cost access to customers and services through digital platforms across supply chains, logistics, and financial services (for example, improved supply chain management; better product quality, including food safety and traceability; and faster, safer, and verifiable e-payments facilitating more secure payments, and access to savings, credit, and insurance products for the previously unbanked) (Deichmann, Goyal, and Mishra 2016).[53]

Innovation from digitization takes advantage of the opportunities of generating more income in an excess capacity environment by creating more jobs rather than destroying them (Spiezia and Vivarelli 2000). This enables an overall net increase in job creation. For example, as online shopping platforms gain ground in many African countries (for example, Jumia, Nuria, Kilimall, and Lynk in Kenya), the physical shopping malls occupied mainly by supermarkets and market stalls for small traders continue to flourish across towns and cities. While customers continue to visit shops, more customers are being reached from their locations by traders through online shopping platforms and the purchased products are delivered to them. This also generates increased opportunity for people to join the distribution sector that provides door-to-door delivery services. Innovation ecosystems are already impacting agricultural outcomes in Kenya and Nigeria (see box 3.4). Indeed, by harnessing disruptive agricultural technology innovations, smallholder farmers in Kenya and Nigeria appear to be reaping various benefits. Overall, the innovation ecosystem in these countries is improving market transparency, enhancing farm productivity, and enabling efficient logistics.

Box 3.4: Potential impact of agricultural innovation ecosystems in Kenya and Nigeria

Half of the surveyed active disruptive agricultural technology (DAT) firms in Sub-Saharan Africa are located in Kenya and Nigeria, which have the most advanced agri-tech ecosystems on the continent. The agriculture innovation ecosystems in these two countries show how they excel along six dimensions: culture, density, finance, human capital, infrastructure, and regulatory environment (see World Bank 2019b, annex 2).

By harnessing DAT innovations, smallholder farmers in Nigeria and Kenya have recognized the advantages gained, with the top expected benefits including reduced travel hours; reduced cost of doing business; increased collective action via stronger farmer networks; faster access to price, market, and farming information; increased adaptability to situational changes; and increased farmer leverage during negotiations with wholesalers, traders, and transport providers.

Overall, the innovation ecosystem in these countries appears to be achieving the following:

- *Improving market transparency* by providing greater arbitrage opportunities, reducing spatial price dispersion, and lowering wastage. It also offers greater market participation in remote areas through more efficient coordination, as well as increased farm gate prices through improved bargaining power with the middlepersons.
- *Enhancing on-farm productivity* by facilitating adoption of improved inputs through the provision of advice and weather forecasts at a lower cost, improving household food security, income, and value of assets through enhanced management practices. Estimations from survey data reveal that mobile money technologies help famers improve their production and welfare. Mobile money users use more agricultural inputs, market a larger proportion (about 19 percent more) of their output, and reap 35 percent higher profits than non-users (Kikulwe, Fischer, and Qaim 2014).

- *Enabling efficient logistics* by optimizing supply chain management, transportation coordination, product delivery, and capacity utilization. Traceability from point of origin to consumers ensures greater food safety in agricultural product chains. Easy and secure means of payments allow fast and safe transfer of funds to pay for products and inputs, agricultural subsidies, or remittances.

Source: World Bank (2019b).

3.2.3 Challenges and risks

There are various challenges and risks that could impede achieving the above-mentioned outcomes.

Absence of needed accompanying assets. In addition to the needed digital infrastructure, physical capital–based infrastructure is needed, such as electricity and transport/logistics; human capital, including digital skills/literacy levels; and supporting institutional infrastructure, including for the broadly-defined business environment. The widespread use of digital IDs would not only increase benefits, but also could facilitate formalization. Unfortunately, many countries are still facing issues related to the quality of mobile connections and telecom infrastructure. The risks of a worsened broadband internet access divide are still very present (urban/rural, primary/secondary cities, within-city divides, gender and young/old divides, and other dimensions). Other dimensions of basic supporting institutional infrastructure are also insufficient in many African countries. For example, decades of conflict and fragile development in the Democratic Republic of Congo have created infrastructural challenges such as the lack of national ID documents and legal procedures to endorse traditional collateral. This has restrained the development of the financial sector. Challenges for digitization are bigger in rural areas and among farmers. A major challenge in the digitization of the cocoa value chain in Côte d'Ivoire (the world's largest cocoa producer) is that many farmers often lack a valid ID. According to World Bank (2018), only just over half of the Ivorian population has a birth certificate or other ID, which is a limiting factor for enrolling farmers in bank and mobile accounts.

New labor market risks. Digital technologies bring new types of risks, such as insufficient competition, job insecurity, technological unemployment, data privacy and cybersecurity, and consumer protection issues related to fraud, manipulation, and deception (Artecona and Chau 2017). Indeed, although digitization can facilitate the creation of new, formal technology-driven firms, it raises new challenges for governments in low-income African countries in their ability to harness the tax base for such jobs, as discussed in chapter 4. This is another two-margins story where, on the one hand, there is an extensive margin that involves registering and paying entry fees to achieve formal status and gain credibility from outside partners, and, on the other hand, the intensive margin where these new businesses decide how much of their taxable income to report under the existing tax law. In the digital domain, products and services are bought and sold, uploaded, downloaded, and used without any product or person physically crossing international borders. Significant profits are often generated from sources within countries without establishing a physical presence in these countries.

Political economy challenges. Digital technologies bring a wide range of political economy challenges (Autor 2015). As the social media and the internet continue to gain considerable power and agency around the world, many governments may see this as an existential threat that must be contained, despite the consequences this may have on other sectors. In most cases, the desire to control the digitization process could be rooted in governments' determination to control the political narrative. This includes blockage by those perceiving that they will lose from rapid digital technology-related changes. For example, the internet

could be seen as a threat because it disrupts traditional forms of government political control, particularly the control of the production and dissemination of information, which has been an invaluable political tool for many African governments.

3.3 Policy implications and future research agenda

This section surveys policy interventions that facilitate access to bundles of support services across the input, knowledge, and output markets that are essential to build the productive capacity of credit-constrained, low-skill informal farms and firms (box 3.5). The goal is effective implementation of an encompassing digital strategy for agricultural and non-agricultural informal firms—to help informal firms and workers reap the technological gains of the digital economy.

In a nutshell, the majority of policy reforms, which have been pro-formalization of firms and workers, have had limited success, despite their relatively high implementation costs. On the one hand, more realistic short- to medium-term policies should focus on pro-productivity and skills-upgrading interventions for small informal firms and unskilled workers. On the other hand, formalization policies should be more targeted on larger informal firms that aggressively compete with formal firms. Digital technologies can be leveraged to boost productivity, job creation, access to credit, and financial inclusion in the informal sector, while also making formalization easier in this region over time.

Box 3.5: Policies implemented to address informality

Various policies. Countries have undertaken a range of policy reforms that have intended or unintended effects on informality (World Bank 2019a). Compared with other regions, Sub-Saharan African countries have implemented more high-paced reforms (figure B3.5.1, panel a). Nonetheless, the bulk of these reforms appears not to be directly aimed at informality (figure B3.5.1, panel b). This highlights the need for an overarching development strategy that is carefully tailored to country circumstances while accounting for specific sources, types, and challenges of informality.

Formalization. Among the implemented policies, reforms addressing the challenge of informality were mostly focused on formalization. The main challenge in helping informal establishments transition to the formal economy is finding the right policy mix that corresponds to the diversity of characteristics and drivers of informality. Fiscal reforms that streamline tax collection, management, and government procurement systems can lead to lower informality in some economies. Conducive business environments that support entrepreneurship and bolster productivity, by leveling the playing field for all workers and firms—increased flexibility for the labor market and better governance—can help curb the level informality. Adaptable rules, even-handed enforcement of regulations, reliable delivery of public services, and balanced social protection of the most vulnerable segments of the labor force can also enhance the working conditions in the informal sector and facilitate a smoother transition from the informal sector to the formal sector. These formalization policies can leverage digital technologies to boost productivity (Nguimkeu 2016).

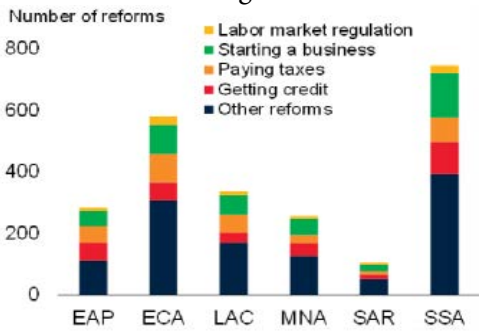
Other pathways. However, in light of the limited success of formalization reforms in Africa, policies that focus on "low-skill-biased" technologies—incentives/subsidies to foster low-skill-biased technology development—can empower informal low-skill workers and firms to achieve higher productivity and inclusive growth (Bruhn and McKenzie 2014). Catalytic improvements in governance can further boost these positive complementary effects.

Moving forward. More research is warranted to identify the effectiveness of these policy reforms and design the appropriate policy mix to address the challenges of informality in Sub-Saharan Africa.

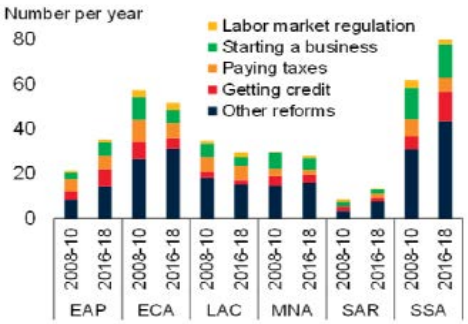
Figure B3.5.1: Policy reforms to curb informality

Despite substantial cross-country heterogeneity, Sub-Saharan African countries have implemented more reforms, at a higher pace, than other regions, although from a lower base. These reforms do not appear to have significantly impacted the level of informality.

a. Reforms across regions



b. Reforms over time



Source: World Bank, Doing Business, Global Economic Prospects, January 2019.
Note: See Doing Business 2008–18 for details.
a. The number of policy reforms that have been implemented since 2008 and are regarded as "improvement" in the ease of doing business or "neutral" (which only applies to "labor market regulation") by Doing Business 2008–18.
b. The annual average number of policy reforms that were implemented during 2008–10 compared with the annual average number of reforms conducted during 2016–18 (shown in bars).

3.3.1 Complementary policies for increased access to credit

Given the above discussions, policy makers should see digital financial inclusion as a tool to facilitate development goals and not necessarily as a bludgeon to force formalization (Kapler et al. 2019). Policies to enhance access to credit and insurance start by an improvement in institutional infrastructure that facilitates the adoption and diffusion of digital financial technologies. Apart from the already mentioned needs for energy, roads, and transportation infrastructure, a critical complementary infrastructure is the provision of affordable internet access, that is, expanding network coverage and building network capacity, both of which are imperative in countries with low population densities, low literacy rates, and lack of local digital content. Other efforts include the improvement and implementation of an effective individual ID system across countries. Finally, the combination of mobile money transaction data with other network operator data provides a powerful platform for tracking informal business behavior across time and space that can be used for better risk management within banks. This could benefit both parties by alleviating information asymmetry, which is a critical step toward a more efficient credit market.

3.3.2 Channeling the gains from digital technologies

The question asked here is how African workers can get a fair share of the innovation benefits from digital technologies. Indeed, African governments face the challenge of not only designing policies to formalize businesses across all sectors, but also of finding new ways for workers to get their fair shares from the efficiency and productivity gains that digitization bring. As argued by Ngweno and Porteous (2018), one way for governments to channel the gains from digitization is to start by recognizing that digital-supported

employment could become an important source of livelihoods in these countries. They should therefore prescribe that "platform providers open their systems to allow workers to register for government benefits and private services rather than creating an entire range of poorly-enforced regulations." The government should also improve the reliability of payments and design a strategy to fight against fraud. For example, many digital transactions go through unsupervised payments from buyers to sellers that may come late or be diverted without punitive consequences. Governments and businesses should therefore work together to prioritize the improvement of payments in the digital economy. Finally, despite the challenges that it involves (including developing good track records of economic activities), it is possible for governments to tax the digital economy and return the profits in the form of improved government services, especially from international digital platforms.

3.3.3 Beyond the current evidence: New research avenues

Evidence that digital technologies are likely to disrupt the future of work in Africa opens new avenues for more in-depth research for better understanding the opportunities and challenges for informal firms and farms. Some directions to consider are the following:

- Collect harmonized and high-quality data on the use of digital technologies in the informal sector in African countries.
- Build a model to rationalize and elicit the channels through which the taste for digitization can shape occupational choices and entrepreneurship amid informality, to understand and quantify how various policies toward adoption and diffusion of digital technologies can influence the (mis)allocation of skills and resources across sectors.
- Assess the extent to which major development strategies for Africa, such as the 2030 Sustainable Development Goals and Agenda 2063, account for pervasive informality on the continent.
- Identify and discuss the refinements (if any) that are warranted to improve the effective implementation of these strategies in achieving the ambitious development goals in Africa.
- Explore how digital business incubators and joint ventures can help African firms to internationalize and boost their exports.

This chapter began by highlighting the poverty challenges faced by workers in the informal sector. The next wave of higher productivity informal jobs will require more targeted social protection to help workers adjust to new risks. More social protection also will be needed as digital technology entrepreneurship increases; as people experiment and try to produce new goods and services, and produce better existing goods and services, they will face more market-related risks. The final chapter argues that, given the reality of the low levels of resources available for social protection coverage to address these work-related risks, the focus of social protection in Sub-Saharan Africa over the short to medium term should be on increasing the efficiency of domestic resource mobilization and social protection policies, rather than broadening their scope.

Notes

[44] Informality, as defined in this chapter, includes workers and enterprises (see box 3.1). Entreprise census data are from the "Rapport global du Recensement général des Entreprises" of the Ministère de l'économie, des finances, et du plan du Sénégal (2016).
[45] The chapter highlights the underlying reasons for enterprise informality (survival, evasion, exclusion) with a specific focus on the socioeconomic context of Africa. Benjamin and Mbaye (2012a), for instance, highlight the major role that large informal firms play in some sectors in francophone Africa, notably commerce. Data on informal enterprises are largely based on registration, since it is difficult to understand the scope of tax compliance from standard enterprise surveys. However, this is an area, among others, where the report's forward-looking recommendations emphasize the need for improved data collection and analyses.
[46] See Gelb et al. (2009) based on survey data from southern and eastern African countries.
[47] Ulyssea (2018) estimates that 35.9 percent of informal firms are "free-riders" and 11.5 percent are "held-back" entrepreneurs.
[48] Table 4 in Grimm, Knorringa, and Lay (2012) shows that only 44 percent of constrained gazelles would register, whereas only 22 percent of survivalists would consider formalizing.
[49] African traditional spiritualists are people who perform indigenous spiritual practices for their customers. They include all people who use spiritual powers, knowledge, and inherited skills to assist other people in solving problems that defied physical remedies. Examples are priests and priestesses of ancestral deities, fortune tellers, spiritual healers, psychotherapists, herbalists, bone setters, diviners, mediums, magicians, and rain makers (Truter 2006).
[50] This is a new tax on the ICT sector that was imposed by the Ugandan government in July 2018 in the form of excise duties on social media use and mobile money services. It consisted of a mobile money tax of 1 percent on the transaction value of payments, transfers, and withdrawals and a social media tax of U Sh 200 per day (Stork and Esselaar 2018).
[51] Harnessing Digital Technologies to Improve Food System Outcomes
[52] For example, micro-credit is labor power intensive and expensive for banks to offer to informal businesses.
[53] There are four main economic channels from these digital technology benefits to informal and formal enterprises to poverty reduction outcomes by households, namely, better consumption opportunities for poor people (from lower-priced and higher quality goods and services including health, education, and social protection services enabled by the associated productivity increases), more labor income (through more jobs and higher wages with differential effects depending on whether the technology is high-skill or low-skill biased), more profit income (from entrepreneurial farms/firms and other owners of capital, to the extent that they are lower-income people), and more income transfers (from digital technology-related efficiencies, increased integrity in the collection of tax revenues, and more transparent and accountable allocation and targeting of public resources).

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CHAPTER 4: SOCIAL PROTECTION

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Abstract

The future of work in Africa will be shaped by disruptions to labor markets from global trends including the generation and diffusion of digital technologies, economic integration, climate change and fragility, and demographic transitions. These trends will create risks but also provide opportunities for the region. Building on World Development Report 2019, this chapter argues that Sub-Saharan Africa differs from other regions in the extent to which these trends will affect economic activities and, by implication, the nature of work. These differences, in turn, require more responsive risk management strategies for Africa entailing (i) strengthening traditional social protection and labor programs for the poor and vulnerable, (ii) supporting innovations to turn these risks into opportunities by leveraging domestic and regional markets, and (iii) optimizing resources to expand social safety nets for the poor through fiscal reforms, supported by a multi-sectoral approach and coordination of national, regional, and global stakeholders. Therefore, in expanding the coverage of social protection and labor programs for the vulnerable, it will be necessary to rebalance social expenditures and instruments to cover more of the urban poor and individuals in transition. A multi-sectoral approach to design and implementation will ensure that social protection policies are part of broader national economic strategies rather than stand-alone initiatives. The coordination of regional and global organizations can strengthen taxation policies for revenue mobilization in Sub-Saharan African countries, reduce the transfer costs of remittances to increase the benefits accruing to poor households, and harmonize development finance for effective social protection and labor support.

4.0 Introduction

This chapter identifies and analyzes the range of social protection policies that can help African countries respond to the changing world of work. The future of work in Sub-Saharan Africa will be shaped by disruptions to labor markets from global trends, including the diffusion of digital technologies, economic integration, climate change and fragility, and urban demographic transitions. These global forces and their interaction with national and regional factors will create risks but also provide opportunities for the region. Building on World Development Report (WDR) 2019, the following questions guide the chapter:

- What are the specific risks to labor markets and policy constraints that Sub-Saharan African economies face in the changing world of work?
- What social protection policies should African governments consider in preparing for the future of work, and how can they be financed?

The chapter argues that social protection policy responses to the future of work should focus on managing a variety of risks to African labor markets. This risk management entails (i) strengthening traditional social protection and labor (SPL) programs for the poor and vulnerable, (ii) turning these risks into opportunities to provide innovative SPL solutions leveraging domestic and regional markets, and (iii) addressing fiscal and policy constraints by optimizing resources through fiscal reforms, a multi-sectoral approach to SPL policies, and coordination of various national, regional, and global stakeholders. The chapter has a heavy but not exclusive emphasis on social safety nets as the most prevalent form of social protection in Sub-Saharan Africa.

4.0.1 What is social protection?

SPL systems, policies, and instruments help individuals manage risk and volatility and protect them from poverty and destitution by improving equity, resilience, and opportunity.[54] Equity is enhanced through instruments that help protect against chronic poverty and destitution. Resilience is "the ability of countries, communities, and households to manage change by maintaining or transforming living standards in the face of shocks or stress" without compromising long-term prospects.[55] It is promoted through programs that minimize the negative effects of economic shocks and natural disasters on individuals and families. "Shock readiness" is the extent to which SPL systems can meet the anticipated needs of vulnerable populations resulting from the impact of endogenous or exogenous shocks that adversely affect livelihoods and labor markets.[56] Finally, opportunity is enhanced through policies and instruments that contribute to building human capital and facilitating access to jobs and investments in livelihoods.[57] SPL systems provide a foundation for inclusive growth with transformative impacts on people's lives.[58] The discussion in this chapter draws mainly on the resilience function and shock-readiness feature of SPL systems to manage risk and uncertainty in the changing world of work. This is achieved through instruments that fall into three categories, summarized in table 4.1.[59]

Table 4.1. Social Protection and Labor Programs

Social protection and labor programs	Objectives	Types of programs
Social safety nets/social assistance (noncontributory)	Reduce poverty and inequality	• Unconditional cash transfers • Conditional cash transfers • Social pensions • Food and in-kind transfers • School feeding programs • Public works • Fee waivers and targeted subsidies • Other interventions (social services)
Social insurance (contributory)	Ensure adequate living standards in the face of shocks and life changes	• Contributory old-age, survivor, and disability pensions • Sick leave • Maternity/paternity benefits • Health insurance coverage • Other types of insurance
Labor market programs (contributory and noncontributory)	Improve chances of employment and earnings; smooth income during unemployment	• Active labor market programs (training, employment intermediation services, wage subsidies) • Passive labor market programs (unemployment insurance, early retirement incentives)

4.0.2. What are the WDR 2019 recommendations on social protection?

To address the risks associated with current and future labor markets, WDR 2019 recommends that governments should rethink social protection systems.[60] WDR 2019 focuses on risks created by the impact of digital technologies on the business model of firms, their production processes, and their demand for skills and therefore jobs (World Bank 2019, 22–23). Through the guiding principle of "progressive universalism," the report recommends an expansion of social protection coverage while giving priority to the poorest people. This bottom-up expansion can occur while navigating the fiscal, practical, and political trade-offs that incremental levels of coverage involve. Progressive universalism starts with a guaranteed social assistance minimum and eventually extends to a comprehensive system that provides social insurance and reforms industrial era labor market regulations (figure 4.1).

Figure 4.1: Framework for social protection and labor regulation to manage labor market challenges

Source: World Bank 2019, 106.

WDR 2019 proposes the enhancement of social assistance through a guaranteed social minimum and the reform of social insurance and labor regulations.[61] This social minimum comprises social assistance programs that provide financial support to a large share of the population. This package aims to provide adequate support regardless of an individual's employment situation and is complemented with insurance that is independent of formal wage employment. In a changing world of work characterized by new occupations in the "gig" economy, the typical Bismarckian model of social insurance systems based on a standard employer-employee relationship excludes many individuals in labor markets.[62] Additional insurance through voluntary saving schemes that are "nudged" by the state reduce the burden on labor regulation of having to deal with risk management. As people become better protected through enhanced social assistance and insurance systems, labor regulation can be made more flexible to facilitate movement between jobs. Complementary support for learning new skills, as well as new arrangements for strengthening the voice of workers, become even more important. Taken together, the expanded coverage of social assistance and the provision of subsidized social insurance imply a stronger role for governments.

In applying these recommendations to Sub-Saharan Africa, several issues need to be considered. First, labor markets in the region are confronting very pronounced risks created by global trends in addition to those posed by digital technologies. Thus, social protection policies will need to manage effectively a large compendium of risks. Second, given the low baseline of social protection coverage in most Sub-Saharan African countries, an expansion of coverage as is recommended would require more resources than are available over the coming years. Consequently, it will be crucial to account for the fiscal implications of expanding coverage in the Sub-Saharan Africa context. Third, given the low income level of most Sub-Saharan African countries, it will be important to identify ways to balance competing policy priorities such as education and health, infrastructure and security, and optimizing public investments.

The chapter is structured to highlight complementary messages to WDR 2019 based on these Sub-Saharan African realities. Section 4.1 identifies the disruptions to African labor markets from global trends that will require social protection and examines the fiscal and policy constraints to comprehensive social protection coverage in Sub-Saharan Africa. Section 4.2 illustrates several social protection policy options to consider in responding to the jobs uncertainty and transitions in the future of work. It also provides recommendations for overcoming the fiscal and policy constraints to providing more realistic levels of targeted social protection coverage. Section 4.3 concludes by outlining areas for future research.

4.1 Systemic risks and fiscal constraints limit social protection coverage in Sub-Saharan Africa

The high levels of unmet needs for social protection in Sub-Saharan Africa are set to increase due to various risks from systemic disruptions to formal labor markets in a changing world of work. This section identifies these disruptive factors and the fiscal and policy constraints to expanding social protection coverage.

4.1.1 Global trends pose systemic risks to African labor markets

Recent studies, including WDR 2019, point to the systemic disruptions to formal labor markets by digitization and globalization as key determinants of the future of work.[63] However, these trends are likely to affect no more than 20 percent of the workers, due to the structure of Sub-Saharan African economies and the low levels of formalization—roughly 90 percent of the workers across Sub-Saharan African economies operate in the informal economy, as chapter 3 discusses. The starting point for the region is different. As chapter 1 observes, most Sub-Saharan African countries do not have a large manufacturing

sector (less than 10 percent of the workforce). Most employment is in agriculture (60-70 percent) and consumer services (20-30 percent)[64], often in the informal sector and characterized by income volatility.

Therefore, for the approximate 90 percent of Africans in informal labor markets, other factors will generate risks and opportunities for work and well-being. This subsection outlines these global drivers of disruption of labor markets. They include digital technology generation and adoption, economic integration, climate change and fragility, and demographic change.[65] These trends are disrupting economies, diversifying the world of work, and challenging norms such as the standard employment relationship around which risk-sharing SPL policies in industrialized countries developed for over a century.[66] The risks they pose for Sub-Saharan African economies include shocks (earnings volatility, work disruption, outdated/unsought skills, and so forth) and market failures (uncertainly, coordination failures, market power, and so forth). According to the World Economic Forum, the impact for nearly all these drivers will occur within the next five years, highlighting the urgency for adaptive action today.[67]

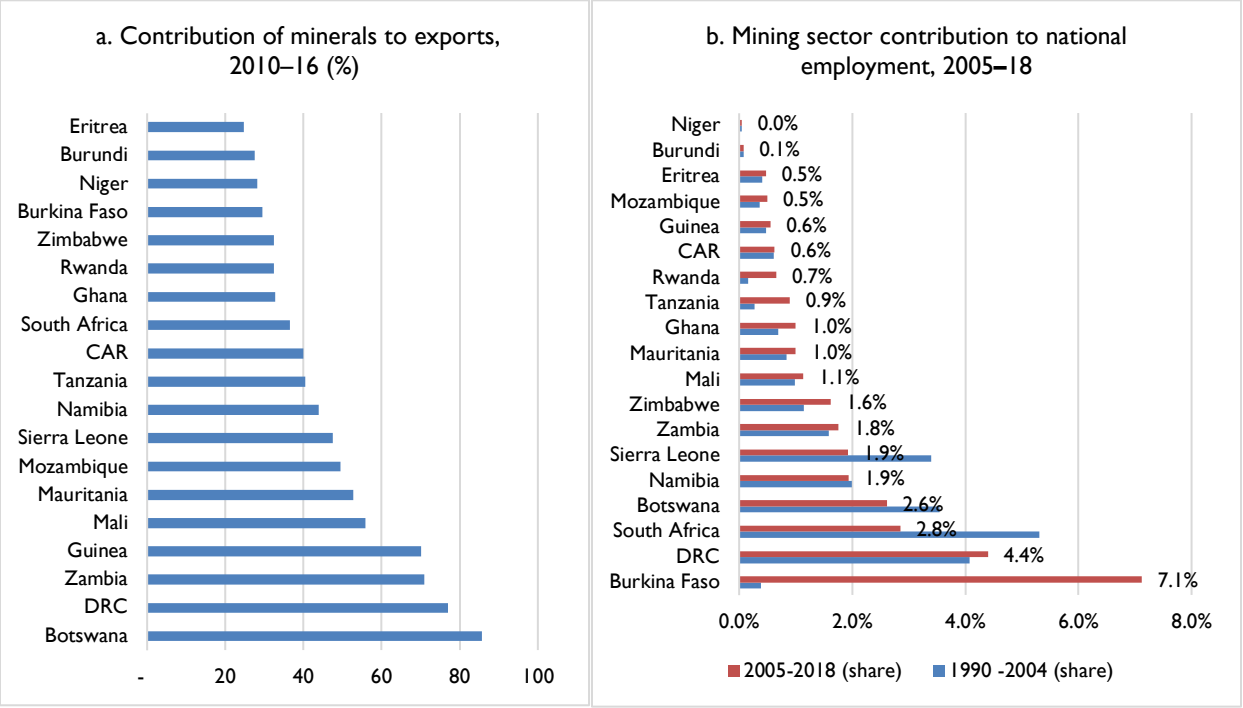
4.1.1.1 Digital technologies

Digital technology innovations are transforming the nature of work, including in Sub-Saharan Africa. As discussed in chapter 1, adoption of digital technologies has the potential for strong, positive net effects on jobs. Chapter 3 notes that adoption of digital technologies also has the potential to lead to higher productivity and jobs gains in the informal sector, with mobile technologies[68] in sectors like financial services and agriculture likely to generate a significant number of jobs for low-skilled workers.

Box 4.1: Will the adoption of digital technologies disrupt work in Africa's mining sector?

The non-renewables resource sector is one of the main "old sectors" in many Sub-Saharan African countries set to be disrupted by the adoption of digital technologies, with implications for formal and informal jobs. Of the region's 48 economies, 19 can be considered rich in mineral resources, defined by the International Monetary Fund as having mineral rents contributing to at least 25 percent of their exports.[69] Globally, it is estimated that robotic technologies in driverless vehicles, sensor-based sorting of minerals, and data analytics will reach their peak deployment in the mining sector within 10-15 years. In the global mining industry, there will be a potential loss of 330,000 jobs, or nearly 5 percent of the workforce due to the adoption of digital technologies, with implications for Africa's mineral-rich countries. Although there is a strong focus on the risk of job losses to automation, there could be improvements in safety that could result in a 10 percent decrease in lives lost and a 20 percent decrease in injuries over the next decade.[70] In Sub-Saharan Africa, the mining sector contributes a small share of aggregate national employment despite contributing between 25 and 86 percent of exports in 19 mineral-rich economies, and 60-90 percent of foreign direct investment (FDI) in many countries (figure B4.1.1).

Figure B4.1.11: Africa's mining sector is a major contributor to exports but constitutes a modest share of national employment



In many countries, the number of people engaged in artisanal and mostly informal mining is three to six times higher than formal direct jobs in the sector (figure B4.1.2). The sector constitutes a smaller share of national employment compared with agriculture, for instance. Employment in the sector has been stable, with notable exceptions. In countries like Burkina Faso and Mali, it has increased, due to recent FDI flows and relatively new large-scale gold mining activity. Only South Africa has witnessed a steady decline in absolute employment, from a peak of more than 900,000 employees to fewer than 400,000 today, and it is one of the countries where large-scale adoption of digital technology could further disrupt employment.

Figure B4.1.2: Artisanal mining absorbs more labor than formal mining operations

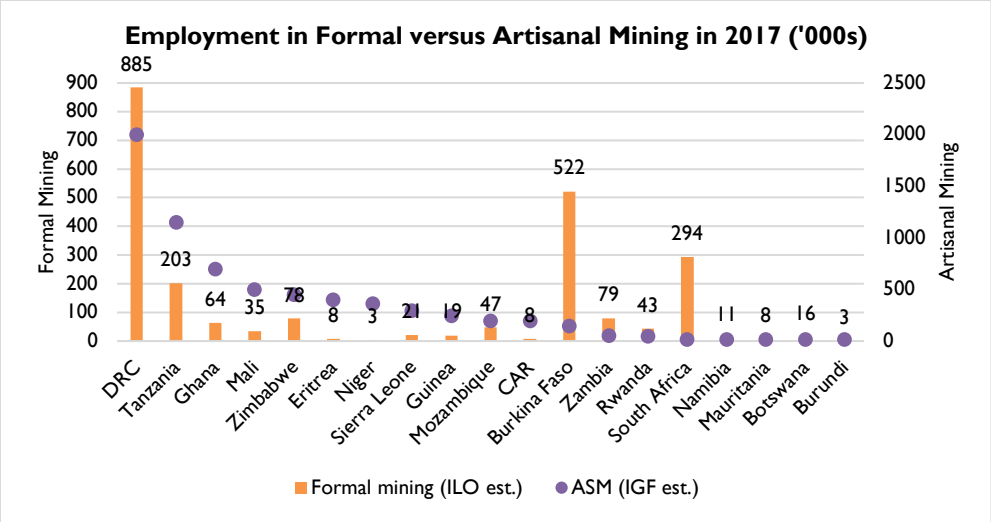
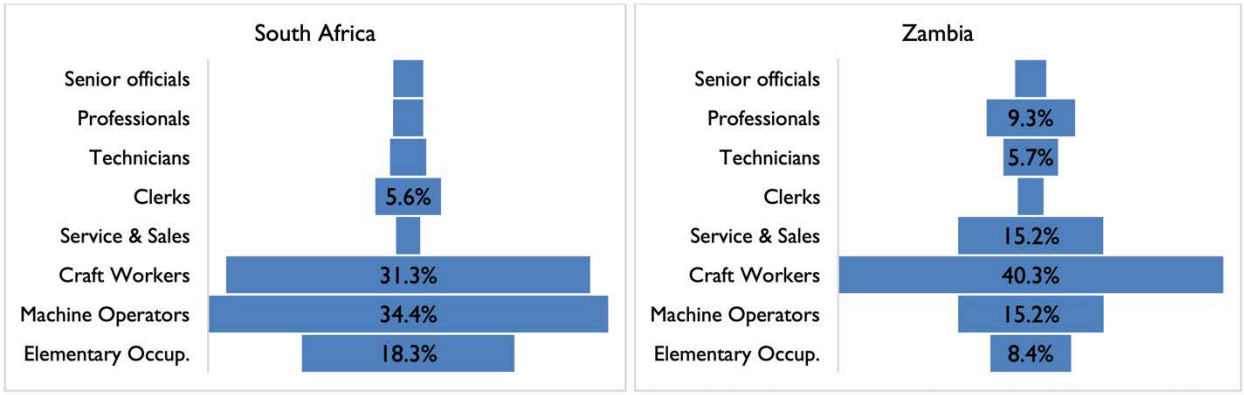


Figure B4.1.3. Most employees are in lower-skilled occupational categories in South Africa and Zambia's mining industries



There is an ongoing debate in the academic and policy literature about the impact of digital technologies on work in the mining sector. The evidence so far is sketchy and presents a mixed portrait, promising to create a win-win situation for companies, communities, and governments, and threatening to exacerbate the tension between productivity enhancement and equity concerns. Some of the questions being raised include the following. Could the adoption of digital technologies result in massive labor displacement, especially at the lower-end of occupational profiles and routine tasks (figure B4.1.3)? Could it eliminate hazardous occupational profiles in underground mines for example? Could it create new occupational profiles that are more inclusive of women, the elderly, and other marginalized groups? Could digital technologies enhance the productivity of artisanal miners, formalize their activities, and promote the development of small and medium-size enterprises in the sector through miniaturization of equipment? Could digital technologies enable the achievement of national development objectives in the sector beyond employment, through tax policy and enforcement and stronger social protection and labor interventions for mining communities? These are important policy debates for stakeholders in the mining sector, including governments, industry, and mining communities where employment in the sector is often the only major source of income.

Source: Analysis from Usman et al. (forthcoming).

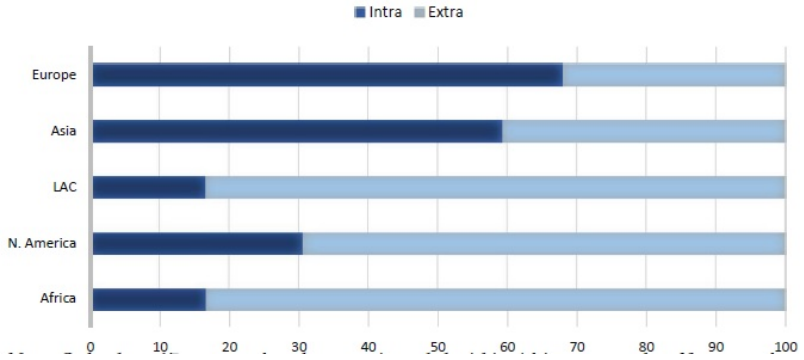
Despite the anticipated net aggregate gains in productivity and jobs that digital technologies can bring, policy makers will need to manage the transitional costs. The people moving from one job or set of tasks to others, or who are temporarily unemployed before finding alternate work, will require social protection. Policy makers will also need to mitigate the unequal distribution of these gains and potential disproportional impacts by gender, sector, and skill level.[71]

4.1.1.2 Global and regional economic integration

The acceleration of trade integration in Sub-Saharan Africa will affect labor markets in profound ways due to new economic opportunities as well as resulting adjustment costs. Given the low levels of integration in Sub-Saharan Africa (figure 4.2), trade integration is accelerating and has almost tripled since the 1980s.[72] Only about 17% of total exports is traded within Africa compared to 68% for Europe and 59% for Asia (figure 4.2). Africa has now ratified the African Continental Free Trade Area (AfCFTA) building on a history of sub-regional integration efforts[73]. Its implementation will change the trade and investment framework of countries in the region.[74] Estimates by UNECA suggest that AfCFTA has the potential to boost intra-African trade by 52% from the elimination of tariffs alone. Further elimination of non-tariff

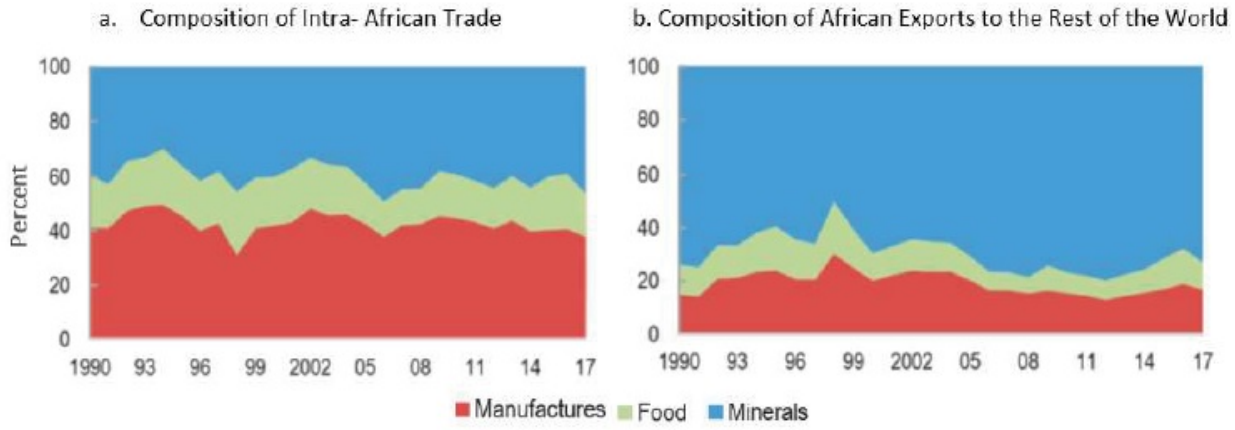
barriers (NTBs) and trade facilitation is expected to double the gains in intra-regional trade.[75] Recent analyses suggest that increased economic integration presents opportunities to create resilience to global shocks through diversifying exports[76] (figure 4.3), supporting industrial growth,[77] enabling participation in global value chains (GVCs), and increasing investment flows to the region, due to economies of scale especially for smaller African economies. The African Continental Free Trade Agreement AfCFTA is expected to increase competition, leading to efficiency gains, reduced costs and prices, and hence large welfare gains.

Figure 4.2: Intraregional trade, 2017 (percentage of total exports)



Source: UNCTAD (2018).

Figure 4.3: Composition of trade within Africa versus the rest of the world



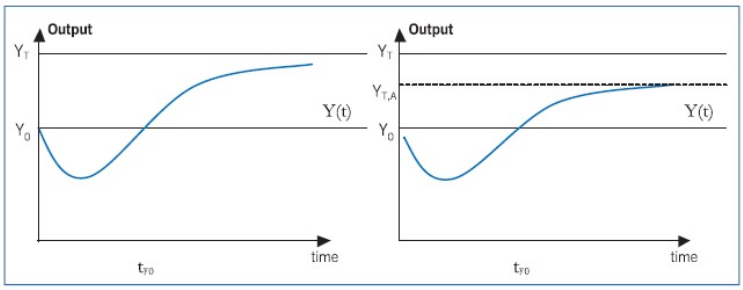
Source: Staff calculations from UNCOMTRADE and IMF data

The structural transformation following AfCFTA will have implications for the future of work in the region. Increased trade can reduce overall poverty. Between 1993 and 2008, the change in real income of the bottom 20 percent of the population in developing countries was strongly correlated with a change in trade openness.[78] Still, the reallocation of factors of production within and across sectors and countries will impose adjustment costs. In the short run, there will be job dislocations across firms, sectors, and borders, as a reduction in trade barriers increases the substitutability of labor within and between countries. Although there are expected economywide increases in investments and jobs, they are likely to divert to more efficient locations. Those communities with preponderant employment in declining industries are

likely to see increased levels of poverty, absent supportive public policies. In subsequent phases of the integration, ease of labor mobility may affect migration.

Figure 4.4 presents a simple representation of the costs of adjustment. This is defined as the value of output that is forgone in the transition to new, long-run production patterns because of the time taken to reallocate factors. The decline in the level of output during the initial phases of transition or adjustment follows a J-shaped curve.[79] More recent studies have shown that, depending on labor market frictions and the mobility of capital, the duration of the transition could be longer, and the magnitude of the adjustment costs could be larger.[80] Dix-Carneiro and Kovak (2017) show that in Brazil, regions that implemented tariff liberalization faced deteriorating labor marker outcomes in the form of falling formal sector employment and earnings over a prolonged period: while on average households experienced net gains within each percentile of the income distribution, workers in some regions suffered earnings declines that were three times larger 20 years later than 10 years after.[81]

Figure 4.4: Adjustment paths following trade liberalization



Note: The long-run equilibrium path is represented by Y_T. If trade liberalization takes place at time t_{y0} , output would rise from Y_0 to Y_T in the absence of adjustment costs. However, with adjustment costs, output will instead follow a J-curve, line $Y_{(t)}$, first declining below initial output Y_0 and gradually approach Y_T. The discounted difference between Y_T and the curve $Y_{(t)}$ is the adjustment cost.

Source: Francois, Jansen, & Peters (2011 : 216)

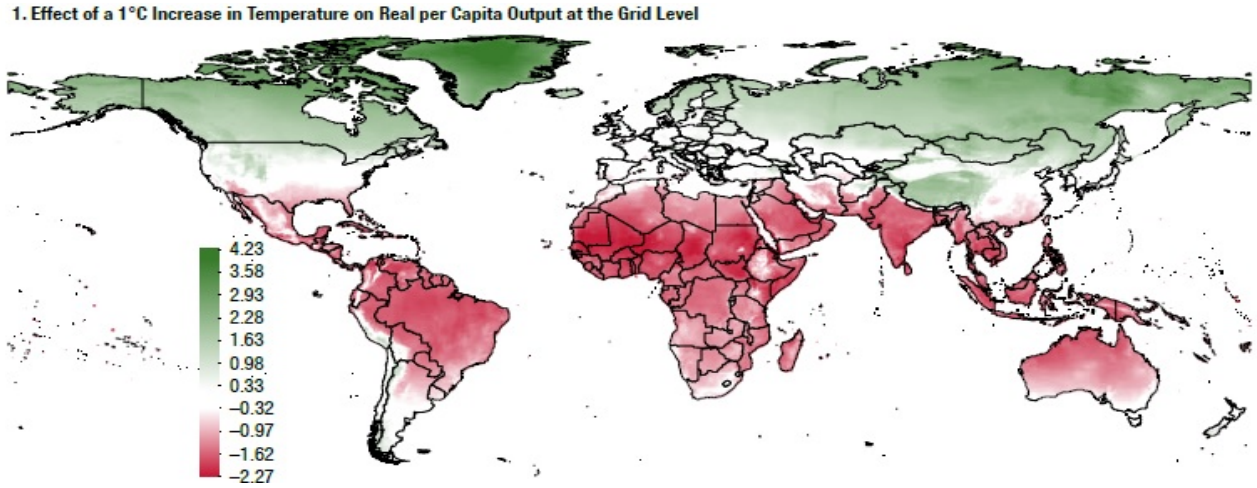
Overall, increased trade will have distributive implications with consequences on income, poverty, human development, and welfare. A large segment of the population in each country faces a high degree of vulnerability due to increasing regional competition, although there will be consumption gains. With complementary policies that reduce trade costs and barriers to the free movement of factors and better social protection measures that help workers adjust and benefit from new opportunities, regional integration through AfCFTA can raise growth and employment and reduce poverty in the region.

4.1.1.3 Climate change and fragility

Climate and conflict drivers also create shocks that are disrupting labor markets and changing the nature of work in Africa. The drivers include natural disasters (such as loss of assets and disability after floods), crop losses (as a result of drought or crop disease), and food price shocks.[82] Climate shocks are particularly acute due to the region's heavy reliance on the agriculture sector, for employment and subsistence, thereby placing many lives at risk of increased poverty and food insecurity.[83] Agrarian economies are especially vulnerable to unpredictable weather patterns and the resulting land-related conflicts. The impacts of climate change have already reduced yields by about 40 million tons of grain[84] a year between 1981 and 2002 and are projected to reach 3 percent per year by 2030.[85] Higher temperatures in tropical low-income countries

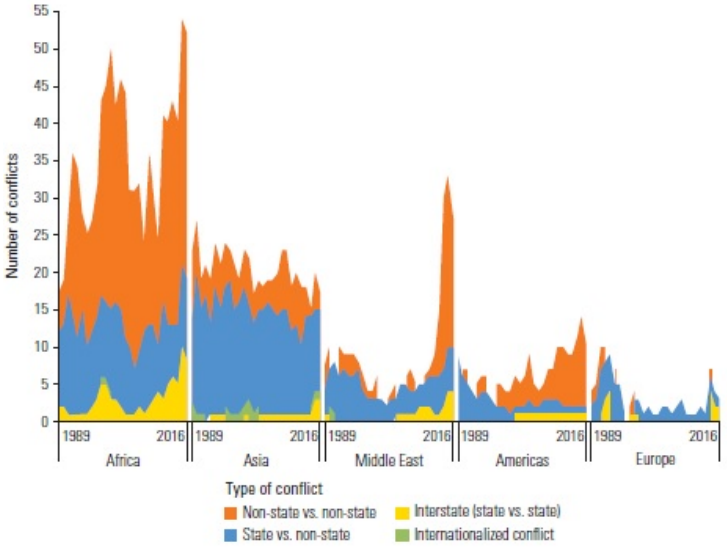
have a long-lasting impact, particularly through the agriculture and manufacturing sectors, but also on labor productivity, mortality, health, and conflict.[86] For the median low-income developing country with a temperature of 25°C, the effect of a 1°C increase lowers growth by 1.2 percentage points (map 4.1).

Map 4.1: African countries are highly vulnerable to climate shocks



Source: IMF, (2017a: 127-128)

Figure 4.5: Conflict events worldwide, by type of conflict and region, 1989–2016



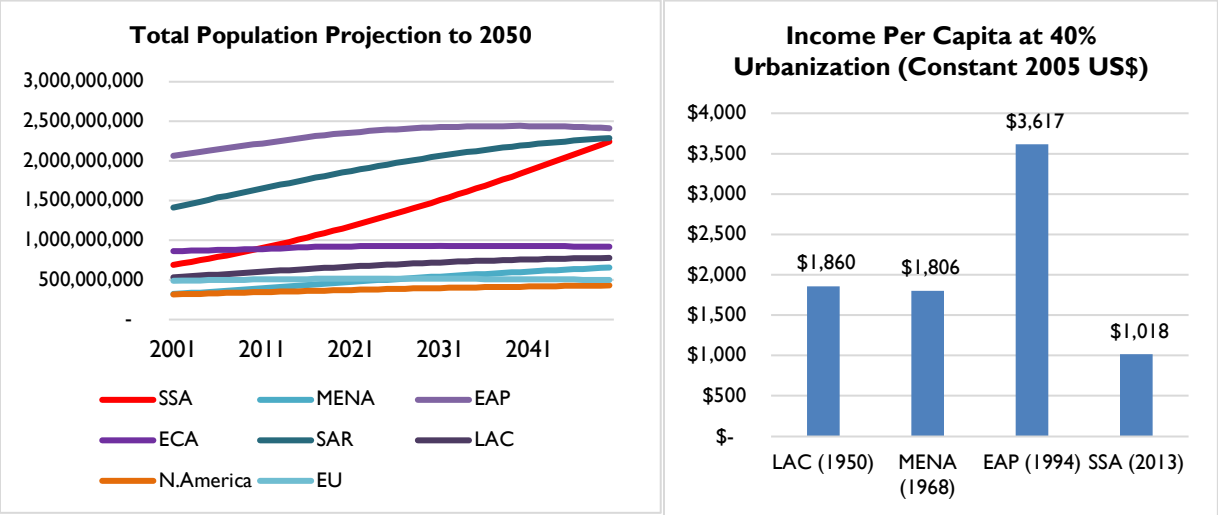
Source: United Nations and World Bank 2018, 20.

Fragile and conflict situations also create shocks that are disrupting the nature of work. OECD's (2018b) fragility framework identifies 58 fragile contexts, of which 35 are in Sub-Saharan Africa (figure 4.5).[87] Of the nine countries in extreme fragility in active armed conflict, five are in Africa. These fragile situations are increasingly transnational and have intersecting drivers, including competition for political power, violent extremism, intercommunal conflicts, climate change, rising inequality, resource scarcity, demographic pressures, new technologies, and illicit financial flows.[88] Violent conflict scatters populations and disrupts incomes. According to the United Nations High Commissioner for Refugees, by end-February 2019, there were more than 2.5 million internally displaced persons in the Lake Chad Basin, including around 2 million in Nigeria, 246,000 in Cameroon, 126,000 in Chad, and 104,000 in Niger.[89] In Central Africa, conflict is triggering forced displacement of around 641,000 internally displaced and about 591,000 refugees in Cameroon, the Democratic Republic of Congo, and Chad. In East Africa, there are 806,680 Somali refugees living mainly in Kenya, Ethiopia, and the Republic of Yemen.

4.1.1.4 Population transitions: Demographic, urbanization, and migration

A rapid demographic transition in Sub-Saharan Africa is fueling a youth bulge and urbanization and contributing to migration flows in a way that will affect the future of work. The region's population is projected to nearly double in the next two decades, from approximately 900 million in 2015 to 1.7 billion in 2040 (figure 4.6).[90] More than half of the anticipated growth in global population between now and 2050 is expected to occur in Africa.[91] Half of the population in Sub-Saharan Africa is under age 25 years. Between 2017 and 2030, the labor supply in the region is estimated to increase by 198 million,[92] with 11 million young Africans expected to enter the labor market each year for the next decade. As the labor force increases, there is a need to create 20 million jobs each year.[93]

Figure 4.6: Africa is projected to experience rapid population growth over the next decades and Sub-Saharan Africa is urbanizing at lower per capita gross domestic product than other regions



Sources: Staff calculations from World Development Indicators; Hommann and Lall 2019, 6.

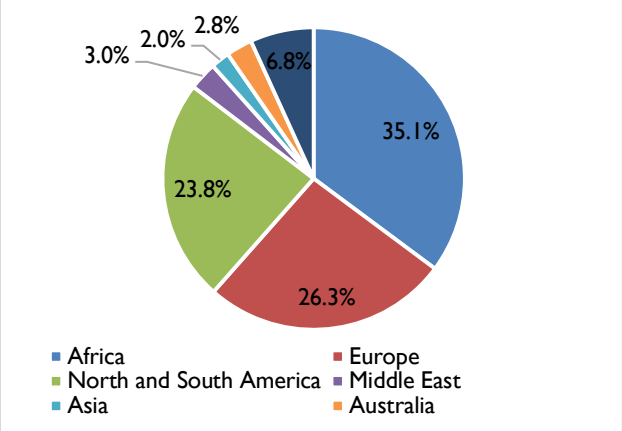
Africa's growing population will be largely city dwellers but with low incomes. Sub-Saharan Africa's urban population doubled during the past 20 years, reaching almost 400 million in 2016, rising from 31 percent in 2000 to 38 percent in 2016.[94] Nearly three-fourths (72 percent) of the region's urban population resides in urban areas outside the largest city. However, the region is urbanizing at a much lower income level than

other regions historically (figure 4.6, panel b). Today, 40 percent of the Sub-Saharan African population lives in an urban area with an average per capita income of about $1,000. In comparison, when the Middle East and North Africa region reached the 40 percent mark in 1968, its per capita income was $1,800; and East Asia's was $3,617 in 1994.[95]

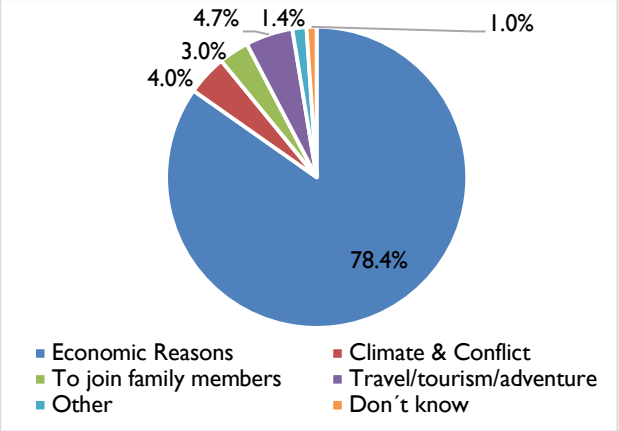
This low income means that Sub-Saharan Africa's urbanization is not accompanied by critical infrastructure investments in physical capital (transport and housing) and human capital (schools, health clinics, and so forth). These low investments undermine the agglomeration benefits of cities, raise the costs of doing business, and make cities uncompetitive. Furthermore, most Sub-Saharan African countries have not seen a large reallocation of economic activity from subsistence agriculture toward the more productive industrial and service sectors, and this has resulted in urbanization without growth.

Figure 4.7: Africa is the most likely region of emigration for Africans, and most African migrants move for economic reasons

a. Region of emigration for Africans



b. Reason for emigration



Source: Staff calculations from Afrobarometer 2019.

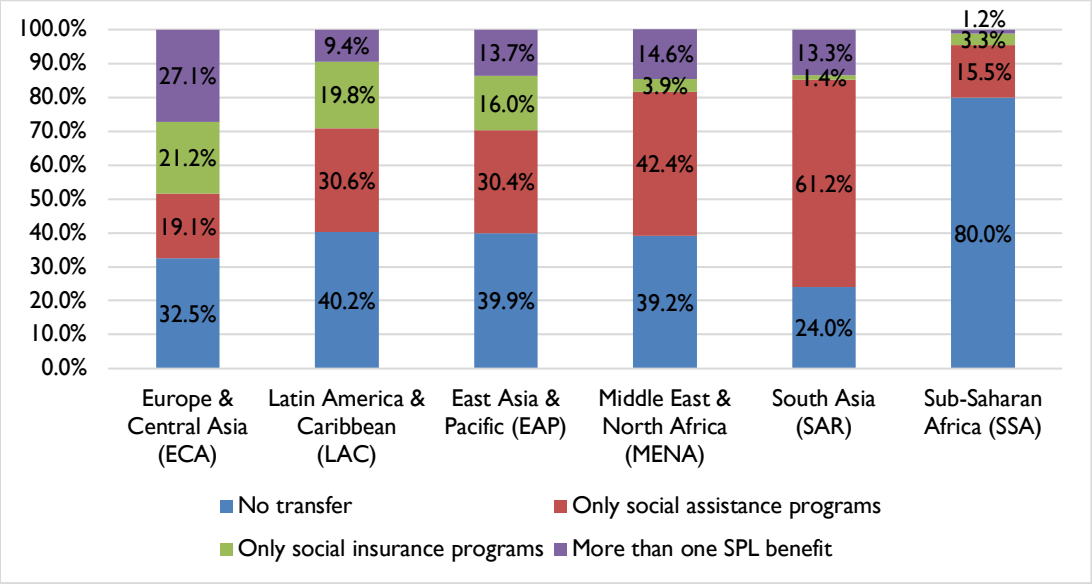
Finally, Africa's population transition is linked to increased levels of migration, especially within the continent. Since 1990, the total number of migrants from Africa has increased by almost 80 percent, reaching 36.3 million people in 2017.[96] However, African migrants represented only around 14 percent of the global migrant population, much less than the shares from Asia, Europe, and Latin America (41, 24, and 14.6 percent, respectively) in 2017. More than 70 percent of Sub-Saharan African migrants move within the continent (figure 4.7, panel a). Almost 80 percent of African migrants are driven by the hope for better economic or social prospects (figure 4.7, panel b). According to Afrobarometer data, contemporary African migrants are mostly young, with about 60 percent of irregular migrants younger than age 35 years. Therefore, the intersection of the population boom, youth bulge, urbanization, and migration will have significant implications for work, especially in cities and urban areas.

4.1.2 Fiscal constraints to social protection coverage in Sub-Saharan Africa

There is a low and fragmented social protection coverage in Sub-Saharan Africa compared with other regions of the world that is underpinned by fiscal and policy constraints.[97] SPL systems cover less than 20 percent of Sub-Saharan Africa's population (figure 4.8, panel a). Most African countries have recently established social safety net (SSN) programs to protect the poor and vulnerable.[98] The number with SSN programs rose to 18 countries by 2000, 36 in 2010, and 45 in 2017 (figure 4.8, panel b). By 2016, 32 African countries had established national social protection strategies or policies, with an SSN as a core pillar. The average number of programs per country is 15, ranging from two in the Republic of Congo and Gabon to 56 in Burkina Faso. Program duplication often occurs, especially in poor countries with weak institutional environments.

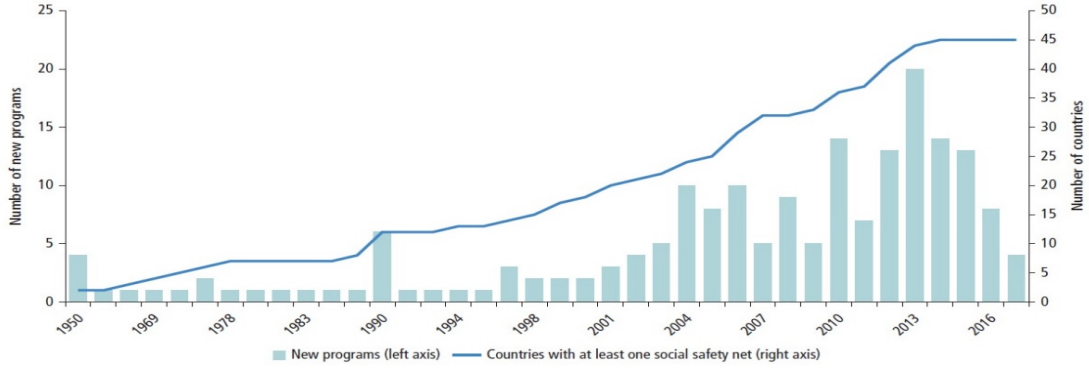
Figure 4.8: Social safety net coverage and number of programs

a. Most of the population in Sub-Saharan Africa is not covered by a social protection and labor program



Source: World Bank Atlas of Social Protection (ASPIRE) database.

b. More social safety net programs have been established in recent years[99]

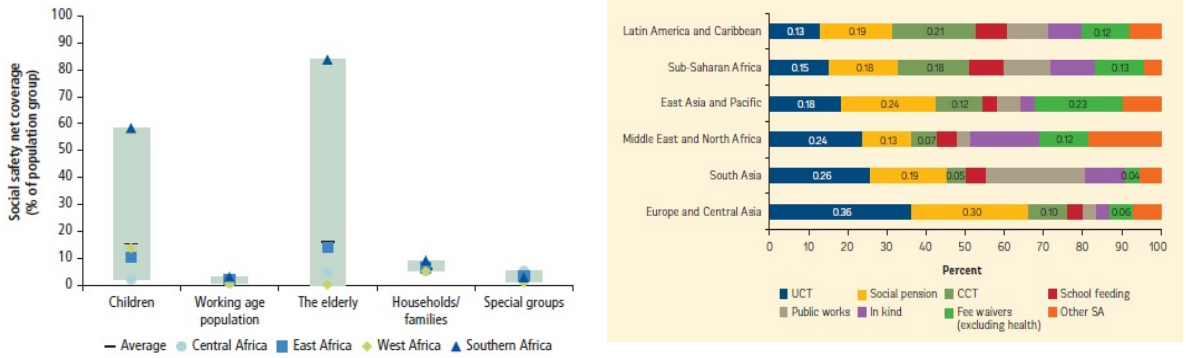


Source: Beegle, Coudouel, and Monsalve 2018, 56.

SSN programs cover more people than social insurance and other SPL instruments. Of the Sub-Saharan African populations that are covered, 78 percent only have access to SSN programs, while only 17 percent are covered by social insurance (figure 4.9). The SSN instruments vary. Cash transfers, conditional and unconditional, account for almost 41 percent of the SSN budget; public works constitute 12 percent; and in-kind transfers account for 11 percent in the region. Burundi, the Central African Republic, Ethiopia, and Liberia spend the highest share of gross domestic product (GDP) on public works in Sub-Saharan Africa.[100] Social pensions are more prevalent in upper-middle-income and high-income countries and in Southern Africa. In Central Africa and fragile states, SSNs are widely used as a response to shocks, and emergency and food-based programs are the most common types of programs.

Social insurance programs in Africa target the elderly, and SSN programs predominantly target children, directly or indirectly, by assisting households with children.[101] Of all the SSNs directly targeting children through nutrition interventions, 29 percent target the benefits at orphans and other vulnerable children, school feeding programs, provision of school supplies, and education benefits (figure 4.0). Of the 31 percent of the programs that target households more broadly, 19 percent target working-age individuals; 6 percent target the elderly; and 14 percent target other population segments, including the disabled, refugees, and internally displaced people. Old-age and veterans' social pensions vary from 7 percent in upper-middle-income countries and 9 percent in Southern Africa to less than 1 percent in low-income countries.

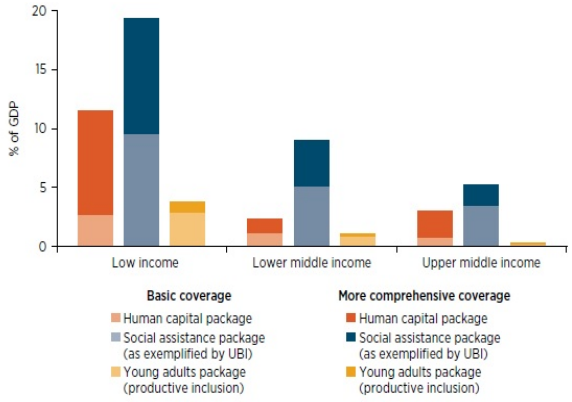
Figure 4.9: Social safety net coverage of population groups in Africa, by region and program type



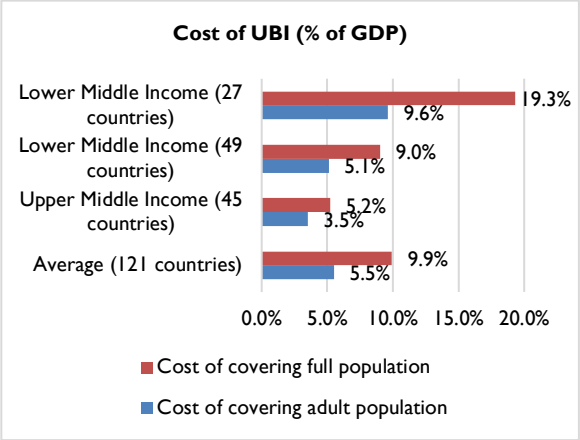
Sources: Beegle, Coudouel, and Monsalve 2018, 62–63; World Bank Group 2018.

Figure 4.10. Social assistance packages in a changing world of work and the cost of universal basic income

a. Social assistance packages



b. Cost of universal basic income



Source: World Bank 2019, 16, 131–32.

The low level of SPL coverage in Sub-Saharan Africa and the various risks in the future of work would challenge the comprehensive implementation of the social assistance packages recommended by WDR 2019. A universal basic income (UBI) is, for instance, put forward as an important option for expanding social assistance.[102] It is meant to provide a guaranteed social minimum through a single program with three design features. First, the program is aimed at every individual, independent of income or employment status. Second, participants do not have to fulfill any conditions or reciprocal co-responsibilities. Third, assistance is provided in the form of cash instead of in-kind transfers and services. The fiscal implications of a UBI could be significant. Thus, a basic social assistance package could cost 9.6 percent of GDP in low-income countries, 5.1 percent in lower-middle-income countries, and 3.5 percent in upper-middle-income countries (figure 4.10, panel b). A comprehensive package could reach 18 percent of GDP for the poorest countries.[103] More broadly, a guaranteed "social minimum" that provides a safety net starting with the poorest is recommended. Implementing these UBI and social minimum recommendations in Sub-Saharan Africa would be challenging due to the fiscal and policy constraints of insufficient public investments, low levels of revenue mobilization, and competing policy priorities.

4.1.2.1 Insufficient public investments in social protection and labor systems

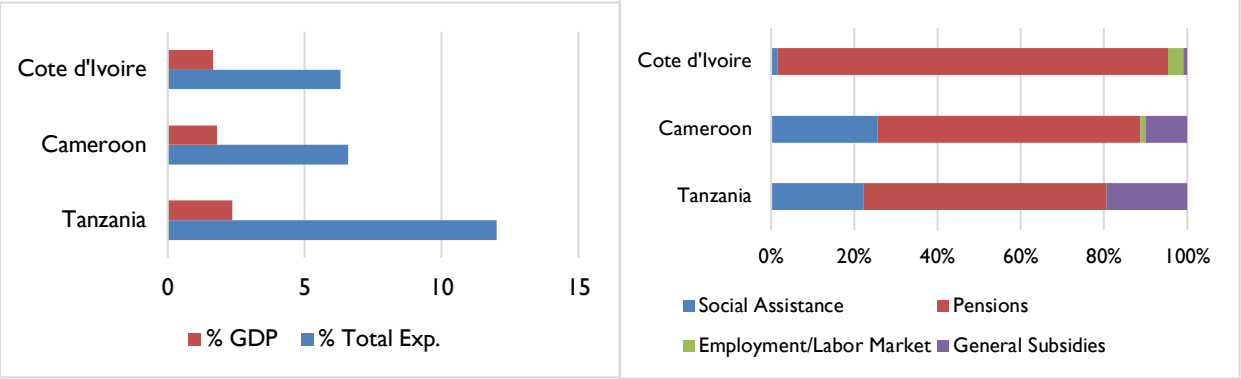
Insufficient resources are devoted to social protection in Sub-Saharan Africa due to low levels of social spending, donor dependence, misallocation, and inefficiencies.

On aggregate, public expenditures on social protection in Sub-Saharan Africa are tilted toward pensions for formal workers. Social protection spending amounts to 1.7 percent of GDP in Côte d'Ivoire, 1.8 percent in Cameroon, and 2.4 percent in Tanzania (figure 4.11). As a percentage of total expenditures, it amounts to 6.3 percent in Côte d'Ivoire, 6.6 percent in Cameroon, and 12 percent in Tanzania. Looking closer at the distribution of SPL expenditures by program type reveals a heavy concentration around pensions. These amount to 93.9 percent of the total in Côte d'Ivoire, 66.7 percent in Cameroon, and 51.1 percent in Tanzania. SSN programs come a distant second at 27 percent of total spending in Côte d'Ivoire and 19.4 percent in Tanzania. There is more spending on general subsidies than on labor market programs in Cameroon and Tanzania.

Figure 4.11: Social protection and labor programs in Côte d'Ivoire, Cameroon, and Tanzania

a. SPL spending constitutes a small share of total expenditure

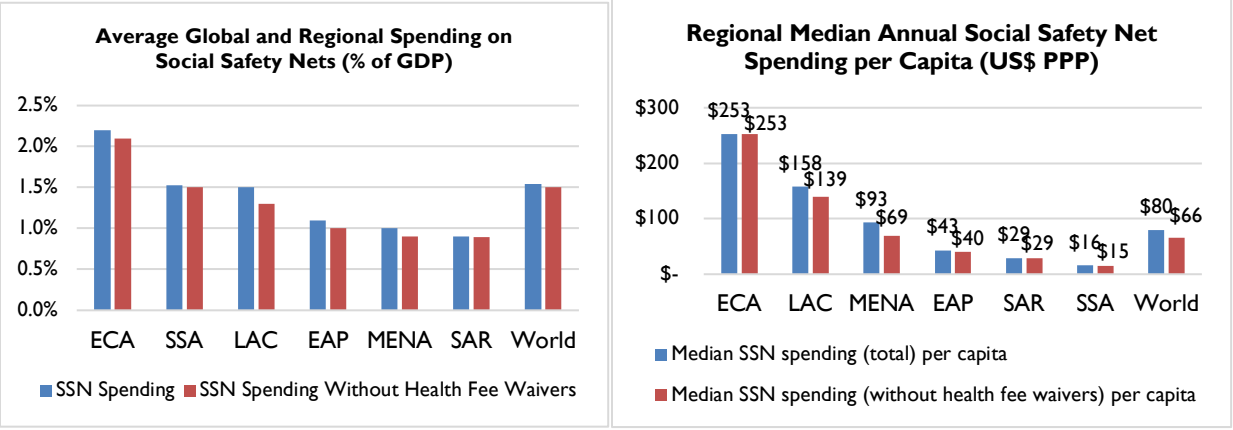
b. SPL expenditures are heavily concentrated in pensions



Source: Staff calculations from World Bank public expenditure reviews.

Social safety net spending as a share of GDP by countries in Sub-Saharan Africa is similar to the global average for developing countries but lower in per capita terms. Countries in Sub-Saharan Africa, as other developing countries, spend on average 1.5 percent of GDP on SSN programs excluding general price subsidies.[104] Drawing on a sample of 124 countries, figure 4.12 shows how the region compares with other parts of the developing world. Similarly, median SSN spending of 0.7–0.8 percent of GDP in Sub-Saharan Africa is comparable to that in East Asia and the Pacific, the Middle East and North Africa, and South Asia.[105] Although Sub-Saharan Africa is the second largest spending region in the world in relative terms, in absolute terms it is last. The Latin America and the Caribbean countries spend purchasing power parity (PPP) US$158, whereas African countries spend PPP US$16 per person.[106]

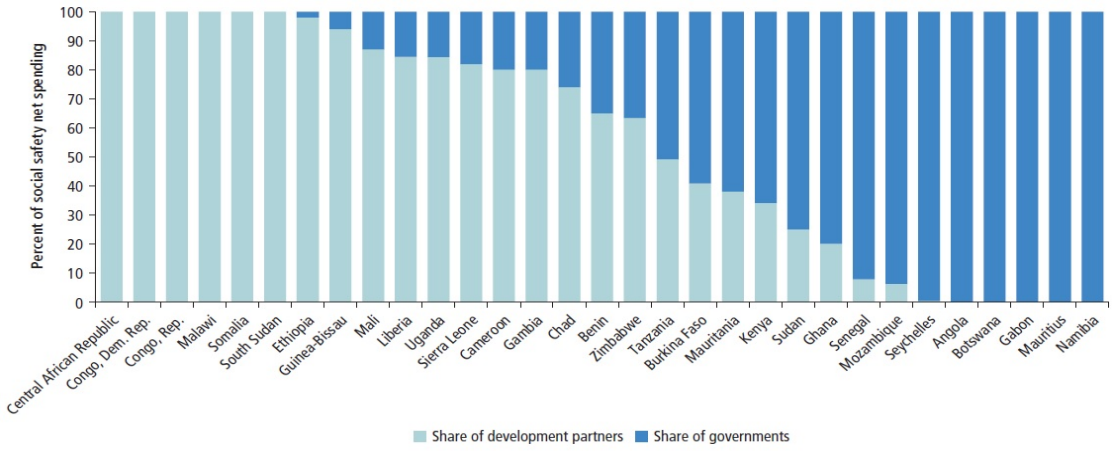
Figure 4.12: Average SSN spending in Africa as a share of GDP is similar to the global average but lower in per capita terms



Source: World Bank Group 2018,17–25.

Over the past two decades, many countries in Sub-Saharan Africa introduced flagship SSN programs and are rapidly expanding coverage, but these programs are largely donor funded. Development assistance through bilateral and multilateral organizations represents an average of 55 percent of SSN financing in most African countries (figure 4.13).[107] About two-thirds of the United Nations High Commission on Refugees budget is allocated to programs in Africa, and this humanitarian assistance is counted as SSN spending.[108] South Sudan spends 10 percent of its GDP on SSN, the highest across Sub-Saharan Africa. However, it has only two emergency assistance programs, both of which are fully financed by donors. Dependence on external financing can jeopardize sustainability if programs fully rely on donor funding, although some programs have transitioned from full funding by development partners at inception to increased support by domestic resources. For instance, Kenya has committed to supporting SSN programs with domestic resources through its National Safety Net Program, which fully funds some programs and covers more than half the cost of others. Nevertheless, SSNs are mostly funded by external financing.

Figure 4.13: Share of donor-funded safety nets in Sub-Saharan African countries



Source: Beegle, Coudouel, and Monsalve (2018, 154).

Inefficiencies in SPL expenditure also contribute to the low levels of coverage. It is estimated that administrative costs represent an average of 17 percent of SSN program spending.[109] This reflects the cost of the initial investments in systems and the small size of many programs. As programs increase in size, average administrative costs are likely to fall. For instance, the administrative costs of the Social Safety Nets Project in Cameroon accounted for 65 percent of program spending at launch in 2015, but fell to 23 percent in 2016, while the number of beneficiaries quadrupled. In Mali, the administrative costs of the Jigisemejiri (Tree of Hope) Safety Nets Project fell from 41.8 to 11.9 percent of program costs in 2014–16, while the number of beneficiaries grew from about 30,000 to more than 375,000 people. However, expansion may not lead to immediate savings if new networks and systems need to be developed for geographic expansion, as occurred in the Tanzania Productive Social Safety Net.

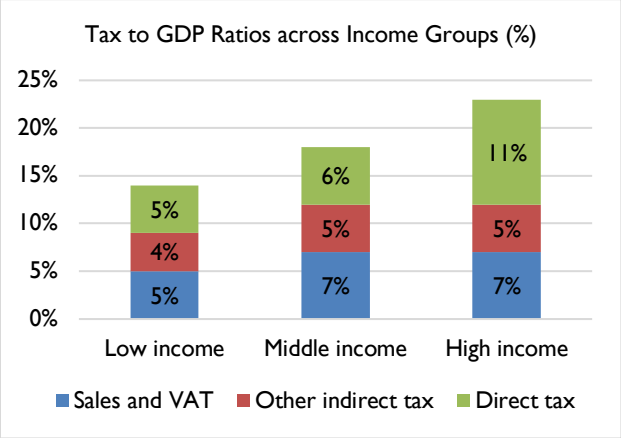
4.1.2.2 Challenges in revenue mobilization to expand social protection coverage

Sub-Saharan African countries have limited coverage and spend less per capita in part due to low levels of domestic revenue mobilization (DRM). WDR 2019 notes that expanding social assistance would require a significant mobilization of revenue by governments worldwide.[110] The low-income economies in Sub-

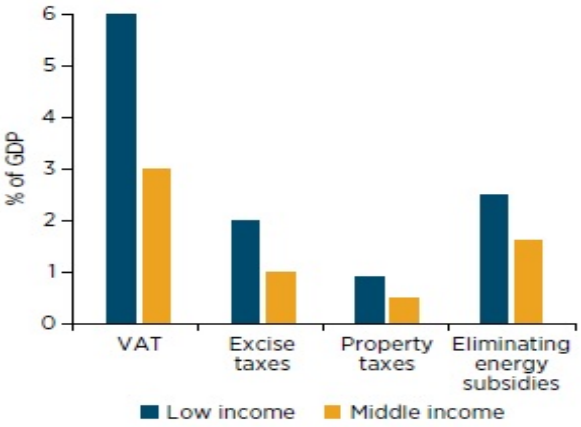
Saharan Africa have the lowest tax-to-GDP ratio, at 15 percent in 2016, below middle-income economies (19 percent) and high-income economies (24 percent) (figure 4.14). Although revenue collection has improved overall, some resource-rich economies, including Nigeria, Equatorial Guinea, and the Democratic Republic of Congo, experienced reversals (figure 4.15). In the Democratic Republic of Congo, for instance, government tax and non-tax revenues have been declining since 2012, amounting to just 8.1 percent of GDP in 2017.[111] Sub-Saharan Africa remains the region with the most economies with DRM below a minimum threshold of 15 percent[112] and the lowest tax-to-GDP ratio globally.

Figure 4.14: Low-income countries have lower tax-to-GDP ratios

a. Tax-to-GDP ratio, by income group (%)



b. Tax as percentage of GDP



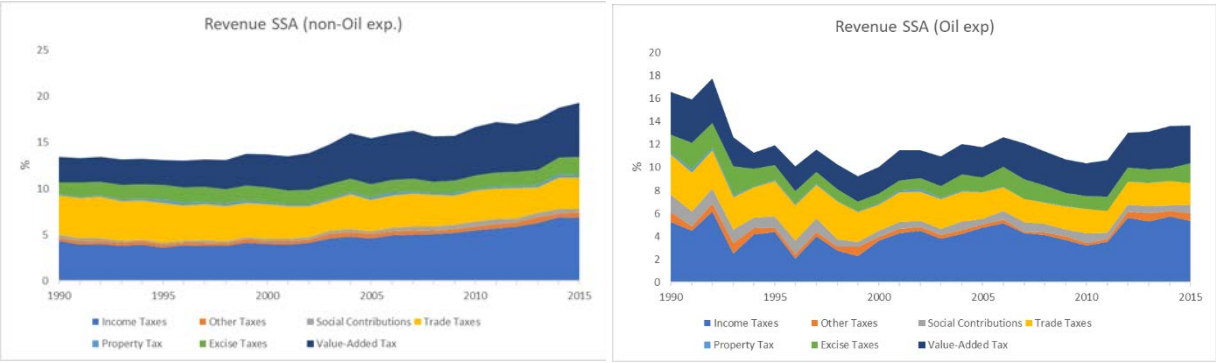
Source: World Bank 2019.

The reasons underlying weak revenue collection in Sub-Saharan Africa are multifaceted[113] and linked to tax policy and administration challenges. Low tax collection is correlated with low tax effort (see figure 4.16).[114] The effectiveness of the most important tax instruments tends to be below global averages and varies, especially among resource-rich economies.[115] Although many thematic areas are relevant, this chapter focuses on four. First, tax exemptions and other fiscal incentives limit resource mobilization. Differential tax treatment of specific sectors, activities, or regions is common and has wide ranging implications for the fairness, efficiency, and effectiveness of tax regimes. Country-level estimates of tax expenditures are around 2-7 percent of national output.[116] In Mauritania, tax expenditures were estimated to amount to 4.9 percent of GDP, or 30 percent of total non-extractive tax revenues. They are also administratively burdensome[117] and once granted prove difficult to eliminate, as beneficiaries lobby for their continued application. Research at a global and regional level, however, suggests that although taxes matter for investment, the effects tend to be less important in developing economies.[118] In several Sub-Saharan African economies, tax holidays have been shown to have no positive effect on investment.[119]

Figure 4.15: Non-oil-rich economies in Africa have a stronger and more stable revenue performance than oil-rich economies

a. Revenue, non-oil-rich countries

b. Revenue, oil-rich countries

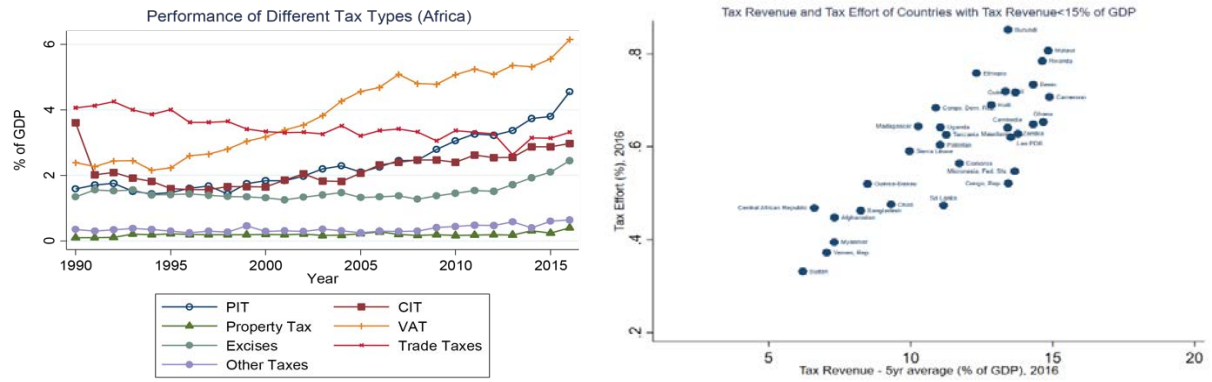


Sources: Staff calculations based on World Bank Group and UN WIDER data.

Figure 4.16: Tax performance and revenue generation have increased in sub-Saharan Africa but still lower than global levels

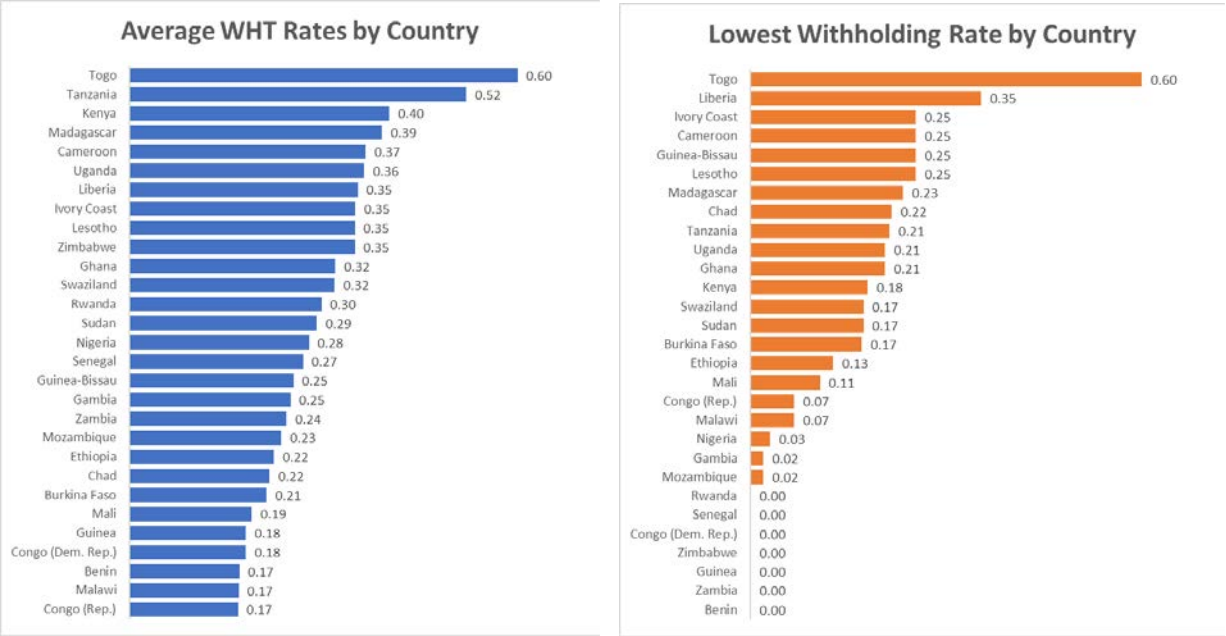
a. Excise and Property Taxes are some of the underused instruments in Sub-Saharan Africa

b. Tax-to-GDP and tax effort



Sources: Staff calculations based on World Bank Group and United Nations University World Institute for Development Economics Research data.

Figure 4.17: African economies have concluded some highly unbalanced tax treaties



Sources: Staff calculations using data from International Centre for Tax and Development and Hearson (2016).
Note: A higher value means a higher share of taxing rights for the source country. The "WHT Rate Index" provides an average of a linear score for the withholding rate on dividends, interest, and royalties.

Second, international taxation challenges can undermine DRM efforts in Sub-Saharan Africa.[120] Several studies find that developing countries are relatively more exposed to profit shifting by multinationals[121] in an environment where revenue collection is often concentrated around a few firms.[122] Additionally, tax treaties that allocate taxing rights between countries can be a major source of revenue losses for Sub-Saharan African economies. As figure 4.17 shows, several countries have concluded highly unbalanced tax treaties, some of which reduce corporate income tax revenues by around 15 percent.[123]

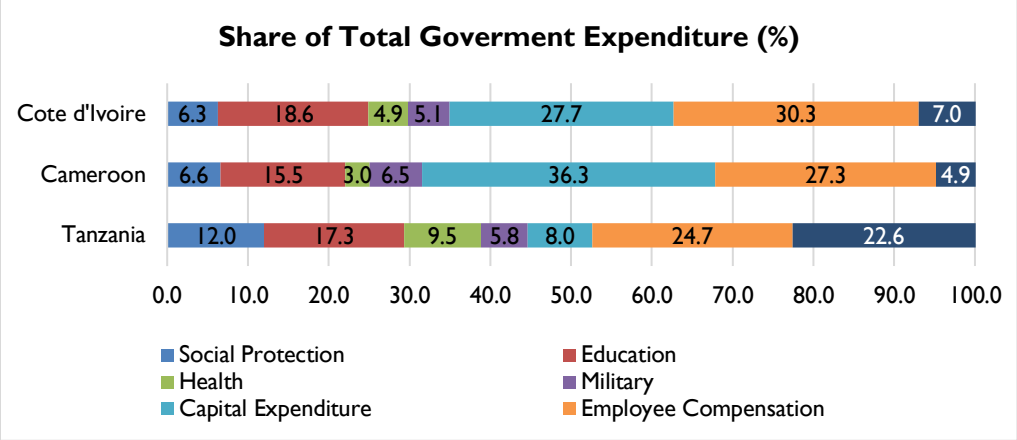
Third, indirect taxation continues to account for the largest share of revenues in most countries in the region. Value-added tax (VAT) remains the workhorse of DRM and has often allowed increasing the tax-to-GDP ratio. Given the importance of VAT in the revenue mix, it is important to maintain an efficient and administrable policy and have appropriate administrative capacity in place. Exemptions often narrow the tax base[124] and complicate administration but may sometimes be required to get the VAT accepted. In the Democratic Republic of Congo, for instance, the effectiveness the VAT, which was introduced in 2012, is undermined by the expansion of exemptions and lack of appropriate administrative systems (World Bank Group 2019). Restrictions on VAT refunds and administrative constraints are also common and an "Achilles' heel" for the functioning of the VAT. Pressures on a proper refund system can result from a lack of state resources, with governments effectively borrowing from taxpayers through the refund system, and there is real and perceived inability to guard against refund fraud, essentially an administrative challenge.[125]

Fourth, other underutilized tax instruments include excise duties, which often amount to less than 1 percent of GDP despite their comparative ease of administration—and property taxes, which can be an important source of local revenues and can be equitable when assessed based on wealth criteria.

4.1.2.3 Competing priorities for public investments and policy trade-offs

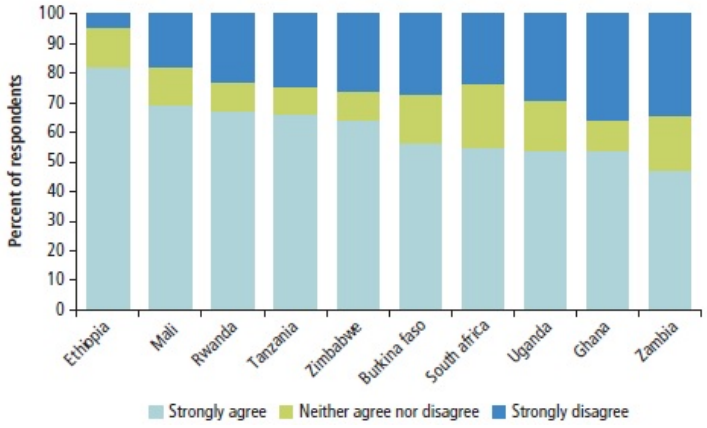
The competing policy priorities for public investments in many countries in Sub-Saharan Africa can affect public investments in SPL systems. Many countries are grappling with poor infrastructure, inefficient health systems, low educational attainment, and security and environmental challenges, all of which require government attention. Recent estimates suggest that the region's infrastructure needs amount to US$130 billion to US$170 billion per year, with a financing gap in the range of US$68 billion to US$108 billion.[126] Thus, SPL expenditure broadly tends to be much lower than public investments in other sectors, including public sector wages and capital expenditure (figure 4.18). On average, Sub-Saharan Africa devotes 4.6 percent of total government spending to SSNs.[127] This is lower than expenditures on energy subsidies, health care, education, and, in some cases, the military. In West Africa and the Sahel, many countries face severe security threats from violent extremism alongside high rates of poverty and vulnerability. Spending on energy subsidies—often cited as a means of supporting vulnerable households but largely regressive in practice—is greater than spending on SSNs, with particularly high levels in Central and Eastern Africa and in low-income countries. Therefore, resources exist to rebalance available fiscal resources toward SPL interventions, although decisions will not be easy, given these competing demands.

Figure 4.18: SPL expenditures are lower than other public investments



Sources: Staff calculations from public expenditure reviews; Beegle, Coudouel, and Monsalve 2018, 229.

Figure 4.19: Receiving cash transfers without working for it is considered humiliating in several African countries



Source: Beegle, Coudouel, and Monsalve 2018, 144.

There are also political economy factors related to perceptions of SSNs and expectations for public investments. In several African countries, a majority of the population declares that it is humiliating to receive money without having to work for it (figure 4.19).[128] Among many households, the ability to provide for the needs of one's family is considered an aspect of human dignity. This fits the view in many countries that recipients of SSNs are undeserving of assistance and may become dependent on handouts—although investments in human capital are investments in the region's most precious asset.

There are also perceptions that SSN programs do not have productive impacts and are therefore a waste of public resources. In a study on cash transfers in five countries, individual beneficiaries saw few if any links between the cash transfer program and other sustainable livelihood options and stated that it could increase dependency.[129] Although a minority of beneficiaries said they felt stigmatized by cash transfers, experiencing a loss of dignity, many said that cash transfers had increased their sense of self-worth and given them more control over their lives. In the same vein, a recent study finds that cash transfers have positive impacts on various development indicators, including monetary poverty, education, health, savings and investments, employment, and empowerment, but that these impacts depend on the programs' design and implementation features, including payment mechanisms, conditionality and complementary interventions, and supply-side services.[130]

4.2 Social protection policies should manage risks, leverage opportunities, and optimize resources

This chapter builds on WDR 2019's recommendation for a social protection system that is progressive and starts with the most vulnerable. For Sub-Saharan Africa, these SPL systems should aim for directly addressing shocks[131] and risks from disruptions in labor markets. Given the low levels of DRM in the region, the SPL systems need to be fiscally sustainable and balance policy trade-offs. These SPL solutions will thus have three dimensions. One dimension strengthens traditional social protection systems to manage risks. A second dimension turns these risks into opportunities to provide innovative SPL solutions leveraging domestic and regional markets. The third addresses fiscal and policy constraints by optimizing resources

through a multi-sectoral approach to SPL policy and coordination of various stakeholders. An illustration of some policy solutions, that is not exhaustive, is provided in table 4.2, and a few examples are highlighted in the following subsections.[132]

Table 4.2: Illustration of social protection policies to mitigate risks and leverage opportunities

	Digitization and trade integration risks	Climate change and fragility risks	Population transition risks
Social assistance	• Public works programs (PWPs) to manage transitions and generate income for displaced workers.[133] • To strengthen social assistance, mineral-rich economies can directly distribute resource revenues to host communities that could be affected by automation of mining jobs, through resource-dividend schemes.[134] The sub-national, resource-dividend schemes in Alaska and Canada are interesting examples.[135]	• Flexible and scalable social safety nets (SSNs) can help households mitigate shocks and enable them to respond after they occur.[136] Digital technology-supported social registries can help in identifying and targeting individuals and households at risk.[137] "Productive-inclusion" elements can help enhance productivity. • PWPs can increase household and climate resilience, for example, soil and water conservation and management, development of irrigation channels, food storage facilities, and rainwater capture, renewable energy jobs,[138] and emergency cash-for-work programs.[139] • Private transfers and other informal SSNs can be leveraged to complement weak formal social protection systems in fragile situations. These include Islamic Zakat, Church tithings, and revolving village savings and credit associations. They could be strengthened with formal risk-pooling and reinsurance solutions that offer protection for covariate and catastrophic risks	• SSNs that are targeted at the urban poor can help working age populations in transition. • "Safety Nets Plus"[140] delivers complements to cash transfers to the urban poor with active labor market policies (ALMPs) such as links to financial services, access to capital or training in a range of skills including microenterprise development, and technical and life skills.
Social insurance	• Social insurance reforms should expand insurance coverage beyond formal	• Governments can facilitate and strengthen private sector	

	employer-employee contracts, especially to the informal sector.[141]	solutions to insurance and risk-sharing.	
Labor market policies	• ALMPs can facilitate the transitions of workers to new jobs displaced by trade liberalization or automation and minimize the costs of trade adjustment. These policies include training and job search programs, formal and vocational education, and skills-job matching programs.[142]		• ALMPs, remedial training programs and employment, entrepreneurial and business support in collaboration with the private sector[143] especially in the digital economy. Some initiatives across the continent include the Microsoft tech hubs for software engineers in East and West Africa; business training for tech entrepreneurs by Alibaba in collaboration with the Rwandan government[144] and by the Tony Elumelu Foundation Entrepreneurship Program.[145]
Other	• Investments in regional public goods, including early warning systems for natural disasters and epidemics, regional centers of excellence on research and training, development of private markets for risk-sharing,[146] and a regional approach to reduce remittance costs.		

4.2.1 Manage risks by strengthening traditional SPL programs

Address uncertainty of disruptions from digital technologies and trade integration.

Mitigating disruptions from technological change and the adjustment costs of trade integration will entail managing the uncertainty of employment transitions. WDR 2019 recommends reforming industrial era social insurance arrangements to extend coverage to more people irrespective of their employment situation. The limited coverage of current contributory schemes alongside rigid labor regulations in Sub-Saharan Africa limits the flexibility of firms and discourages firms from hiring workers in labor abundant countries.[147] Although this reform of industrial era systems may vary across countries, an overarching principle is to ensure convergence in the types of benefits and protections that formal and informal workers receive.[148] Given the size of the informal economy, as discussed in chapter 3, a key priority for Sub-Saharan Africa to manage such transitions is to extend social protection coverage to the informal sector and those in the "gig economy." Social pensions for informal sector workers should start with a voluntary scheme that incentivizes them to save for old age.[149] The infrastructure for the operationalization of the pension scheme builds on existing financial inclusion and national identification systems. Thus, microfinance institutions and digital payment systems can serve as the primary method for participants to contribute to the scheme and, alongside informal sector associations, can play an important outreach function. The scheme's administration, in the absence of the employer, can be linked to the country's national identification system. The Governments of Ghana and Kenya were the first in the region to introduce such schemes to cover the

informal sector. Other examples abound. Some countries in Latin America have extended coverage to small enterprises and the self-employed by a subsidy combined with a simplified tax and social security contribution mechanism called a mono-tax.[150]

Addressing risks resulting from climate change and fragile situations

To address disruptions from climate change and conflict, shock-responsive social protection systems can help manage resulting risks to household incomes.[151] Africa's agrarian economies and poor regions are particularly vulnerable to covariate shocks that affect large groups of people simultaneously. "Adaptive Social Protection" (ASP) can increase household resilience against these shocks and respond quickly to them.[152] ASP employs various instruments—from cash transfers to emergency cash-for-work programs—with the overarching objective of preventing individuals and households from sinking into chronic destitution (box 4.2).

Box 4.2: Productive inclusion through the Sahel Adaptive Social Protection program

"Economic inclusion" or "productive inclusion" programs are multi-sectoral interventions that support and enable households to achieve sustainable livelihoods and increase their incomes and assets, while building human capital and promoting social inclusion. The Sahel Adaptive Social Protection program is an example of a regional safety net that has productive elements. It covers severely climate-stressed and very low-income countries in the Sahel (Burkina Faso, Chad, Mali, Mauritania, Niger, and Senegal). It aims to foster increased productivity for very poor households engaging in agriculture and non-agricultural self-employment through a "graduation-type" integrated package designed to help them manage risks and increase resilience. Selected beneficiaries receive group formation and coaching through community-level agents, access to savings (village savings and loan associations), technology training, a $150 cash grant, and psycho-social support (life and social skills training and an aspirational video). Several variations are being tested across countries (different recipients of the programs, conditional transfer recipient or not; rural versus peri-urban, and timing at the beginning or end of the transfer cycle). Different delivery arrangements are also being tested.

Source: World Bank's Partnership for Economic Inclusion Trust Fund.

Additionally, in situations of fragility and natural disasters, informal safety nets can complement weak or nonexistent formal systems. They promote a pooling of risks and shared responses to common life-cycle and livelihood risks for individuals and households. These informal SSNs are based on ties of shared kinship or locality, or can be inspired by religious values of charity and redistribution. Among Muslim communities in the Sahel, Zakat is a type of tax system explicitly intended to reduce inequality.[153] Zakat obliges those with a minimum level of wealth (*nisab*) to set aside 2.5 percent of the total to support the poor and needy as a way of "purifying" one's riches.[154] The eight categories of intended beneficiaries of Zakat correspond closely to the population groups in need of social protection. Other private intra-household transfers contribute up to 18 percent to the revenue of poor households and up to 26 percent for female-headed households in the Sahel.[155] Village savings and loans associations (VSLAs) that are popular across Sub-Saharan Africa can also serve as informal social insurance.[156] They could be strengthened by providing cost-effective risk-pooling and reinsurance solutions that offer protection for covariate and catastrophic risks.[157] In Niger, an international nongovernmental organization built on a traditional revolving savings and credit association, offering technical support and adding specific design features to create VSLAs that are helping

to build broader resilience to climate change.[158] However, such informal mechanisms are themselves vulnerable to shocks and stresses. Nevertheless, they are complementary to, rather than a replacement for, formal social protection.

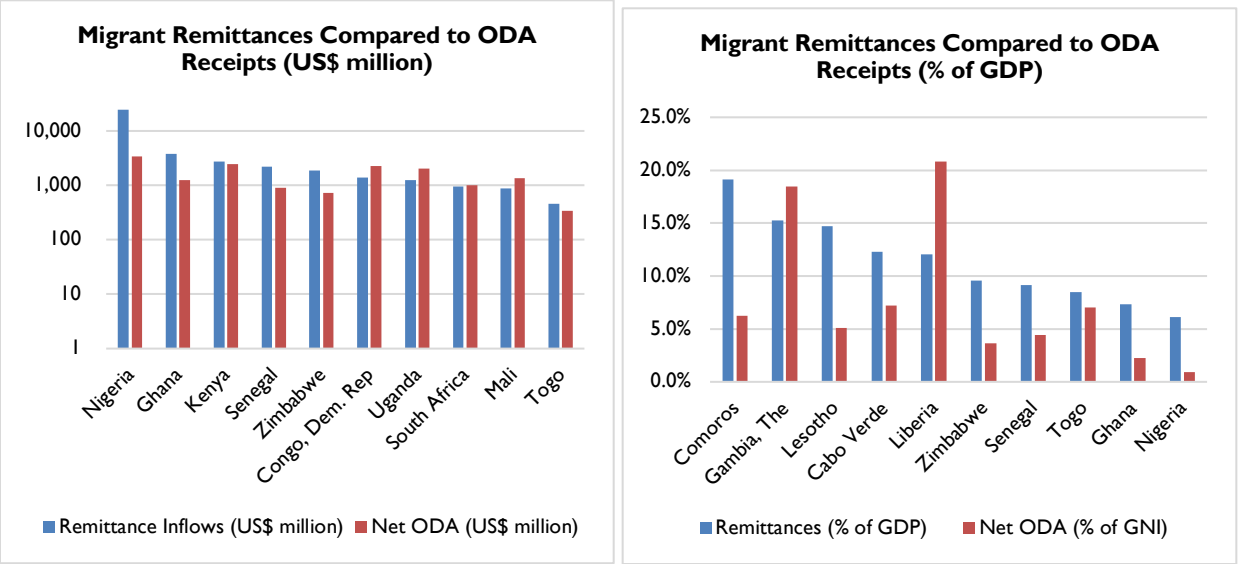
4.2.2 Leverage opportunities for innovative SPL policy solutions

Addressing risks resulting from population transitions, urbanization, and migration

As Africa experiences profound demographic changes, SPL programs should adapt and respond to the needs of people in transition. Interventions that combine short-term SSNs with complementary active labor market policies that leverage economic activities targeted to youth[159] can pave a pathway to productive employment. This support is at a critical period when young people may be completing their education, transitioning to work, or in low-productivity occupations.[160] Remedial education and training programs that aim to bridge the skills gap that affects youth employment prospects combine training with internships, apprenticeships, and other labor market insertion initiatives.[161] They tend to have modest impacts unless they are well-designed and adapted to local contexts. As many parts of Africa urbanize, it is necessary to provide social protection to the urban poor. SSNs in Africa have typically been designed with a rural focus except for fee waivers and universal social pensions.[162] However, a few programs have recently been launched in urban areas, such as the voucher system in Burkina Faso, the urban cash-for-work program in Mali, the National Family Scholarship Program (PNBSF) cash transfer program in Senegal, and the program to supply free access to water in urban Madagascar. Governments are now considering adjustments in design and implementation arrangements to identify and cover the urban poor more effectively. The challenges to this endeavor include identification and targeting of the poor in informal urban settlements, communication campaigns, and high population mobility, which could result in low program uptake and enrollment—digital technologies can in principle help address all these challenges.

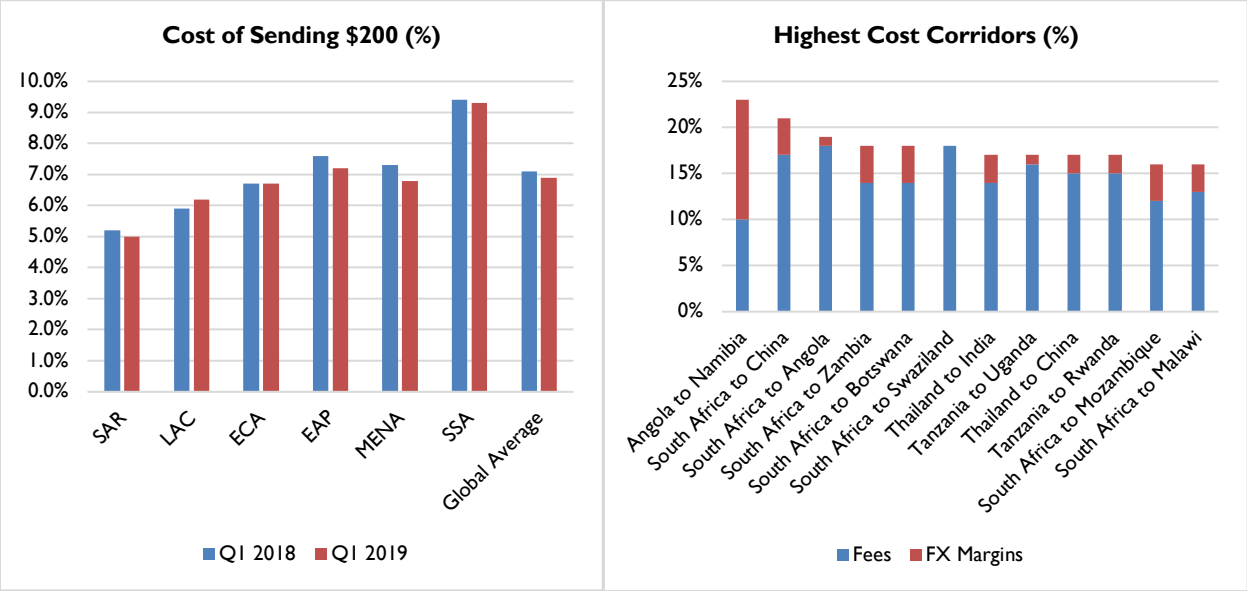
Rising migration provides the opportunity for better leveraging migrant remittances for social protection. Migrant remittances help smooth household consumption and act as a form of insurance for African households facing shocks to their income and livelihood caused by natural disasters.[163] Globally, remittances seem to have stronger poverty-reducing impacts than formal cash transfers. Studies in Moldova and Vietnam show that remittances reach a greater share of the poorer households, are often higher in value than cash transfers, and may be used particularly for productive investments.[164] Ethiopian households that receive international remittances are less likely than other households to sell their productive assets, such as livestock, to cope with food shortages.[165] Remittances in many low- and middle-income countries are now the largest source of foreign exchange earnings and are larger than official development assistance (ODA).[166] Remittances to Sub-Saharan Africa have grown by 9.6 percent, from $42 billion in 2017 to $46 billion in 2018.[167] Nigeria, the largest remittance recipient country in the region and the sixth largest among lower-middle-income countries, received more than US$24.3 billion in official remittances in 2018 (figure 4.20). Similarly, in the Comoros, Lesotho, Cabo Verde, Zimbabwe, and other countries, remittances are far larger than ODA receipts.

Figure 4.20: Migrant remittances in some African countries are larger than official development assistance



Sources: Staff calculations from WDI for ODA (2017) and migrants and remittances databases for remittances (2018).

Figure 4.21: Sub-Saharan Africa has the highest costs for sending US$200 and the highest-cost corridors in 2018



Source: Staff calculations from World Bank Group 2019, 6.

The reduction of remittance costs can better enable African countries to reap the benefits of migration by channeling diaspora remittances toward social protection for poor households. The average cost of sending US$200 to Sub-Saharan African countries is 9.3 percent in 2019, the highest in the world (figure 4.21). Despite a declining trend, this is higher than the average 7 percent for lower-middle-income countries and more than triple the Sustainable Development Goal target of 3 percent by 2030.[168] Remittance costs across many African corridors remain above 10 percent, the highest in the world (figure 4.21). Due to policy

incoherence, remittance costs tend to include a premium, a cost markup, when national post offices have exclusive partnership arrangements with a dominant money transfer operator (MTO). The high costs involved in money transfers along many remittance corridors, particularly for poor workers who lack adequate access to banking services, reduce the benefits of migration, especially for poor households in origin countries. At the national level, opening national post offices, banks, and telecommunications companies to partnerships with other MTOs could remove entry barriers and increase competition in remittance markets.[169] At the international policy level, reviewing financial regulations that deal with anti-money laundering (AML) and combatting financing of terrorism (CFT) measures can help reduce remittance costs. These AML/CFT measures have played an important role in de-risking strategies by global banks in which they restrict business relations with whole categories of high-risk clients.[170] These banks indicate that risks to their reputation from AML/CFT and possible sanctions deter them from having correspondent bank accounts with MTOs. Mobile money services and digital payment systems can also help remittance transfers arrive faster and potentially reduce costs.

4.2.3 Optimize resources to finance SPL programs

The optimization of resources can help address the fiscal and policy constraints to expanding social protection coverage. This section discusses three approaches: sustainable resource mobilization, efficiency of current social protection expenditure, and managing policy trade-offs in allocating public investments.

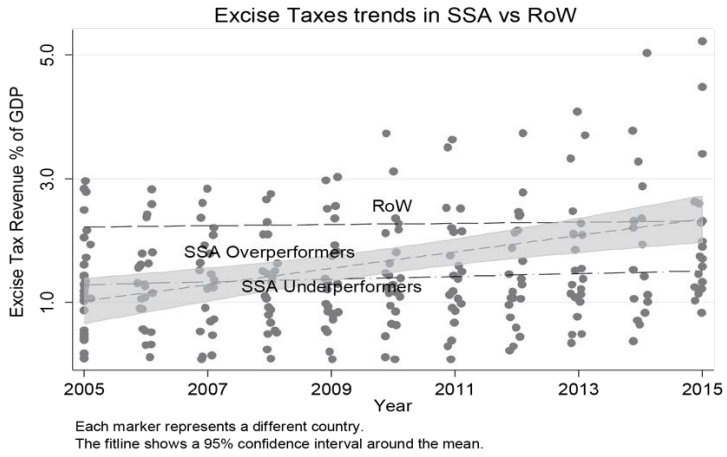
Sustainable resource mobilization to extend social protection coverage

The fiscal space of Sub-Saharan African economies can be broadened by reallocating public expenditure toward social investments.[171] This could entail assessing ongoing budget allocations through Public Expenditure Reviews and other types of thematic budget analyses, and replacing high-cost, low-impact investments with those with larger socioeconomic impacts. The social impacts of some large infrastructure projects, such as airports in third-tier cities and large sports stadiums, and public sector wages tend to be limited, although they consume large quantities of public resources. Budget items with large recurrent costs but small social impacts should also be reconsidered. For example, Costa Rica and Thailand reduced military spending to finance needed social investments. Countercyclical fiscal policies in resource-rich economies that are dependent on oil and mineral rents for government revenues can help mitigate the volatility of these rents and prevent a disruption in social spending. Eliminating spending inefficiencies and/or tackling corruption can also create the fiscal space for social protection. The African Union estimates that 25 percent of the GDP of African states, amounting to US$148 billion, is lost to corruption every year. Global initiatives to return laundered resources back to developing countries, such as the Stolen Assets Recovery Initiative (STAR), should be a source of finance for social protection.

Tax reforms can generate additional revenue for sustainable investments in social protection. Estimates suggest that Sub-Saharan African countries could raise between 3 and 5 percent of GDP (US$50 billion to US$80 billion) from tax reforms, more than the US$36 billion the region receives each year from international aid.[172] Building on WDR 2019 recommendations, we discuss four solutions that can help address the DRM challenges in Sub-Saharan Africa. First, cost-ineffective tax incentives should be eliminated or dramatically reduced through an approach that is systematic and transparent. This could result in significant additional revenues.[173] To help reduce race-to-the-bottom pressures among countries, coordination at a subregional level can provide boundaries and common targets. Notably, the West African Economic and Monetary Union (WAEMU) provides its members target corridors for tax rates for VAT (15-20 percent), corporate income taxes (25-20 percent), and excise taxes (by product); the effectiveness of WAEMU's de jure measures has been mixed, however.[174] Second, international tax rules need to be simpler

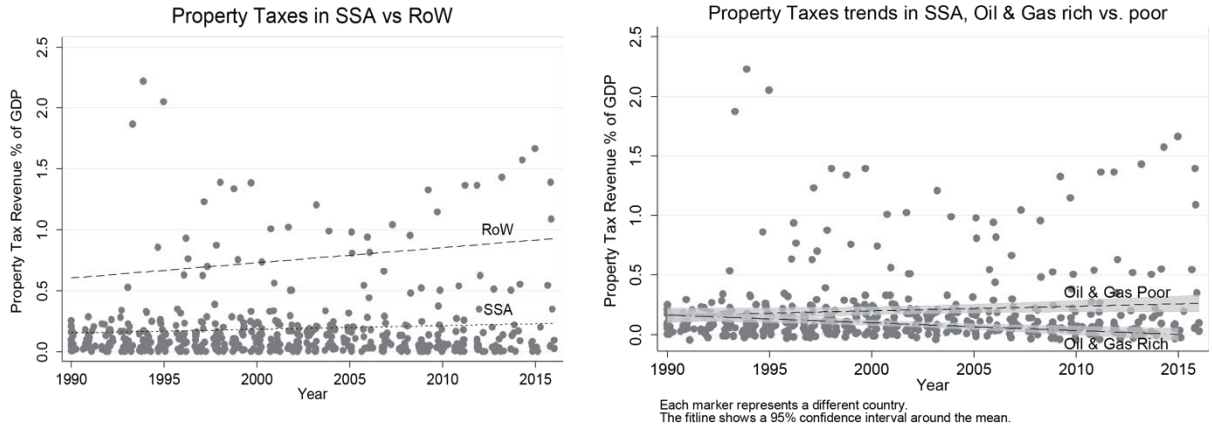
and more responsive to match developing country needs. Priorities include appropriate unilateral or regional measures to help protect tax bases. These include solutions to address challenges of asymmetrical information,[175] the revision of unbalanced tax treaties, and the adoption of wider anti-abuse measures.[176] Third, countries need to pursue other tax policy opportunities, such as improving VAT efficiency and strengthening underused instruments. Excise taxes tend to be comparatively low in the region and hold large revenue potential (figure 4.22). They include socially desirable "sin-taxes" (cigarettes, alcohol, sugar-sweetened beverages), "green taxes" (on fossil fuels and even carbon emissions), taxes on luxury goods consumed by high-income individuals, and other forms of taxation to help achieve progressivity and address negative externalities. Property taxes should also be increased as an important revenue source (figure 4.23).

Figure 4.22: Excise tax revenue among Sub-Saharan African underperformers, overperformers, and the rest of the world



Source: Staff calculations based on WBG and UN WIDER data.

Figure 4.23: Property tax collections is (a) lower in Sub-Saharan Africa compared with the rest of the world and (b) lower in hydrocarbon exporters compared with non-exporters



Source: Staff calculations based on WBG and UN WIDER data.

Fourth, major opportunities exist to leverage digital technologies to address common technical revenue administration challenges. A review of the existing ICT systems and processes to deepen the computerization of operations can bear fruit. Basic and meaningful initial steps include investing in (i) obtaining and expanding relevant information available to tax and customs administration; (ii) better mechanisms for effectively sharing information across institutions; and (iii) filling capacity gaps in core functions such as data analysis, modeling, and audit selection. Extending e-filing options can bring important benefits in improving the business environment and help generate revenue,[177] and so can the promotion of electronic cash registers.[178] A recent simulation analysis suggests that reducing the distance to the digitization frontier by half can raise median VAT revenue by 1.7 percent (and median tariff revenue by 0.5 percent) in low-income developing countries (IMF 2018).

Diaspora bonds could enable the direct use of remittances to provide social protection. These bonds are debt instruments issued by a government to raise financing from its overseas diaspora.[179] The investors who purchase them are usually motivated by a desire to contribute to the development of their home countries.[180] Diaspora bonds have been successfully introduced in India, Israel, and Nigeria. Through such bonds, the State Bank of India raised more than US$11 billion by 2007, while Nigeria issued US$100 million in diaspora bonds in 2013.[181] The diaspora bonds are one component of using development impact bonds for social investments.[182]

Finally, African governments can involve the private sector in innovative ways for sustainable resource mobilization to expand social protection coverage. Some governments in the region and elsewhere have made strides in leveraging corporate social responsibility (CSR) initiatives to fund their social development priorities.[183] In El Salvador, multinational companies have supported the creation of two major foundations in education and broader socioeconomic development. In Mauritius, the Ministry of Finance requested that all firms spend 2 percent of their profits on CSR activities approved by the government or transfer the funds to the government to be used for social and environmental projects. Several areas to consider in leveraging CSR to fund SSN programs include placing social protection on the global business development agenda, leveraging government engagement in the development of CSR within countries, ensuring that CSR activities are aligned with the development objectives of SSNs to maximize synergy, and defining those components of SSNs that can be effectively addressed by CSR activities and resources.

Other avenues for DRM include prudent macroeconomic policies and debt management and relief, the proceeds of which could be directed toward sustainable investments in SPL systems.

Efficient use of current social protection expenditures

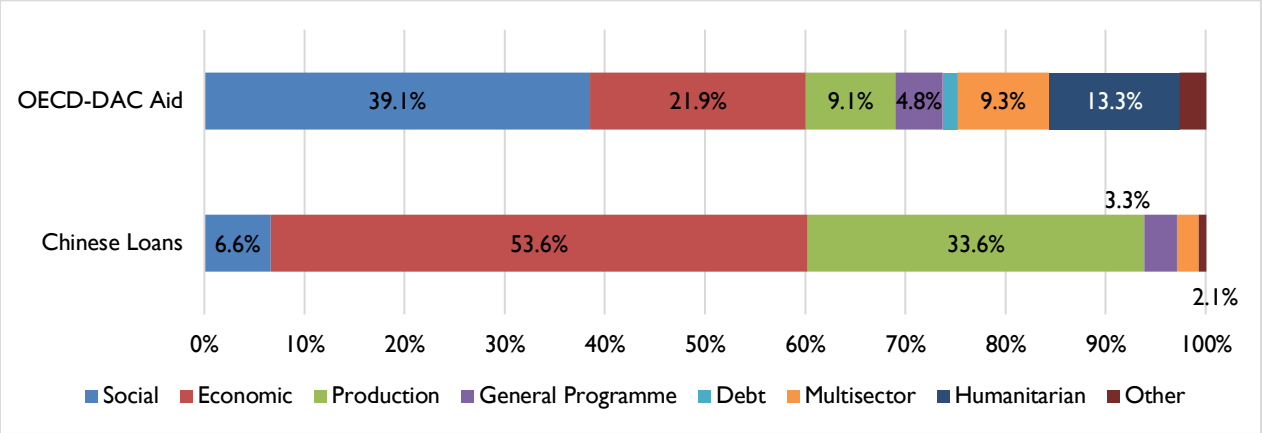
The efficiency of SPL programs can be enhanced through better coordination, including through the use of digital technologies. Social registries can help reduce duplication of effort for concurrent SPL programs. Through integrated social registries that harmonize multiple programs using common intake and registration gateways, citizens can gain access to a broad array of benefits and services, with far lower transactions costs.[184] These registries can connect people to public services (social, health, and financial inclusion) and prioritize the poorest, with the aid of digital technology platforms that save millions of dollars caused by pre-digital era errors.[185] Pakistan's social registry now includes 85 percent of the population. It serves 70 different programs and has contributed to savings of US$248 million. In South Africa, a similar harmonization of various SPL programs saved US$157 million. Efforts to consolidate and rationalize programs are on the policy agenda of many countries.[186]

Increasing and rebalancing SPL spending among population groups and instruments can have a more lasting impact on poverty reduction. Among population groups, in addition to the current focus of SSNs

on children (29 percent) and households (over 31 percent coverage), more of the working age population (currently at 19 percent) should also be covered, given that they are at high risk in Sub-Saharan Africa's changing world of work. As SPL expenditures tend to be concentrated around pensions, it will be important to accelerate efforts to expand such contributory schemes to the informal sector. SPL interventions that are currently skewed toward cash transfers (41 percent of the SSN budget) should do more in areas that have a higher impact on poverty reduction through productivity upgrading. An illustrative, but not exhaustive, list of instruments includes economic inclusion programs that combine safety nets with productive elements (see box 4.2, for example), public works for infrastructure, and health care programs directed at boosting human capital. Governments in East Asia successfully used public works programs to mitigate the impact of the Asian financial crisis in the late 1990s.[187] Presently, South Asia has the highest share of public works spending, at 25 percent of its overall SSN budget.[188] Countries like Bangladesh and India, with large public works programs, have also recorded tremendous progress in poverty reduction. However, although they improve consumption, income, and rates of employment in the short term, the impact of public works programs on economic welfare in the long term is less certain and depends on program design and implementation.[189] Based on a recent survey, the majority of SSN beneficiaries chose public health and nutrition programs (86 percent) over cash transfers (13 percent), and chose roads (over 63 percent) above cash transfers (35 percent).[190] Such a rebalancing in coverage of population groups' use of SSN instruments, depending on the context and type of risk, and larger aggregate sums based on improved DRM, can help to respond to the disruptions to African labor markets in the changing world of work.

Finally, improved coordination is necessary among development partners through clear reporting systems and by leveraging their comparative advantage to optimize development assistance for SPL programs. Development agencies should coordinate their resources and advice (see box 4.3) to avoid contributing to fragmentation, and to help develop SPL programs to scale, rather than spend on isolated pilots.[191] Currently, large development partners like the United Kingdom, the European Union, and France are more likely to channel their support through their own programs, while those with smaller ODA programs, such as Austria and Finland, channel their support through multilateral agencies like the International Labour Organization, United Nations agencies, the World Bank, and international nongovernmental organizations.[192] This fragmentation is also reflected in the diverse mechanisms for providing social protection support directly and indirectly through sectoral programs. To ensure harmonization, development partners must adjust how they report and track aid spending on social protection.[193] Desirable measures include explicitly providing a code for social protection in the OECD Creditor Reporting System, providing a social protection marker comparable to tracking aid for gender and climate change, and using terms such as "cash transfer," "pension," and "insurance" in social protection project descriptions. Lastly, better coordination can be achieved if the various development partners engaged in Africa focus on their comparative advantage. Almost 40 percent of development assistance in 2016 from OECD-DAC went to social sectors (education, health, water, governance, and so forth) while non-OECD donors like China focused more on economic sectors (energy, transport, communications, banking, and business) (figure 4.24).

Figure 4.24: OECD-DAC bilateral aid to Africa is more supportive of social protection and labor compared with Chinese loans, 2016



Source: Staff calculations from SAIS-CARI database and OECD Statistics.[194]
Note: OECD-DAC data comprise bilateral donors and aid by EU institutions. Social sectors include health, education, governance and civil society support, water, and population. Economic sectors include communications, energy, business, transport, and banking. Production sectors include agriculture, forestry, industry, mining, and trade.

Box 4.3: Donor collaboration through the Rapid Social Response Trust Fund195

The Rapid Social Response (RSR) Multi-Donor Trust Fund (MDTF) program was established in 2009, in partnership with the World Bank, to help the world's poorest countries build effective social protection systems. The RSR MDTF is supported by Australia, Norway, the Russian Federation, Sweden, and the United Kingdom. In its Phase 1 (2009–12), the RSR had a crisis response orientation. It assisted countries in addressing urgent social needs stemming from crises and helped them build the capacity and institutions to respond better to future crises. In Phase 2 (2012 onward), the RSR shifted toward a broader agenda of social protection and labor (SPL) systems building. Cross-sectoral by nature, the RSR embraces core SPL areas as well as priorities in other sectors, including gender, nutrition, employment, and jobs, and—more recently—disaster risk management. Since 2009, RSR has been able to support the growing social protection agenda, through supporting pilot programs in countries without prior SPL experience, facilitating new dialogues and partnerships, and supporting knowledge exchanges between countries and globally. Specific interventions include designing new payment modalities, creating new targeting mechanisms, strengthening management information systems, and coordinating with ministries, agencies, and subnational governments. As of December 2016, approximately 131 million people worldwide were covered by SPL programs that are associated with RSR funding. The RSR's role, importance, and engagement have been evolving in response to new challenges in social protection. As new frontiers emerge in the development arena, the role of social protection is growing, along with expectations for it to become more innovative and collaborative, with new programs and systems that will be able to respond not only to shocks originating within an economy, but also to exogenous shocks such as climate change, natural disasters, and displacements.

Source: World Bank (2018).

Managing policy trade-offs

To manage policy trade-offs in allocating public investments, SPL policies should be integrated into wider national and regional strategies of African governments. The goals of resilience, equity, and opportunity to help workers adjust and benefit from the future of work cannot be achieved with isolated programs, within a single sector, or through public mandates alone. Attaining them requires appropriate policy, legal and institutional frameworks, as well as a portfolio of instruments and collaboration across economic sectors.[196] The transition out of industrial era social insurance systems ideally should be linked to broader civil service reforms. This could be a more politically feasible approach to rebalancing social spending that is otherwise skewed toward pensions in many countries. As the AfCFTA comes into effect, a broader discussion and review of SPL policies at the national and regional levels is necessary to minimize the negative impacts of trade liberalization on populations groups. This may entail specific SPL interventions targeting important regional corridors across the continent, especially in East, West, and Central Africa. Increasing public investments in social protection can be linked to a broader strategy to provide regional public goods in an era of increased integration. Managing policy trade-offs may necessitate renewing the underlying social contract between the state and citizens on where and how to allocate public resources to have the greatest welfare impacts in a changing world of work.

4.3 Conclusion

Building on the foundation of WDR 2019, this chapter has examined social protection policies to mitigate and manage risks in the future of work in Africa. The following are areas where further research can provide important insights:

- A more precise understanding of the implications of disruptive trends for labor dynamics within specific countries
- A rigorous assessment of the effectiveness of emerging SPL interventions that aim to extend social protection to the informal sector
- Understanding ways to collaborate with the private sector, especially for active labor market policies to address urban poverty and youth unemployment
- How to improve leveraging informal private transfers to serve a more effective risk-sharing and co-insurance function, especially in fragile settings.

Annex I: The World Bank's ASPIRE Program Classification

SPL AREA	PROGRAM CATEGORY	PROGRAM SUB-CATEGORY
SOCIAL INSURANCE	Contributory pensions	Old age pension (all schemes, national, civil servants, veterans, other special)
		Survivors pension (all schemes, national, civil servants, veterans, other special)
		Disability pension (all schemes, national, civil servants, veterans, other special)
	Other social insurance	Occupational injuries benefits
		Paid sickness leave benefits
		Health
		Maternity/Paternity benefits
LABOR MARKET	Labor market policy measures (active LM programs)	Training (vocational, life skills, cash for training)
		Employment incentives/wage subsidies
		Employment measures for disabled
		Entrepreneurship support /startup incentives (cash and in kind grant, microcredit)
		Labor Market services and intermediation through PES
		Other Active Labor Market Programs
	Labor market policy support (passive LM programs)	Out-of-work income maintenance (Unemployment benefits, contributory)
		Out-of-work income maintenance (Unemployment benefits, non-contributory)
SOCIAL ASSISTANCE	Unconditional cash transfers	Poverty targeted cash transfers and last resort programs
		Family/ children/orphan allowance (including orphan and vulnerable children benefits)
		Non-contributory funeral grants, burial allowances
		Emergency cash support (including support to refugees/returning migrants)
		Public charity, including zakat
	Conditional cash transfers	Conditional cash transfers
	Social pensions (non-contributory)	Old age social pensions
		Disability benefits/war victims noncontributory related benefits
		Survivorship
	Food and in-kind transfers	Food stamps, rations and vouchers
		Food distribution programs
		Nutritional programs (therapeutic, supplementary feeding and PLHIV)
		In kind/non-food support (education supplies, free texts and uniforms)
	School feeding	School feeding
	Public works, workfare and direct job creation	Cash for work
		Food for work (including food for training, food for assets etc.)
	Fee waivers and subsidies	Health insurance exemptions and reduced medical fees
		Education fee waivers
		Food subsidies
		Housing subsidies and allowances (and "privileges")
		Utility and electricity subsidies and allowances
		Agricultural inputs subsidies
	Other social assistance	Scholarships/education benefits
		Social care services, transfers for care givers
		What is left out from above categories
PRIVATE TRANSFERS	Domestic private transfers	Domestic transfers, inter-family in kind gifts and monetary transfers
		Alimony (divorce and food)
		Income and support from charity/ private zakat, support for churches and NGOs*
	International private transfers	Remittances from abroad

* Depending on country contexts and on how NGOs are financed, transfers from NGO may be classified as social assistance.

Notes

[54] World Bank (2012).
[55] Alfani et al. (2015); DFID (2011).
[56] The term "shocks" used here refers to the "covariate" type that affects communities or whole societies, rather than the "idiosyncratic" type that affects individual households, such as life cycle events, such as births, illnesses, or deaths. Further discussion is available in McCord (2013, 7) and Bastagli (2014).
[57] This is comparable to the definition from the International Labor Organization and the OECD (ILO, 2019; OECD, 2019).
[58] World Bank (2012, 2).
[59] World Bank (2019, 5–6).
[60] World Bank (2019, 10, 119).
[61] World Bank (2019, 106–07).
[62] The "Bismarckian model" refers to the industrial era social insurance system that provides benefits to workers in the formal sector financed by dedicated taxes on wages. Otto von Bismarck, Germany's chancellor in the 19th century, is widely recognized as the inventor of this model (World Bank 2019, 106).
[63] World Bank (2019).
[64] IMF (October 2018).
[65] These trends and disruptors are adapted from the World Bank Group's White Paper on Social Protection and Jobs (World Bank Group (2019, 5), ILO (2017), and WEF (2016).
[66] World Bank Group (2019).
[67] WEF (2016).
[68] Ng'weno and Porteous (2018), World Bank Group and China Development Bank (2017), IMF (October 2018).
[69] Lundren, Thomas, and York (2013).
[70] WEF Accenture (2017).
[71] ILO (2017, 10).
[72] IMF (October 2018).
[73] These include the Southern African Development Community in Southern Africa, the Economic Community of West African States in West Africa, and the Common Market for Eastern and Southern Africa in East Africa, among others.
[74] The agreement came into effect in May 2019, after 52 countries signed the agreement, and 22 countries had ratified it, the minimum needed to activate the AfCFTA.
[75] UNECA (2017).
[76] Brixová, Meng, and Ncube (2015).
[77] IMF (2019).
[78] IMF (2017b).
[79] Francois, Jansen, and Peters (2011).
[80] Dix-Carneiro and Kovak (2017); Dix-Carneiro (2014).
[81] This was driven by imperfect labor mobility and declining labor demand. Slow interregional labor mobility was due to entrepreneurs waiting for their capital investments to depreciate fully before closing their firms, and due to negative regional agglomeration effects, which amplified the fall of labor income in regions adversely affected by import competition relative to other regions.
[82] Cervigni et al. (2016).
[83] ILO (2018, 13).
[84] Cervigni et al. (2016, 3).
[85] ILO (2017, 12).
[86] IMF (October 2018, 42; 2017a).

[87] OECD (2018).
[88] United Nations and World Bank (2018, 22).
[89] UNHCR (2019).
[90] IMF (October 2018, 42).
[91] United Nations (2017).
[92] ILO (2018).
[93] (IMF, October 2018, p. 42)IMF (October 2018, 42).
[94] Hommann and Lall (2019).
[95] Hommann and Lall (2019, 5–6).
[96] Mo Ibrahim Foundation (2019, 14–15).
[97] The data and analysis are largely but not exclusively drawn from Beegle, Coudouel, and Monsalve (2018); World Bank Group (2018); World Bank (2019).
[98] Beegle, Coudouel, and Monsalve (2018, 53–57).
[99] Beegle, Coudouel, and Monsalve (2018, 56).
[100] Beegle, Coudouel, and Monsalve (2018, 57–60); World Bank Group (2018, 27–28).
[101] Beegle, Coudouel, and Monsalve (2018, 60).
[102] Other options considered in this debate include programs that guarantee jobs or "public works programs." The report notes that a UBI may be an alternative to public works when their overwhelming function is mere income support. However, when more meaningful activity is envisioned, public works emerge as a complementary instrument for those who are fit and able to work (World Bank 2019, 109–12).
[103] World Bank (2019, 132).
[104] World Bank Group (2018).
[105] World Bank Group (2018, 17).
[106] World Bank Group (2018, 18).
[107] Beegle, Coudouel, and Monsalve (2018, 81).
[108] World Bank Group (2018).
[109] Beegle, Coudouel, and Monsalve (2018, 230).
[110] World Bank (2019, 13 –33).
[111] World Bank Group (forthcoming).
[112] IMF, OECD, UN, and WBG (2016).

[113] Structurally, agriculture remains the main economic activity in the region, with the sector commonly providing for most employment opportunities. However, the sector tends to be only lightly taxed and revenue potential among smallholders and subsistence agriculture is limited. Collection efforts often risk not being cost-effective.
[114] Tax effort is defined as an index of the ratio between the share of the actual tax collection in GDP and taxable capacity. Taxable capacity is determined by predicting the tax-to-GDP ratio in a regression analysis. See Minh Le et al. (2012).
[115] IMF 2017, annex 2.1. For a discussion of the literature and methodological challenges, see LaPorte and de Quatrebarbes (2015).
[116] For example, tax expenditures are estimated at 4.5 percent of Cabo Verde's GDP (World Bank Group 2018), 7.8 percent of Senegal's GDP in 2014 (MoF 2016), and 5.2 percent of Ghana's (World Bank Group 2017).

[117] In the region, the determination of eligibility for special tax and customs exemptions often follows a discretionary negotiation and approval processes that is sometimes outside the scope of oversight by the legislature. It is not uncommon for taxpayer-specific conventions to be negotiated on a project-by-project basis, generating high ex ante screening and ex post monitoring costs, while jeopardizing a level playing field among competing projects in the same industry. Monitoring of the use of incentives and associated abuse risk also result in significant administrative effort. For instance, tax planning to move profits from higher to lower taxed affiliates in the same firm can create challenges that are difficult to monitor in reviewing domestic transfer pricing arrangements. See Beer and Loeprick (2018); Cooper et al. (2016).

[118] Surveys suggest that tax incentives do not feature among investor priorities in developing countries (World Bank 2015). Similarly, household survey data often reveal that value-added tax exemptions, especially for food and utilities, fail to benefit many of the poorest households in Africa (Inchauste 2018).
[119] In francophone Africa, Van Parys and James (2010) find no robust positive relationship between tax holidays and investment.
[120] The revenue at stake can indeed be substantial but depends on country specifics and does not always exceed other DRM priorities. In Sub-Saharan Africa, corporate tax tends to account for a larger share of revenue and the sums at stake in specific cases involving international tax issues can be large compared with overall revenues.

[121] Estimates based on micro-data are limited for developing economies (Beer, De Mooji, and Liu 2018). Relying on publicly available firm-level information on 26,000 multinational enterprises in in 94 low- and middle-income countries (but only including 170 firms in Sub-Saharan Africa), Johannessen, Tørsløv, and Wier (2016), find relatively more exposure to profit shifting in developing countries. Similarly, Beer and Loeprick (2015) find more exposure of non-Organisation for Economic Cooperation and Development countries when estimating profit shifting in the oil and gas sector. In an assessment of taxpayer data in South Africa, Reynolds and Wier (2016) find a higher profit shifting response among South African subsidiaries than in more developed countries, while their findings also suggest, however, that the income at stake may only be moderate.
[122] In Togo, in 2016, the five largest companies accounted for 66 percent of total direct tax revenue from businesses and around 50 companies accounted for more than 90 percent of the receipts (World Bank Group 2018).
[123] Beer and Loeprick (2018).

[124] A critical dimension for the policy discussion is the VAT treatment of the agriculture sector in Sub-Saharan Africa, which is frequently exempted. Crops and livestock are often exempt from VAT because of equity concerns. However, these general exemptions tend to also exclude large farmers from the tax base. In absolute terms, the level of support provided to these larger operators can significantly exceed the support provided to small farmers. A reasonable general VAT exemption threshold would normally still allow the vast majority of small famers to remain outside the scope of the tax.

[125] See Bird and Gondron (2011, 177–79).
[126] AfDB (2018).
[127] Beegle, Coudouel, and Monsalve (2018, 228).
[128] Beegle, Coudouel, and Monsalve (2018, 142–45).
[129] The countries are: Kenya, Mozambique, Uganda, the Republic of Yemen, and the West Bank and Gaza (Jones, Samuels, and Malachowska 2013).
[130] The study reviews evidence from 165 studies, covering 56 programs, on the impact of cash transfers on: monetary poverty; education; health and nutrition; savings; investment and production; and employment and empowerment (Bastagli et al. 2016).
[131] World Bank (2012).
[132] Discussion on targeting, program design, and delivery systems, while important, goes beyond the scope of this chapter. Suggested further reading includes del Ninno and Mills (2015).
[133] Mitra and Ranjan (2011, 200).
[134] Moss, Majerowicz, and Lambert (2015).
[135] World Bank Group (2019, 55).
[136] World Bank Group (2018, 88–89).
[137] Leite et al. (2017); World Bank Group (2018).
[138] World Bank Group (2018, 89); ILO (2017).
[139] McCord (2013); Marzo and Mori (2012); Bastagli (2014).
[140] Filmer and Fox (2014, 142–47).
[141] Guven (2019).
[142] Abebe et al. (2016); Stanley et al. (2018).
[143] On remedial education and training, see Arias, Evans, and Santos (2019) and on collaborating with the private sector, see Filmer and Fox (2014, 18).

[144] Shapshak (2019); Abayateye (2018); *Business Daily* (2017); Kirpop (2017).
[145] Tony Elumelu Foundation Entrepreneurship Programme (2019); PM News (2019).
[146] Beegle, Coudouel, and Monsalve (2018, 67); Beegle and Christiaensen (2019, 220–34).
[147] Mitra and Ranjan (2011, 201) argue that PWPs were the most important social policy instrument used by East Asian economies to mitigate the consequences of the1997 financial crisis, given the large relative size of the informal sector in most of these countries (World Bank 2019).
[148] One study identifies four areas for reform, including employment contracts, minimum wages, dismissal procedures, and severance pay and unemployment benefits (Kuddo, Robalino, and Weber 2015). See also World Bank (2019); World Bank Group (2019).
[149] Guven (2019).
[150] Ortiz (2018); Gentilini (2018).
[151] On shock-responsive SPL systems, see Grosh et al (2008); McCord (2013); Oxford Policy Management (2015).
[152] Cervigni et al. (2016, 59–60).
[153] Cervigni et al. (2016).
[154] Watson (2016, 6–7).
[155] Ibid (pp.5)
[156] ibid
[157] Clarke and Dercon (2009).
[158] Watson (2016).
[159] Newfarmer, Page, and Finn (2018).
[160] Filmer and Fox (2014, 142).
[161] Arias, Evans, and Santos (2019, 315–21).
[162] Beegle, Coudouel, and Monsalve (2018, 68–72).
[163] Mohapatra and Ratha (2011).
[164] On Vietnam, see Van den Berg and Cuong (2011) and on Moldova, see Waidler et al. (2017). For a literature review on remittances having a stronger poverty reducing effect than cash transfers, see Hagen-Zanker and Himmelstine (2014).
[165] Mohapatra et al. (2011, 4).
[166] World Bank Group (2019); Mohapatra and Ratha (2011).
[167] World Bank Group (2019); Nicoli, Kachingwe, and Kaput (2018).
[168] World Bank Group (2019, 5).
[169] World Bank Group (2019, 6).
[170] World Bank Group (2019, 5).
[171] Ortiz, Cummins, and Karunanethy (2017).
[172] IMF (May 2018).
[173] For a detailed summary and methodological guidance, see World Bank (2015).
[174] For a detailed discussion, including remaining scope for competition via derogatory regimes outside the main tax legislations, see Mansour and Rota-Graziosi (2013).
[175] For detailed discussion, see World Bank (2017).
[176] These include minimum taxes on turnover; already commonly used in about 20 African countries (Durst 2018). See also OECD (2019); Leigh Pemberton and Loeprick (2019).
[177] Using cross-country data from World Bank Enterprise Surveys, Kochanova and others find that adopting e-filing systems reduces tax compliance costs, the likelihood and frequency of firms being visited by a tax official, and the perception of tax administration as an obstacle to firms' operation and growth. In their sample, e-filing is also associated with a moderate increase in the income tax revenue-to-GDP ratio (Kochanova, Hasnain, and Larson 2018).

[178] See Awasthi and Engelschalk (2018).
[179] Ketkar and Ratha (2004).
[180] Beegle, Coudouel, and Monsalve (2018, 251).
[181] Ketkar and Ratha (2007); Ozaki (2016).
[182] Coleman (2016).
[183] Beegle, Coudouel, and Monsalve (2018, 253).

[184] Leite et al. (2017).
[185] Georgieva (2018).
[186] Beegle, Coudouel, and Monsalve (2018, 57).
[187] Mitra and Ranjan (2011).
[188] World Bank Group (2018, 27).
[189] Mvukiyehe (2018); Subbarao et al. (2013).
[190] Khemani, Habyarimana, and Nooruddin (2019).
[191] World Bank (2012).
[192] OECD (2012, 11).
[193] Ravelo (2016).
[194] OECD (2018); Atkins et al. (2017).
[195] World Bank (2018).
[196] World Bank (2012).

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