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Pathways to sustainable growth in Niger

A WORLD BANK GROUP COUNTRY ECONOMIC MEMORANDUM

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EXECUTIVE SUMMARY

This Country Economic Memorandum aims to support Niger's efforts to walk on a path conducive to a resilient and sustainable economic growth. It does so by attempting to answer the following five questions, each of which constitutes a separate chapter: (i) What were the salient structural characteristics of Niger's growth performance in the last 20 years? (ii) What are the margins to accelerate growth in the medium to long term? (iii) How can technology be a vehicle for private sector development? (iv) How can the country's large natural resource endowments be managed in a transparent way that benefits the whole population? (v) How can the current disaster management framework be strengthened to increase resilience to natural shocks?

Amidst competing development needs and priorities, three main areas of analysis and policy reforms have been selected. The selection criteria were based on the lessons drawn from other developing countries' experiences, on Niger specificities, and on the potential gains from moving to the frontier. The areas are, i) the use of technology to develop private sector, ii) the development of a well-managed extractive industry, and iii) the establishment of a disaster risk management and finance frameworks. For each area, long-standing bottlenecks that have held back growth performance are identified and specific policy options presented, with a view to create pathways for increasing economic diversification, reducing vulnerability to natural disasters and ultimately boosting long term growth in a sustainable manner.

In particular, five pathways are identified throughout the chapters:

- Leverage new technologies to promote agricultural productivity and export orientation;
- Foster the development of digital finance;
- Promote sound local content policies in the extractive sector;
- Manage oil revenues in a transparent and fiscally responsible way;
- Strengthen the disaster risk management framework and establish a disaster risk financing strategy

It is worth emphasizing that these pathways are not mutually exclusive. Instead, overall growth performance will be magnified by the implementation of overarching reforms that exploit the significant existing complementarities between each of these areas.

20 YEARS OF LOW PRODUCTIVITY, LOW INCOME AND UNRESOLVED PROBLEMS

Although Niger's recent GDP growth performance has been relatively robust (5.2 percent on average from 2000 to 2020), it has not led to the fundamental change in the economy required to achieve a prolonged period of income growth and poverty reduction in the face of challenging demographic prospects. Per capita GDP at current prices stands at only US$ 568 as of 2020, compared to US$ 197 in 2000. This modest change in per capita GDP is also attributable to the weak productivity gain of around 2 percent per annum and a rapid population growth rate of 3.8 percent. With the highest fertility rate in the world (6.2 children per woman in 2020 according to the most recent national survey), Niger's economic growth has been too weak to significantly dent poverty. While the poverty rate decreased from above 50 percent to 41.2 percent during this period, the number of people living in extreme poverty (i.e., with less than US$ 1.9 per day) increased, reaching 10 million in 2020.

A suitable metaphor to represent this situation might be that of an athlete running on a treadmill: energetic but static. The reason behind this inertia is that the Nigerien economy has fundamentally remained the same as two decades ago: undiversified and poorly specialized. Agriculture remains the main sector as share of workers employed (75 percent of the total workforce) and accounts for roughly the same share of valued added (40.8 percent) as services. However, frequent climatic shocks impact agricultural productivity and cause food insecurity. On average, droughts create yearly agricultural income losses of US$ 15 million, and between US$ 20 million and US$ 70 million are caused by floods. Weak institutions, poor governance, the spread of violence and insecurity and other internal and external drivers of fragility further complicate the pursuance of a long-term development strategy. The longstanding challenges that need to be addressed to create the conditions for the self-sustaining growth process required to lift millions out of poverty include an underdeveloped formal private sector, a large agriculture sector marked by low productivity (both in level and growth) and insufficient ties with export and financial markets, a low level of financial inclusion, a growing extractive sector with limited local content, and the adverse impacts of recurrent natural disasters on lives and livelihoods.

In 2022, Niger finds itself at a critical juncture, as formidable development challenges are exacerbated by multifaced shocks and the risk of escalating conflicts. The spread of violence and instability continues to be an issue even as the country celebrates its first peaceful political transition. Niger has faced political instability since its independence in 1960. Since then, it has experienced seven republics and violent seizures of power by the national army. The growing regional insecurity and the presence of violent extremist groups in border areas threaten the stability of the country and fuel pre-existing inter- and intra-communal tensions. These drivers of fragility and conflict have a large impact on the economy as they amplify pre-existing inter- and intra-communal tensions such as those among pastoralists and farmers. They also exacerbate conflict over natural resources, the marginalization of youth and women in the labor market and low public service provision in border areas. While the first peaceful transition of power took place in 2021, it is yet to be seen if this will reestablish the social contract that has been eroded as a result of the lack of improvement in living standards. The Nigerien political sphere is characterized by a system whereby social cohesion and political stability are maintained by granting political elites privileged control over parts of the economy and state power. This leads to the centralization of power and services in Niamey, leaving the majority of those in the rest of the country with limited access. This equilibrium is upheld by privileging stability over dynamism, avoiding the short-term disruption that a bold reform agenda might entail.

The process of economic development requires a set of structural changes able to sustain a continuing increase in income and social welfare (see chapter 1). Unfortunately, Niger has only partly been able to replicate the patterns observed in other countries that have successfully transitioned from a system where the economic structure was mainly characterized by low income, informal, and labor-intensive activities, to one with higher incomes, higher savings and domestically financed investment, especially in manufacturing. For instance, given the low-income level and continued rapid population growth, domestic consumption is still highly tilted (70 percent of GDP) towards food, and even the composition of food items consumed does not show a pattern towards more sophisticated or higher nutritional items. The sustained demographic trend generates growing demand for services and infrastructure and at the same time constrains the current level of domestic saving. Such demand cannot be accommodated therefore without high access to foreign capital. This is largely evident in the extractive sector, where there are monopoly foreign operators in the uranium, gold and oil sectors, each operating a single site.

A significant inflow of foreign capital has not been able to raise productivity or broaden the production basis. Large foreign direct investments (FDI) above the Sub-Saharan African average as share of GDP, had until 2011 contributed to dramatically increasing the share of gross fixed capital formation to around 24 percent of GDP. However, the real value of the total stock of public and private capital (as share of GDP) per person in 2019 was 86 percent of what it was in 2000. FDI has been concentrated mainly in rent-seeking activities in the extractive industries, although they exhibit a high level of 'localization' in their operations in terms of fractions of expenses occurring in Niger or by Nigerien staff. Investments in agriculture have been almost absent, inhibiting the adoption of technologies that, in combination with adequate public policies to develop access to markets, would have supported the development of comparative advantages in agricultural trade.

Structural change in the last twenty years has been very limited, amounting to 12 percent of the total change in productivity, and contributing only 0.25 percentage points to yearly per capita value added growth. Inter-sectoral movements (i.e., labor movement from low to high productivity-level sectors) have taken place at a slower pace than in many peer countries. From 2010 to 2019, Niger saw an *increase* in the share of agriculture in value added, and a continuous decline in the employment share in industry at a yearly average rate of -0.5 percentage points. Services is the only sector contributing positively to structural change, but the impact is much lower than in comparator countries. Weak governance and the failure to develop a level playing field over the years have had a negative effect on the private sector, preventing the reallocation of resources to a more productive sector. On a brighter note, empirical evidence shows that in resource-rich countries, a lower rate of structural change does not necessarily imply lower overall productivity growth. Resource-rich countries tend to have highly capitalized enclave mining and extraction industries. The average productivity gains of moving one person from agriculture into industry are actually 30 percent higher in resource-rich than in resource-poor low-income countries (LICs). This bodes well for Niger in view of the expected increase in the employment share in industry following the expansion of the natural resources sector, provided that the policies to develop a local content are in place.

Decomposition of GDP per worker, Niger

% Yearly Contribution to Growth	2000-2019	2000-2009	2010-2019
Total per capita Value Added	1.43	0.46	2.05
Productivity	2.07	0.70	3.17
Within-sector productivity	1.82	0.54	2.74
Across-sector productivity[1]	0.25	0.16	0.41
Participation rate	-0.41	0.14	-1.04
Employment rate	-0.04	-0.01	-0.07
Demographic change	-0.19	-0.37	-0.01

1 Across-sector productivity gain captures two elements, 1) labor relocation to sectors with high productivity level and, 2) dynamic-type across-sector movements, as highlighted in the charts (workers' relocation to sectors with *increasing* (or decreasing) productivity levels) (McMillan, Rodrik, & and Sepúlveda, 2017). However, this second term alone can be difficult to interpret when, for example, reductions in the employment share are accompanied by increases in productivity. This is because the term becomes negative, seemingly acting as a drag on productivity, when in fact it could be viewed as a positive development in such sectors as agriculture.

The low level of productivity per worker might be hiding underemployment and underuse of productive potential. Intra-sectoral productivity has grown fast in Niger but the overall level of productivity (measured by the value added per worker) is still very low. One of the reasons behind this performance (especially in agriculture) is the underutilization of existing human capital (low number of hours worked) and technologies, as a result of lack of inputs (water, electricity) or inaccessibility to markets (costly transportation). Meanwhile the few available resources are not used in an efficient way. A large share of the working age population is employed, but work is concentrated in small-scale, low-productivity activities, mostly in agriculture. Waged jobs are the exception: 40.7 percent of work in Niger's agriculture sector is unpaid, and a further 51.6 percent is self-employed. As a result, a third of working rural adults are unpaid, compared to just 8.7 percent in urban areas. Productivity in agriculture could be increased through a more extensive use of the labor input by removing the bottlenecks in market structure and accessibility that are impeding the use of labor productive capacity (see chapter 3).

Labor productivity is hindered by stark gender inequalities which have high costs in terms of economic opportunities. Despite efforts, the primary completion rate for girls aged between 15-18 has only reached 26.5 percent compared to that of boys at 41.4 percent. Young women face especially daunting challenges related to early marriage and childbearing, low access to education and labor force participation, and limited representation in local and national governance structures, particularly traditional ones. Social norms and some legal barriers lead to gender inequality that result in women having fewer opportunities in the labor market than men, receiving less pay and being less productive. In 2018, a woman was twice as likely to not be earning an income, compared to a man: 63.2 percent of women were either out of the labor force or in unpaid employment, compared to 32.5 percent of men. Gaps in access to basic services, increased childcare responsibilities during the pandemic, and movement restrictions added to women's existing poverty trap chains in Niger.

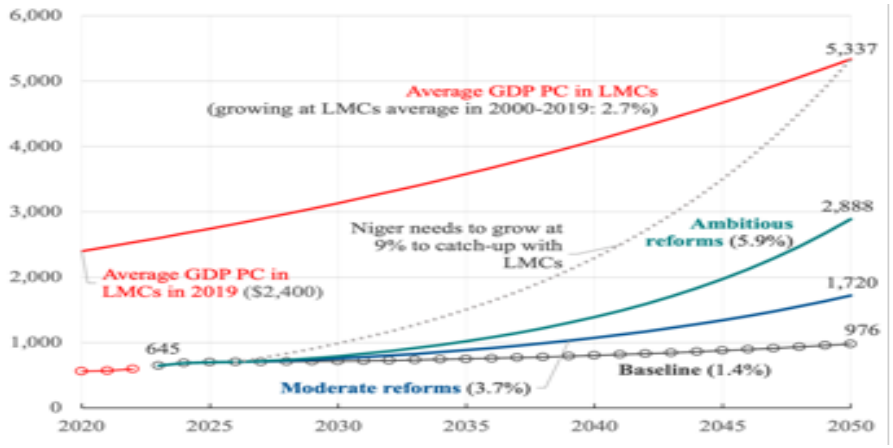
POLICIES FOR INCOME GROWTH AND POVERTY REDUCTION IN NIGER: ALTERNATIVE SCENARIOS UP TO 2050

Under current policies, growth performance is not expected to significantly accelerate compared to recent years. Simulation on the basis of two economic models (see chapter 2) show that economic growth rates is expected to average at 4.8 percent between 2026 and 2050. Despite population growth, GDP per capita growth is projected to step up to 2 percent in the 2040s. In particular, simulations from the World Bank's Long Term Growth Model (LGTM) projects that average GDP per capita growth will rise to 1 percent in the 2030s and increase to 2 percent in the 2040s. These simulations assume that the population will grow at an average speed of 3.5 percent while the production of oil is projected to reach a plateau at 120,000 barrels per day at a price of US$ 60 dollars (real 2010 prices) but start to decline in the mid-2030s. Reserves of oil are prudently estimated at two billion barrels in 2020, and the baseline assumes that, in the absence of further discoveries, oil reserves are projected to halve by 2050. The depletion of oil reserves and lack of productivity gains lead investment in the oil sector collapsing to nearly zero in the long term. As a result, investment in the non-oil sector increases from 20 percent of GDP in the short-term to 25 percent in the long term. Moreover, the efficiency of investment (i.e., the marginal product of capital) increases over time due to the continuation of trends in productivity gains in the non-oil sector—mainly through total factor productivity (TFP) but also human capital. As a result, the contribution of non-oil investment to growth accelerates from 1 percentage point in the medium term to 1.7 in the 2030s and 2.2 in the 2040s.

Therefore, Niger is not projected to catch-up but to witness a growing development gap vis-à-vis other low-income countries. A per capita growth rate of 2 percent in the long term lies above the 75th (95th) percentile of the growth distribution in low-income and lower-middle-income countries (LICs and LMICs respectively) in Sub-Saharan Africa (SSA) over the last decade. Although this rate of growth is not trivial, Niger's trajectory of GDP per capita would still remain below the country's ambition, remaining below US$1,000 (in 2010 constant prices) by 2050, well below the level observed today in many SSA countries. If income per capita in the LMICs continues to grow at the same rate observed between 2000 and 2019 (2.7 percent), in 2050 Niger's GDP per capita would remain around 20 percent of the level expected in LMICs. Niger's GDP per capita would need to grow at 9 percent until 2050 in order to catch up with this group of countries, at a GDP per capita level of USD 5,337 in current 2010 prices. Given the underlying demographic assumptions, this will require an average real GDP growth of 12.5 percent a year. If the economy grows at the trend observed under the baseline, the convergence is expected to happen only in the year 2170.

Broad-based economic reforms could generate significant economic gains and reduce the development gap. Simulations from the LGTM show that a moderate reforms package based on increasing non-oil TFP and human capital to the 75th percentiles of distribution in LIC and LMICs, and investment to the 90th percentile, would boost GDP per capita growth by an additional 2.3 percentage points on average until 2050 compared to the baseline, raising it to around US$ 1,720. A decomposition of growth shows that reforms to private investment generate significant extra growth in the medium term but in the long-run, incremental growth is mostly driven by reforms to non-oil TFP and human capital. GDP per capita growth could be boosted by an additional 2.2 percentage points on average until 2050 under a more ambitious reform package where all drivers of growth are increased to the 90th percentile or higher of the distribution in LIC and LMICs, as Niger would benefit from complementarity among reforms. For instance, reforms to investment benefit greatly from higher non-oil TFP growth, as it increases the marginal product of capital, preventing the efficiency of investment from declining too sharply over time. Under this most favorable scenario, the convergence to the average level of income per capita in the group of low-income countries will happen in 2060

Simulated GDP per capita: lower-middle income countries versus Niger's baseline and reform scenarios, Real 2010 U.S. Dollars

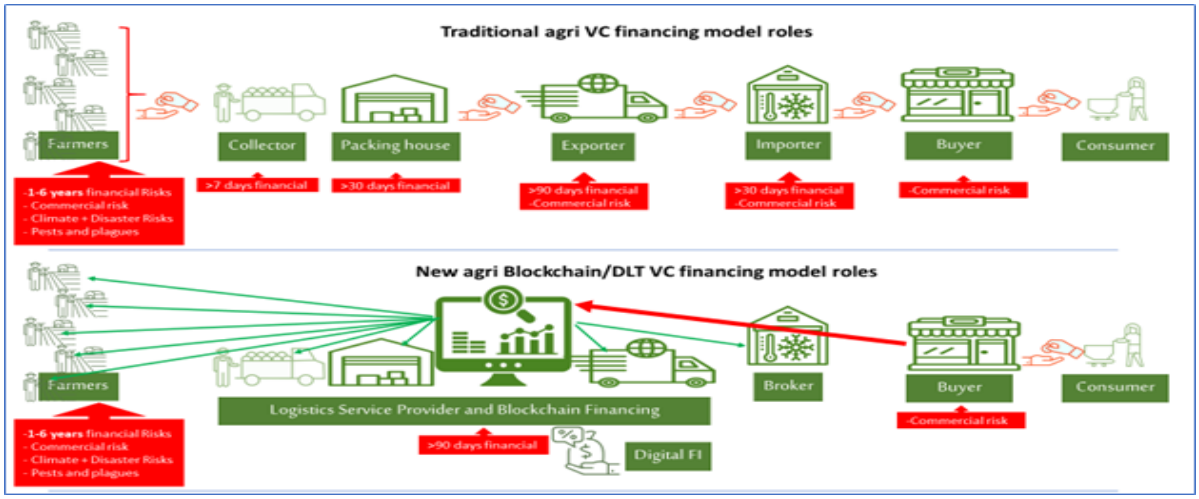


FIRST PATHWAY: LEAPFROGGING PRIVATE SECTOR-LED GROWTH WITH NEW TECHNOLOGIES

There is ample room to enhance growth by reforming the fundamentals of the economy and removing bottlenecks to the development of the private sector (see chapter 3). The priority for low-income countries like Niger should be to keep investing in skills and physical capital while removing regulatory bottlenecks, including access to finance, entrepreneurship and private sector development. At present, Niger's business climate, market landscape and governance system rather than supporting private sector development and job creation, hamper its attractiveness to foreign investment and discourage entrepreneurship.

New technologies such as agri-platforms, blockchain, precision agriculture, technology-based storage and management of products, temperature-controlled logistics among others offer opportunities to improve the productivity and competitiveness of agricultural value chains in Niger, but this will not be enough. While digital solutions could play a key role, there is a need to establish a new paradigm. The limitations of the present trading patterns need to be better understood. It will be important to redefine target markets where Niger will have sustainable competitive advantages by taking into account the counter seasonality and estimates of climate change impacts on its main competitors. The country will need to invest substantially in irrigation, logistics and digital infrastructure to ensure growth to move from subsistence agriculture to a more commercial one. Intra-Sahel trade opportunities are limited because of the climate similarities. However, new opportunities are appearing with the increase of Niger underground water as observed through the NASA Grace Satellite. This might allow the country to become a bigger producer and exporter of horticultural value chains products and increase its participation to global value chains beyond sesame, onions, tiger nuts, and livestock value chains products etc.. For that, it will be critical for Niger to increase investments in temperature-controlled logistics, transport infrastructure, and mobilizing private capital in the agriculture sector. Diverse policies will be needed to allow Niger's participation to the global value chains including among others improved trade facilitation policy, regulation of business services, favorable business taxation, better conformity to international standards. The atomized structure of the agriculture and agribusiness sectors is a significant obstacle for the generation of a larger supply of homogeneous high-quality agricultural products and will need to be addressed by strengthening the farmers organizations (FOs). If adequately supported and overseen, FOs can play a significant role in aggregating the produce of smallholder farmers and revolutionize the sector but a strong political will be needed at this aim. In addition, a variety of measures will be needed to strengthen financial intermediaries, especially those serving agriculture, so that they can provide a sustainable and competitive access to finance for all actors across the value chain.

New Blockchain-based agri value chain financing model



SECOND PATHWAY: FOSTER THE DEVELOPMENT OF DIGITAL FINANCE FOR FINANCIAL INCLUSION

Experiences of countries with structural similarity to Niger have confirmed that mobile technology can drive financial inclusion even in fragile environments and boost resilience and productivity. Indeed, mobile finance has changed the landscape of the financial markets in six out of eight countries in the West African Economic and Monetary Union (WAEMU) region by doubling or even tripling the percentage of adults with transaction accounts in the last two years. In Mali and Burkina Faso for example, in 2017 the percentage of adult population with formal accounts grew by 115 percent from 20 to 43 percent, and by 335 percent from 14 to 71 percent, respectively thanks to higher mobile penetration[2]. The Central Bank estimated at 340,000 the number of active mobile money accounts in Niger compared to 7.8 million in Burkina Faso. As access to financial services is an inextricable part of the process of productivity growth and economic growth, it will be key for Niger to put more emphasis on digital financial services in the next decade to spur its private sector development and increase the resilience of its population and enterprises. A central place should be given to the implementation of the Government's existing digital economies initiatives and projects, the digital transformation of the Niger's traditional financial system, the digitalization of Government payments, and the creation of a conducive legal framework to boost mobile adoption given the weak reputation of private mobile operators and limited trust in mobile finance. This will be critical to ensure that the 85.5 percent of the populations that is currently financially excluded can access basic final services and move away from the existing cash economy with all its challenges. Better accessibility to financial access points and increased number of use cases for mobile finance will be crucial. Current number of money access points at 25,100 including about 9570 active ones compared to the very low number of bank branches and microfinance institutions at 372[3] is a clear pointer that mobile finance will be key to financial inclusion in Niger.

2 Findex 2017
3 World Bank, ANSI, SOFRECOM , Demand and supply Mobile money in Niger report, 2021

Quick wins will come from concerted efforts between the Government and the private sector to ensure that the mobile money access points are functional and liquid, facilitating digital payments across key sectors of the economy. Agriculture digital payments in rural areas, safety nets, scholarships, taxes and other types of Government payments can be paid electronically through mobile or banks. Efforts are needed to make sure that financial and digital literacy is available for women and youth (with support of religious and traditional authorities), increasing mobile coverage is reliable, biometric identification systems ID are available to largest part of the population to facilitate account opening and access to credit, digital infrastructure platforms are in place to facilitate large scale digital on-boarding and, and second generation of mobile finance products such as digital lending credit, and insurance through mobile are introduced. This will allow Niger to accelerate adoption of mobile finance, move from the low 0.6 digital finance transaction per habitant per year to a 35 digital finance transactions per habitant per year like in Mali, and therefore starting the country's de-cashing process. The benefits will be high for Niger in the fiscal sector, as the impact of de-cashing would be felt on both the revenue and the expenditure sides. On the revenue side, the level of nontax revenue for governments from signorage will be inevitably affected[4].

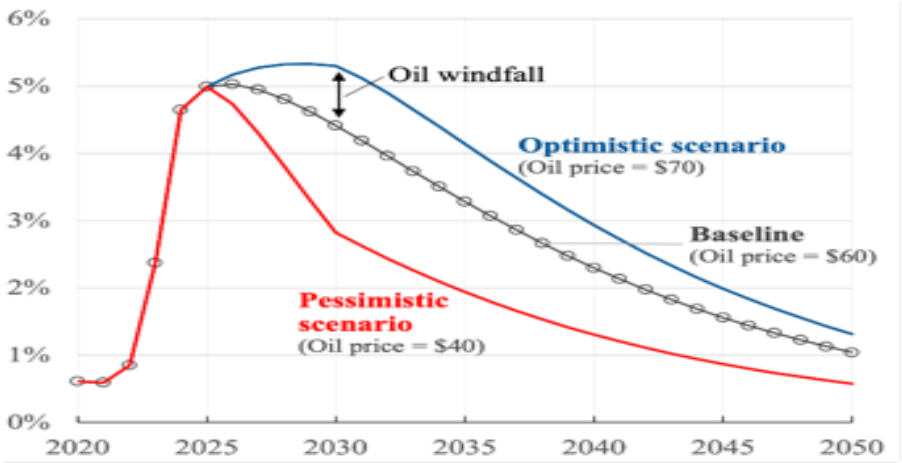
THIRD PATHWAY: MANAGE OIL REVENUES IN A TRANSPARENT AND FISCALLY RESPONSIBLE WAY;

With the expansion in petroleum production, the role of the extractives sector is likely to expand in the near future (see chapter 4). The extractive industry has historically played an important role in Niger's economy , but its contribution is set to decline as a result of declining uranium revenues due to mine closures and depressed global uranium market prices. Under baseline projections, the oil sector prior to the construction of the Niger-Benin pipeline is small, accounting for only 2 percent of GDP in 2022. As the pipeline becomes operational in 2023-2024, the oil sector expands to 12 percent of GDP. In per capita terms, annual oil income increases from US$13 to US$84, which represents about 15 percent of the GDP per capita of 2020. However, this extra income is not sustainable, slowly falling to US$25 by 2050 in the absence of new discoveries. Growth in the extractive sector is impeded by the same structural factors that have held back Niger's growth, notably, the scarcity of financial capital and domestic skilled human capital.

Oil revenues are unlikely to have a large impact on Niger's long-term economic growth, even under a fiscal rule that invests all oil windfalls. Oil windfalls from higher oil prices are not projected to be large or persistent enough to yield a substantial boost to investment and growth in the long term, even under procyclical fiscal rules. Higher oil prices -by around US$ 10 -than in the baseline would generate extra fiscal revenues by about one percent of GDP vis-à-vis baseline by 2030. In the case of a transitory shock, the boost to growth would be small even if all the windfall is invested. Moreover, even a permanent increase in oil prices would not be able to finance a significantly higher level of public investment in the long term. This is because Niger's oil sector is expected to contract sharply due to the expected depletion of oil reserves. In later years, the oil sector will generate less fiscal revenue while the effectiveness of investment falls sharply, driven by declining marginal product of capital and increasing losses due to capital depreciation. In these circumstances, it is advisable to plan the future by implementing fiscal rules to (i) smooth booms and bust, and (ii) invest in productive non-oil sectors.Although the oil windfall cannot boost

4 IMF, the macroeconomics of de-cashing, https://www.imf.org/-/media/Files/Publications/WP/2017/wp1771.ashx

Government oil revenue, Percent of GDP



long-term growth per se and poses the "resource curse" risk, it still represents a great opportunity to finance critical investments in the short to medium-term. The oil boom is projected to generate extra fiscal revenues of 3-4 percent of GDP for over a decade. This windfall could contribute to finance the large investment needs in infrastructure and human capital provided they are managed well, to avoid the fiscal mismanagement, economic distortions and oil-related corruption observed in a number of resource-rich countries.

FOURTH PATHWAY: PROMOTE SOUND LOCAL CONTENT POLICIES IN THE EXTRACTIVE SECTOR;

Although the extractive sector's potential for job creation and growth is limited, its full economic benefits have not yet been fully reaped. The expansion of the extractive sector carries significant institutional and fragility risks.. The extractive sector plays a large role in shaping conflict dynamics in the country, given the competition over rents among various stakeholders including regional armed groups, past grievances from inequitable sharing of gains from the sector, and corruption (see chapter 4 and Appendix D). Moreover, the public sector has limited capacity to enforce regulations, owing to poor governance, low human capital and scarce technical and financial resources. Boosting local content is a crucial way to integrating the extractive sector with the wider agriculture-based economy. Promoting sound local content policies is a pathway to ensuring that the gains from the extractive sector are shared locally and used as a vehicle to increase human capital, all while remaining attractive to foreign capital. A comprehensive local content strategy that focuses on increasing the capabilities of the existing pool of Nigerien workers while attracting fresh capital is therefore critical.

FIFTH PATHWAY: STRENGTHEN THE DISASTER RISK MANAGEMENT FRAMEWORK AND ESTABLISH A DISASTER RISK FINANCING STRATEGY

As a landlocked country with a mostly semi-arid climate, Niger faces multiple climate threats, most prominent of which are recurrent droughts and floods. Several factors, including dependence on rain-fed agriculture, rapid population growth, political instability, pervasive poverty,

and persistent food insecurity further compound the country's vulnerability to these climate threats. On average, Niger experiences a drought year that lowers GDP per capita by -1.5 percent at least once every 2.2 years, generating yearly agricultural income loss of US$ 15 million from droughts (2019 World Bank GFDRR). Annual averages losses from floods are estimated to be between US$ 20 million and US$ 70 million per year (2017 UN Global Assessment Report on Disaster Risk Reduction). Drought-related emergency costs are even higher, amounting to nearly US$ 100 million per year. The poor suffer disproportionally from adverse natural events and are considered the main driver of poverty.

Current challenges are only expected to be amplified in the face of climate change. Despite the limited capacity of climate models to represent complex regional patterns and detect trends in extreme rainfall regimes, most recent research points to more extreme rainfall events in Niger. Climate change and adverse natural events might impact the rural-urban migration dynamics and increase urbanization. In turn, the projected demographic and urbanization trends in Niger could lead to an increase of the negative effects of flood events, through higher exposure and vulnerability. Besides short and medium-term social protection measures to support the population in coping with these events, investments in long-term solutions focused on integrated urban land-use policies and plans, resilient infrastructure, early warning systems, and risk reduction strategies are critical.

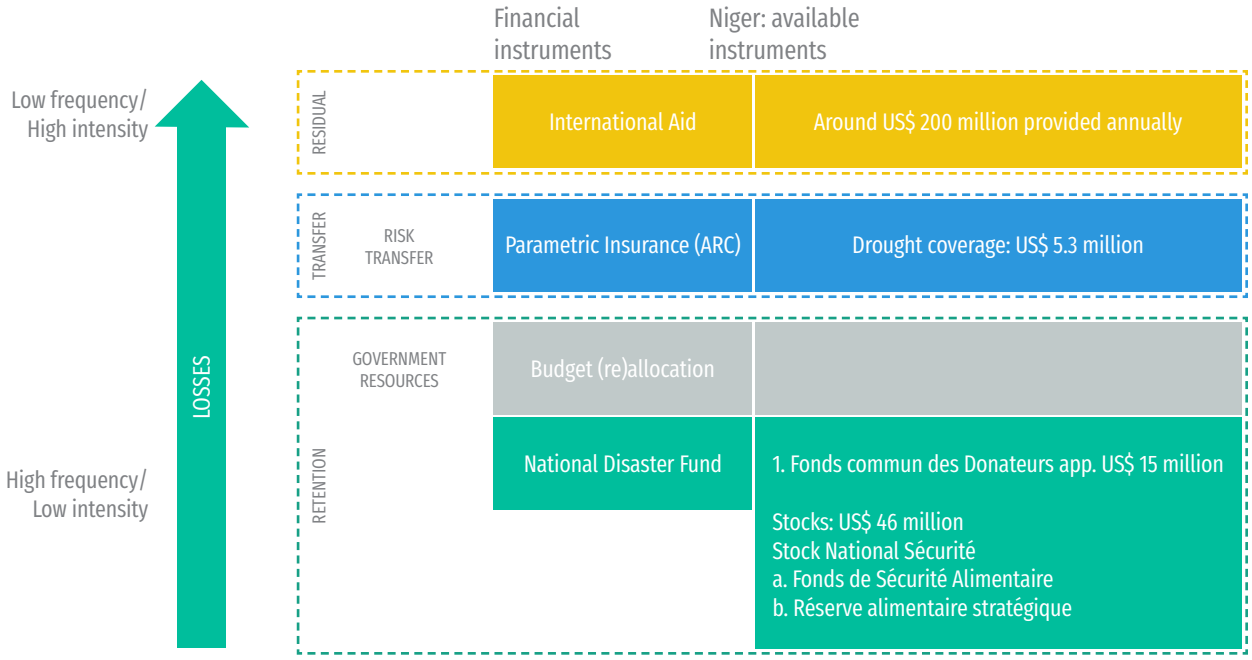
Decreasing the human and economic impacts of disasters would necessitate the strengthening of emergency preparedness and response capacities, as well as risk reduction investments and policies. However, even though disaster risk management (DRM) has been identified by the Government as a priority in its Strategic Development Plan, the DRM sector still faces several challenges linked to institutional and resources limitations. Notably the lack of a DRM law clarifying roles and responsibilities for DRM at central and local level, the inadequate capacity for emergency preparedness and response at the national and local levels, including Early Warning Systems, weak DRM at the local level, and limited capacity and budgetary resources for disaster risk reduction are highlighted by this CEM as critical gaps that needed to be addressed in the DRM framework.

Simulation presented in this report show that shock-related food insecurity is a big liability for Niger. Drought-related emergency costs to respond to food insecurity in Niger amount to nearly US$ 100 million per year. On average, 1-in-5-year droughts cause liabilities of almost US$ 200 million. This number jumps to about US$ 250 million for 1-in-25-year events. When considering a larger mix of causes of food insecurity (climate causes (drought, heatwaves, and flood) as well as conflict/violence, political instability, commodity price/trade shocks and unstable markets, and forced migration), annual liabilities related to food-security costs amount to US$ 150 million on average. However, the average costs of US$ 150 million can increase significantly when disasters arise. Niger faces emergency response costs of over US$ 200 million every five years and of nearly US$ 300 million every 10 years on average.

The Government of Niger faces a large financing gap. Niger disposes overall of resources of US$ 66.02 million for all layers of risk (National Disaster Fund, Food Reserves, Droughty Insurance ARC), and US$ 60.7 million for the lower layers of risk (1-5 years, National Disaster Fund, Food Reserves). Compared to the mere cost of drought related food insecurity (US$ 100 million per year) and overall food security (US$ 150 million per year), the funding gap amounts to about US$ 40 to US$ 90 million per year. The funding gap significantly increases when taking into consideration the modelled food production shocks. The combined humanitarian and economic funding gap is of US$ 768 million for 1-in-5-year food production shocks and US$ 1.1 billion for 1-in-10 years food production shocks.

Relying on humanitarian assistance following disasters, Niger faces uncertainty regarding the amount of funding mobilized as well as delays in the provision of assistance. Niger is heavily dependent on ad-hoc international humanitarian aid to finance its shock-response. From 2012 to 2019, Niger received between US$ 200 and US$ 400 million per year in external international humanitarian assistance (OCHA Financial Tracking System) in total. The country is currently not sufficiently prepared to deal with shocks, and finances its humanitarian shocks mostly ex-post through external donor support as well as to a lesser degree through budget reallocations. With humanitarian assistance arriving on average 7 to 9 months after a disaster, this approach is slow and unreliable, leading to unnecessary loss of lives and livelihoods. Uncertainties over amounts of funding available can undermine government planning of response efforts, and lead to shortages in the assistance provided to the affected population. In the case of Niger, appeals between 2011 and 2019 were on average funded at 63.9 percent.

Against this background, Disaster Risk Financing (DRF) strategy built around a risk layering approach could support the Government of Niger financially manage its risks more efficiently and reduce the economic, fiscal, and human impact of disasters. Risk layering refers to the combination of instruments to ensure cost-efficient financing for emergency response and long-term recovery. As no single instrument is optimal for responding to all disaster events, the most cost-effective way of financing disaster response is through a range of tools to address different layers of risk, ranging from frequent small-scale events to rare catastrophic events. Relying on humanitarian assistance following disasters, Niger faces uncertainty regarding the amount of funding mobilized as well as delays in the provision of assistance. A DRF strategy could allow the Government of Niger to further quantify its risks, discuss what risks will be taken on by the Government at different levels (national/regional/local), what risks will be shared with others such as households and firms, and what risks will be shouldered by international partners. A DRF strategy could also help the Government of Niger by putting in place the right financing instruments and making available adequate financing to ensure that funds are available quickly when required.



Key policy options[5]

Policy recommendations	Timeline for implementation	Fiscal implications
Making the registration/use of the technology simple and trouble-free for the consumer by improving consumer protection reforms and adopting tiered Know Your Customer (KYC) measures	Short term	Low
Enhance the quality of the export products of Niger by providing training and technical assistance to the different value chain actors and strengthening certification processes	Long-term	Low
Level the playing field to attract and retain FDI by ensuring rule-based decision making and transparency in business regulation	Medium term	Medium
Invest in solar energy systems, irrigation, logistics, technologies such as precision agriculture and drip irrigation, digital agri-platforms and blockchain	Medium term	High
Focus the strategy for commercial agriculture on target markets and products where Niger will have sustainable competitive advantages taking into account climate changes and intra-regional collaboration/ rivalry	Medium term	High
Address the shortcomings of the microfinance industry and give it a fresh impulse, involving FinTech solutions and new MFI players to the extent possible	Medium term	Medium
Design properly the Financial Inclusion Fund to provide medium- and long-term loans to strengthen MFIs, Fintechs and banks through a combination of equity, loans and grants for digital transformation	Long term	Medium
Promote value chain financing (VCF) arrangements including the use of warehouse receipts	Short term	Medium
Mandate an appropriate arm of government (e.g., Ministry of Industry or equivalent) to focus specifically on local content needs and opportunities	Short term	Low
Provide incentives to multinationals operating in Niger to provide regular training workshops for instance, quarterly, on various technical/industry matters important to industry (e.g., road design, industrial safety, food hygiene etc.)	Medium term	Low
Encourage or require that foreign investors in Niger put aside a certain fraction of salary (say 2-10 percent) to be spent on training of their own employees	Medium term	Low
Implement revenue-sharing framework, clear arrears of pending payments and ensure funds are spent towards local development projects	Short term	Medium
Develop revenue management legislation e.g., establishing a fiscal stabilization fund	Medium term	Medium
Strengthen legislation enforcing fiscal discipline around usage of windfall resource rents	Medium term	Low
Broaden access to ASM formalization by decentralizing essential process such as registration and license issuance to local governments	Short term	Low
Adopt a DRM law clarifying roles and responsibilities for disaster risk management at central and local levels	Medium term	Low

5 Timeline for implementation: short-term (1 year); medium-term (2-3 years); long term (3+ years) Fiscal implications are estimated as low: affordable within current spending structure; medium: requires budget reallocation; high: need further reform, funding sources and domestic revenue mobilization.

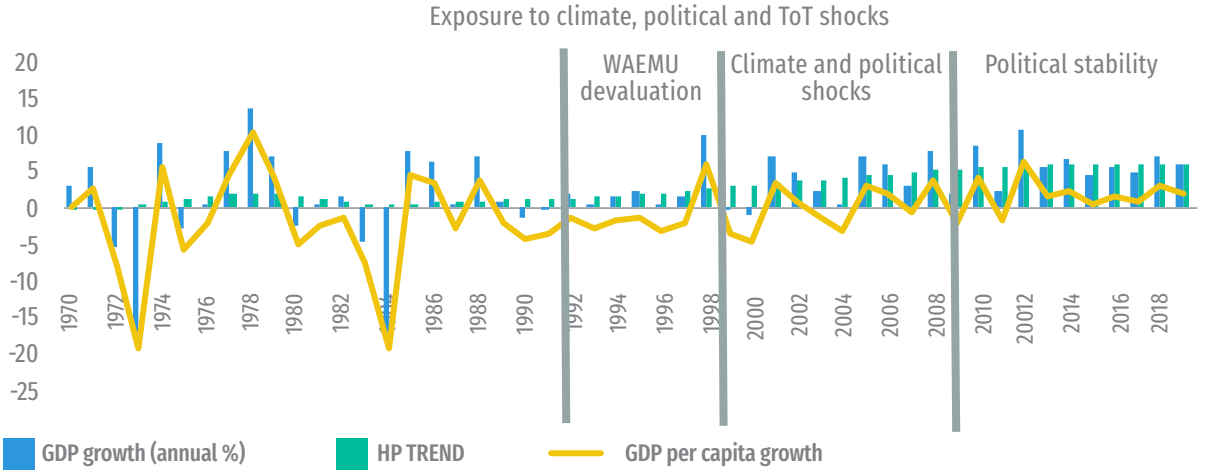
Policy recommendations	Timeline for implementation	Fiscal implications
Strengthen capacities for emergency preparedness and response at the national and local levels, including Early Warning Systems	Medium term	Medium
Use the National Platform to improve inter-ministerial and other stakeholders' coordination	Short term	Low
Enhance capacity and budgetary resources for disaster risk reduction, including investments in resilience in key sectors, land-use planning and building code enforcement.	Medium term	Medium
Increase investment in disaster risk reduction and disaster risk management activities. Financing disaster risk reduction is often more cost-effective than the financing of post-disaster search, rescue, relief, rehabilitation, reconstruction, and recovery	Long term	High
Develop a comprehensive Disaster Risk Financing strategy. As Niger faces high disaster-related contingent liabilities particularly caused by droughts and floods, there is a strong rationale to work towards a more systematic approach to finance these shocks	Long term	High
Work on risk layering. Working towards a disaster risk finance strategy could further support the identification of optimal risk layering	Long term	High

COUNTRY CONTEXT

Niger appears in two episodes of growth deceleration over the past 50 years and has yet to kick off a self-sustaining process of economic growth. Growth rates have largely fluctuated in response to the shocks that Niger has frequently experienced. As a result, GDP per capita growth grew less than 1 percent from 1963 to 1978 and declined by 3 percent on average during the 1980s and part of the 1990s. Trend growth has steadily accelerated only in the wake of the 1994 CFA devaluation that contributed to restoring external sustainability. The improved macroeconomic stability in recent years has led to somewhat less volatile economic growth. Over the last decade (2010-2019), the economy has performed better than the SSA average, with real GDP growth averaging 5.9 percent. However, Niger is not cited in the 127 episodes of persistent growth acceleration[6] listed by the IMF (2017) between 1970 and 2014. It appears instead in two episodes of growth deceleration (in 1971 and 1982).

Unfavorable structural conditions, both exogenous and endogenous, have historically played a primary role in holding back and conditioning the volatility of economic growth in Niger. These include purely exogenous shocks, such as unfavorable geographical and weather conditions, and the disruptive forces of climate change leading to several years of drought in the early 1970s, as well as commodity price boom and bust cycles (Figure 1). On top of this, persistent instability in the Sahel region and the COVID-19 crisis represent additional bottlenecks and sources of fragility. The primary sector, the main engine of the economy, is subject to frequent climatic shocks, especially drought, which cause food insecurity. Other more endogenous elements are also at play, such as high rates of population growth, low human capital (health and education), a large informal sector accounting for more than half of the value added, underdeveloped private and financial sectors, and infrastructure gaps.

Figure 1. Real and per capita growth rate (1970-2019)



Source: WB staff elaboration on World Development Indicators (WDI) data.

6 Persistent accelerations are associated with increases in real income per capita typically ranging from 15-40 percent above the starting level before the episode in a four-year time period.

Weakinstitutions, poor governance, and other internal drivers of fragility exacerbate all the above and further complicate the pursuance of a long-term development strategy.

Post-independence political instability has hampered the capacity to formulate and implement consistent policies to solve structural impediments. Reforms have not produced sustained growth over the past decades due to a succession of coups and power struggles between elites. Since independence in 1960 and until 2010, there have been five military-led coups d'état, and six different Constitution Charts have been adopted. This prolonged uncertainty has had a strong toll on income growth, by weakening governance, discouraging private investments, and preventing the long time-horizon needed for proper planning, implementing and following-up of successful economic reforms. Neither the expansionary and interventionist policies of the uranium boom throughout the 1970s and the beginning of 1980s, nor the structural reforms and the liberalization policies of the following adjustment era successfully influenced the aforementioned structural constraints. The 2007 Country Economic Memorandum (CEM) identifies three possible explanations of why policies have had a limited positive impact on the economy: (i) Much of the impact of government economic policies is felt by the modern sector, which represents just a quarter of GDP; (ii) for years very few significant investments have been made to reduce bottlenecks to productive economic activities in sectors like education and infrastructure; (iii) incapacity to reduce the drain represented by the high fertility rate on public resources and on the saving capacity.

In the political arena, multiple actors dominate a population living in survival mode and in need of protection, while competing to extract rents from the limited resources of the country and the state. Among the core power players are the military; a group of lifetime politicians; powerful traders; and selected traditional leaders, sheikhs, and religious leaders who balance each other's interests (and power) in a dynamic but relatively stable equilibrium. This 'political class' is sustained by a very poor, largely uneducated population who seek protection against poverty and shocks. The 2017 Systemic Country Diagnostic explains that as a result of this complex landscape, incentives in the public sector are not aligned with poverty reduction and the scope for change is limited. Rent seeking, clientelism, and impunity are endemic, and ensure a certain stability but also lead to a non-inclusive development model geared towards generating benefits to insiders. It explains a preference for capital-intensive investments by the public sector such as in main roads, dams, large irrigation schemes and oil refineries as opposed to investments in agricultural extension, small scale irrigation or rural electrification and spurring financial inclusion and private sector development. It also explains the large informal sector, as the economy is dominated by a small number of public and private monopolies who prefer to restrict competition in their respective domains. It gives rise to an adverse business environment with high transaction costs which can be avoided by remaining informal, or by becoming large and well-connected. It also leads to an inefficient administration with many ministries and burdensome procurement procedures. Finally, it leads to economic exclusion and inefficiency, and very low-quality service delivery in health and education.

Improving living standards remains impossible without addressing the bottlenecks for higher and more stable growth. Even before the Covid-19 crisis, Niger's growth lagged behind the levels needed to improve the living standards of its citizens. The share of the Nigerien population living under the national poverty line was 42 percent in 2019, according to the recently collected household survey EHCVM 2018/19. Of these, 95 percent (9 million) reside in rural areas. Nearly half of the rural population are unable to meet their basic nutritional and non-food needs, compared to 13 percent of the urban

population. The steady population growth has presented a persistent wedge between overall GDP and per capita growth rates. For instance, one additional percentage point of GDP growth is required to reach the same GDP per capita growth of Burkina Faso, solely because of Niger's current fertility rate of 6.8 children per woman and population growth rate (3.8 percent).

Moreover, returning to the previous pace of growth will not be sufficient to overcome the development lags accumulated over the years, and even less to address the new challenges. The country has been ranking at the bottom of the UN Human Development Index for over a decade, and the prospects for climbing some positions in the future are at the moment very grim. In the next 30 years the country will be facing the continuous deterioration of climate conditions that will increase its exposure to shocks, with enormous consequences for the population and economic activity. It will also have to learn how to manage the potential wealth coming from the increase in oil production without being exposed to the" resource curse" witnessed in other SSA countries. Finally, it will be facing a steady increase in population driven by a high fertility rate. Hence, the economy will have to provide jobs to a large mass of new entrants into the labor market, but without substantial change in the age structure, and consequently, little benefits from an elusive demographic transition.

This Country Economic Memorandum aims to support Niger's efforts to walk on a path conducive to a resilient and sustainable economic growth. It does so by attempting to answer the following five questions, each of which constitutes a separate chapter: (i) What were the salient structural characteristics of Niger's growth performance in the last 20 years? (ii) What are the margins to accelerate growth in the medium to long term? (iii) How can technology be a vehicle for private sector development? (iv) How can the country's large natural resource endowments be managed in a transparent way that benefits the whole population? (v) How can the current disaster management framework be strengthened to increase resilience to natural shocks?

Amidst competing development needs and priorities, three main areas of analysis and policy reforms have been selected. The selection criteria were based on the lessons drawn from other developing countries' experiences, on Niger specificities, and on the potential gains from moving to the frontier. For each area, long-standing bottlenecks that have held back growth are identified, and specific policy options presented, with a view at creating pathways for 1) boosting long-term growth in a sustainable manner, 2) increasing economic diversification and, 3) supporting preparedness to natural disasters.

In particular, five pathways are identified throughout the chapters:

- Promote sound local content policies in the extractive sector;
- Manage oil revenues in a transparent and fiscally responsible way;
- Leverage new technologies to promote agricultural productivity and export orientation;
- Foster the development of digital finance;
- Strengthen the disaster risk management framework and establish a disaster risk financing strategy

It is worth emphasizing that these pathways are not mutually exclusive. Instead, overall growth performance will be magnified by the implementation of overarching reforms that exploit the significant existing complementarities between each of these areas.

Box 1. Fragility, Conflict, and Violence Drivers in Niger

The Niger World Bank's Risk and Resilience Assessment (RRA) being finalized at the writing of this report, analyzes the structural factors and recent drivers of fragility, conflict and violence (FCV) in the country and explains the interlinkages between cycles of instability that have been brought about by both exogenous and endogenous factors as depicted in the figure below. Driver 1 shows how growing cross-border insecurity and inter-communal violence perpetuate cycles of violence and trauma; Driver 2 illustrates how competition over natural resources and lack of extractive revenue sharing aggravated by climate change and demographic pressures is leading to heightened intercommunal conflict levels; Driver 3 explains how exclusion, inter-group and territorial inequalities amidst decreasing economic opportunities generate grievances; Driver 4 describes how ungoverned spaces, territorial marginalization, and lack of decentralization limit the ability of the state to deliver services to its citizens, and Driver 5 focuses on the self-preserving elite that captures rents to hold on to power, thereby failing to generate a social contract between citizens and state.

Figure 2. Drivers of FCV in Niger

Figure 3. Niger reported fatalities

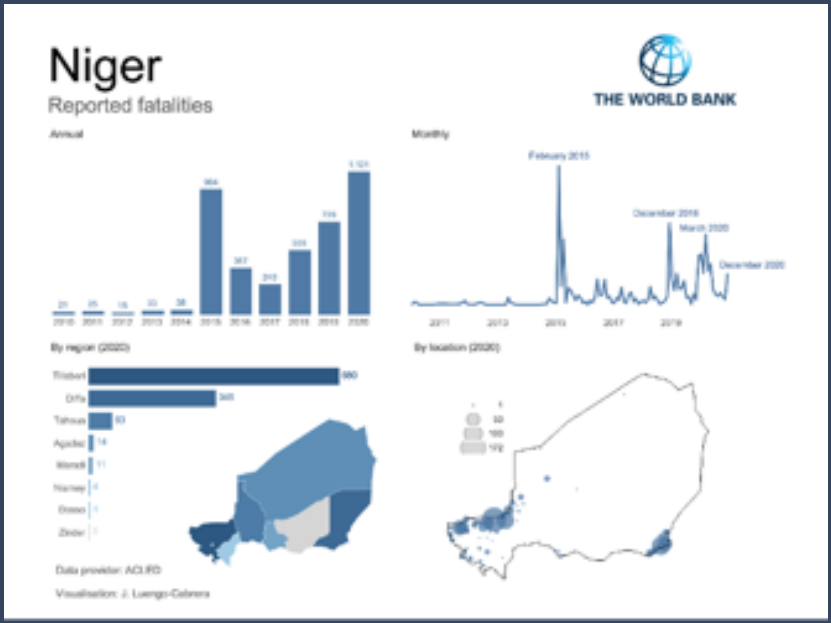
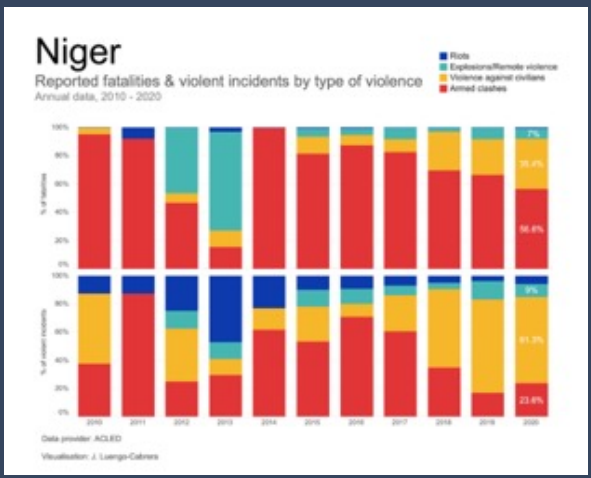
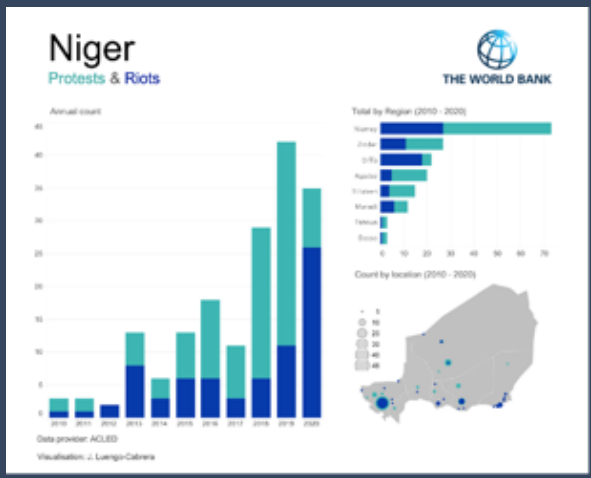


Figure 4. Reported fatalities and violent incidents by type of violence & Protests and riots in Niger 2010-2020





Source: ACLED data analysis conducted for the Niger RRA, June 2021.

Violence has been rising steadily since 2017, with 2020 marking a record both in the number of reported violent events and fatalities associated with them (Figure 3) Clashes between armed actors is the primary factor accounting for an average of 64 percent of fatalities. In parallel, the share of civilian deaths has risen to a decade-high record of 35 percent in 2020. Nine major attacks have been carried out between January and June 2021 by suspected elements of non-state armed groups targeting positions of the Defense and Security Forces respectively in Diffa, Mainé-Soroa and Bosso. Some of this violence is attributable to state security forces, as the Commission Nationale des Droits Humains (CNDH) reported in July 2020 that 102 men had been forcibly disappeared by security forces in Inates in Tillaberi.

There has also been a steady rise in protest and riot activity, more than doubling in 2020 compared to 2019 (Figure 4). While recent surveys show Nigeriens have a moderate level of trust in public institutions; high levels of corruption, violent extremism, and lack of access to services are affecting levels of trust in the state as these recent events demonstrate. Between 2010 and 2020, 41 percent of protests and riot activities have been located in Niamey.

The security situation in the three borders region (where terrorist groups have established bases) continues to deteriorate, with 2020 being the deadliest year since the crisis started. Over the first few months of 2021, some 300 people including women and children were killed in armed attacks by suspected Islamic State in the Greater Sahara (ISGS) militants. The attackers also injured many others, destroyed infrastructure and homes, and stole livestock. The Nigerien government has increased the presence of security personnel, and 1,200 Chadian soldiers under the G5 Sahel banner are also deployed. Nonetheless, some 30 soldiers were also killed in terrorist attacks. In the Southeast, the security situation remains precarious in the Diffa region, where militants from the Islamic State in West Africa Province (ISWAP) and the Boko Haram faction are conducting attacks on state security forces as well as harassing civilians. Farther west, in the Maradi region, the pace of attacks against villages bordering Nigeria, involving cattle rustling and kidnappings, remains high.

Three of the country's eight regions, namely Diffa, Tahoua, and Tillabery continue to be under a state of emergency. National security forces, with support from the G5 Sahel forces and the French Barkhane forces continue to deploy military operations. On June 10, 2021 French President Emmanuel Macron announced the end in its current form of the Barkhane military operation and the reduction of troops from 5,100 soldiers when it began in August 2014 to 3,000.[8] The remaining French troops will concentrate their efforts on the tri-border area between Niger, Burkina Faso, and Mali, and will continue to support Sahelian army forces as well as other European forces including the Takuba European Task Force whose command center is now being moved to Niger. This places Niger at the center-stage of counterterrorism efforts in the Sahel and as France's new preferred security partner in the region.

On top of it all, an increase in refugees and Internally Displaced Persons (IDPs) is straining government services and stressing the social fabric of host communities. Violence and insecurity in border areas have resulted in 300,000 IDPs, primarily in Diffa and Tillaberi, half of whom have been displaced since November 2019. Close to 35,000 Nigeriens have also returned from even more insecure parts of Nigeria. In addition, Niger is hosting 234,000 refugees, putting further pressure on natural and socioeconomic resources in hosting areas. The main refugee groups are from Nigeria (172,000) and Mali (60,000) and are settled in areas already experiencing conflict or that are at risk of conflict, primarily in Diffa and Tillaberi regions. A state of emergency declared in Diffa, Tahoua, Tillabery, and Maradi continues to add economic and social pressures to an already weak service delivery system in these fragile areas.

CHAPTER 1

Niger's growth experience in the last 20 years: low income and labor productivity gains, many unresolved problems

This chapter gives an overview of the main economic obstacles that have prevented a more sustained process of income convergence by exploring the evolution of labor productivity, widely considered the main contributor to economic development and raising living standards. The chapter starts by checking the contribution of labor productivity and other factors to per capita income growth in Niger from 2000 to 2019. Subsequently, output per worker is further decomposed in order to assess the extent to which productivity gains have been driven by structural change or by productivity dynamics at the sector level. This section also assesses how growth and productivity gains have translated into the creation of better jobs for more people, with a special focus on wage employment, and female labor force participation. The second section applies the conceptual framework of Chenery and Syrquin (1975), and Kuznets (1966), to explore the nature of structural change with respect to three, not mutually exclusive, processes.

To identify areas in which Niger faces the greatest challenges to accelerate growth, three benchmarking groups have been identified. The first group, referred to as regional comparators, includes for every indicator the average values in Sub-Saharan Africa (SSA) and Low-Income Countries (LICs). In addition, a data-driven approach was used to identify structural and aspirational peers.[7] This approach led to the selection of Burundi, Democratic Republic of Congo (DRC), and Burkina Faso as structural peers. Republic of Laos, Uzbekistan and Rwanda have been chosen as aspirational peers. [8]Some of those countries are grappling with similar conflict contexts, are resource intensive, or landlocked countries.

7 Structural peers are defined as countries which had similar economic characteristics as Niger in recent years (2011-2019), while aspirational peers share common economic and institutional features with Niger but have managed to evolve and perform better than Niger along a set of aspirational growth criteria from 2000 to 2019.

8 The same set of countries (plus Senegal) have been chosen as structural comparators in the recent World Bank Niger Public Expenditure Review. However, due to some data limitations, values for Laos sometimes are not reported in the figures.

1. NIGER'S DEVELOPMENT PATTERN VIS-A-VIS SUCCESSFUL DEVELOPMENT EXPERIENCES

The transformation of an underdeveloped to a developed economy can be defined "by the set of structural changes required to sustain a continuing increase in income and social welfare" (Chenery, 1982). Although these requirements tend to vary according to country characteristics – such as natural endowments and each country's social objectives – there exist factors that, hypothetically, produce a degree of uniformity in this transition. Such factors include the changes in consumer patterns with the level of income, the need to accumulate physical and human capital to increase output, access to common sources of technology, and development of international trade. Following Kuznets (1966), the principal dimensions of this transformation are measured by the change in the composition of aggregate demand, production, international trade, and in the use of capital and labor as the level of income of a country rises. We will see that Niger has been able only partly to replicate the pattern observed across these dimensions in other countries that have successfully transitioned from a system where economic structure was mainly characterized by low income, informal, labor-intensive activities, to a configuration where higher income has been associated with a different use of this income, higher savings and then domestically financed investment. This transformation from a demand-side perspective cannot come from the outside the country, as signaled by the slowdown in the influx foreign fund is and the fact that trade specialization is still at an embryonal stage.

Over the past 20 years the composition of private consumption in Niger has shown a remarkable constancy, hinting to nonsignificant changes in income levels and welfare. A well-known empirical regularity is that changes in the composition of production, trade, and employment would raise income, which in turn transforms the pattern of consumption. For instance, Engel's law predicts that the proportion of demand for some goods, especially food, can fall with the increase in income, even if absolute expenditure rises. This usually happens to the benefit of other items such as housing or communications and transport. In the case of Niger, between 2011 and 2017 (the first and the last years for which disaggregated data are available), the proportion of food consumed in the total household final consumption has remained stable at 53-54 percent. Moreover, the composition of food items that are consumed does not show either a pattern towards more sophisticated or higher nutritional items. Bread and cereals have remained stable as the main item consumed at 45 percent while the weight of the consumption of meat has even declined by 1.2 percentage points.

However, capital accumulation has accelerated, compensating for a relative decline in the share of government consumption. Another empirical regularity in many developing countries is that as average income increases, consumption's share decreases and investments o the opposite, helping the economy to rebalance away from agriculture toward manufacturing and services. Merotto (2020) finds that in non-resource rich countries with faster per capita GDP growth compared to regional averages over the last 30 years, growth was driven either by an increase in physical investments (in largest countries, China, India, and Bangladesh), or by a combination of net trade and investment (in smaller countries).[9] The share of final consumption in total GDP in Niger dropped by about 7 percentage points between 2000 and 2019, with a more marked decline (5 percentage points) in public

9 Merotto, Dino (2020, March). In Low Income Countries It Is Factor Accumulation That Drives Transformative Growth, https://www.jobsanddevelopment.org/in-low-income-countries-it-is-factor-accumulation-that-drives-transformative-growth/

consumption. In parallel, gross fixed capital formation dramatically increased from 14.4 percent of GDP in 2007 to 21 percent in 2008, driven by a spike in private investment, and has fluctuated around 24 percent of GDP over the last 10 years.

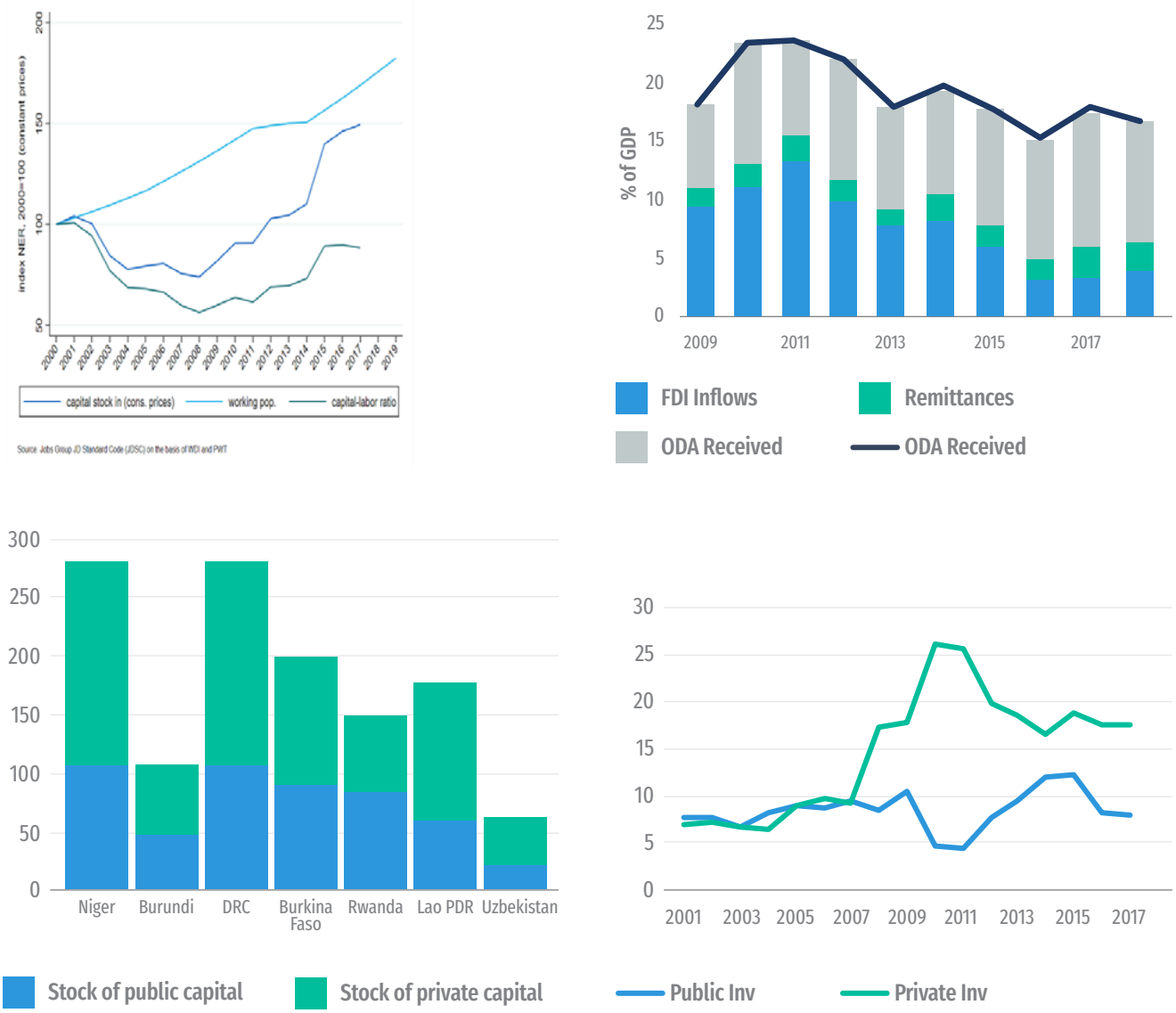
The limited availability of savings is a major constraint for investments to keep pace with the demographic growth. Domestically financed capital spending currently plays a large role in investment composition, representing 85 percent of total capital spending in 2019, up from 68 percent in 2010 (Table 1). This is due mainly to rising trends in private investment, making up for the drop in the value of the stock of private capital observed between 2000 and 2008. Overall, the value of the total stock of public and private capital (as share of GDP) in Niger is estimated as being far higher than in comparators, with a ratio to output of around 470 percent in 2019 (Figure 5).[10] Also, the stock of capital per person in 2019 is 90 percent higher in Burkina Faso and almost 4 times higher in Rwanda or Uzbekistan. However, the stock of capital in Niger is 86 percent of what it was in 2000. This may be explained in part by Niger's continued rapid population growth. Sustained demographic trends like the one in Niger and generate growing demand for services and infrastructure and require a high level of capital to ensure that labor productivity is high enough.

The current level of domestic saving fails to accommodate the demand for investments in physical capital, increasing the country's need to access foreign capital. The FDI stock is in line with the average of the SSA region and in 2019 Niger still received more FDI inflows (as a share of GDP) than comparators. However, inflows have halved since 2010, moving from 10 percent of GDP to less than 5 percent, and most employment in Niger remains in capital-thin `traditional sectors', marked by high degree of informality.

The increasing role of investment in domestic demand has only partly been mirrored in the production structure. The change in domestic demand led to a deterioration in the trade balance driven by an increase of 8 percentage points of GDP of imports, mainly equipment for projects in the extractive industries and for public investments. This adds to the continuously negative service and primary income balance, with limited remittances inflows. Overall, while Niger was able to access foreign capital to help finance growth-enhancing investments, it was not able in parallel to raise productivity through policies that could support comparative advantage in trade. Although the real effective exchange rate has generally been assessed by the IMF as in line with fundamentals, competitiveness problems were repeatedly highlighted.

10 This is the value from the Peen World table, based on constant prices expressed in 2017 US$. It is considerably higher than what in recorded in most peer countries (340 percent of Burundi, 181 percent of DRC, 140 percent of Rwanda for instance). The IMF Investment and Capital Stock Dataset expressed in PPP, also gives similar very high values, that are hard to reconcile with the economic reality on the ground. One explanation can be that a too low-price deflator was used to transform current values in constant values. As the issue requires further scrutiny, we prefer to focus here on Niger's specific trends, rather than in engaging in a cross-country comparison which can be methodologically flawed.

Figure 5. FDI, investment and capital stock in Niger



Source: PWT, World Development Indicators (WDI), IMF; GDP and gross fixed capital formation are measured in constant LCU.

Table 1. Niger's Foreign vs. Domestic Investment (2010-2019, % of GDP)

	Niger			SSA		
Year	Total Investment	FDI	Domestic Investment	Total Investment	FDI	Domestic Investment
2010	31.90	10.22	21.68	22.55	6.79	16.37
2011	31.59	12.26	19.32	22.63	7.49	15.59
2012	28.80	8.98	19.82	22.52	6.74	15.83
2013	29.58	7.08	22.49	22.49	5.75	16.70
2014	30.70	7.61	23.09	23.96	4.39	19.64
2015	32.43	5.48	26.95	23.26	4.90	18.48
2016	26.24	2.93	23.31	23.18	3.61	19.74
2017	28.10	3.03	25.07	21.67	4.22	17.63
2018	28.97	3.63	25.33	21.63	3.78	17.89
2019	30.19	4.59	25.61	23.45	3.29	20.14

Source: WDI

Trade openness[11] has grown over time, but it still trails average regional and country comparators, and the current trade specialization is hampering productivity growth. This is strictly correlated with the lack of diversification from low productivity activities. International experience shows that productivity growth benefits from expertise in producing relatively complex and sophisticated exports, which is associated with international technology diffusion (Hausmann, Hwang, and Rodrik 2007). Based on the data available for Niger for the indicators of economic complexity[12] , the country shows a very low and decreasing index of economic fitness, in line with average LICs, but a level of export sophistication well below peers. The products in which the country shows a relative specialization are mainly in agriculture and extractives, but the weak productivity level of the agriculture and livestock sectors prevents an increase in the total export share. On average between 2011 and 2017, food and manufacturing accounted only for a quarter of the total merchandise export, while food goods comprise the main imports. At the same time, live animals—cows, sheep, and goats which are mostly sold to Nigeria and Chad – are largely unrecorded in the official exports data. The extractive sector plays a significant role in Niger's economy, with uranium and gold accounting for between 6 and 8 percent of GDP and approximately 50 percent of the country's export receipts.

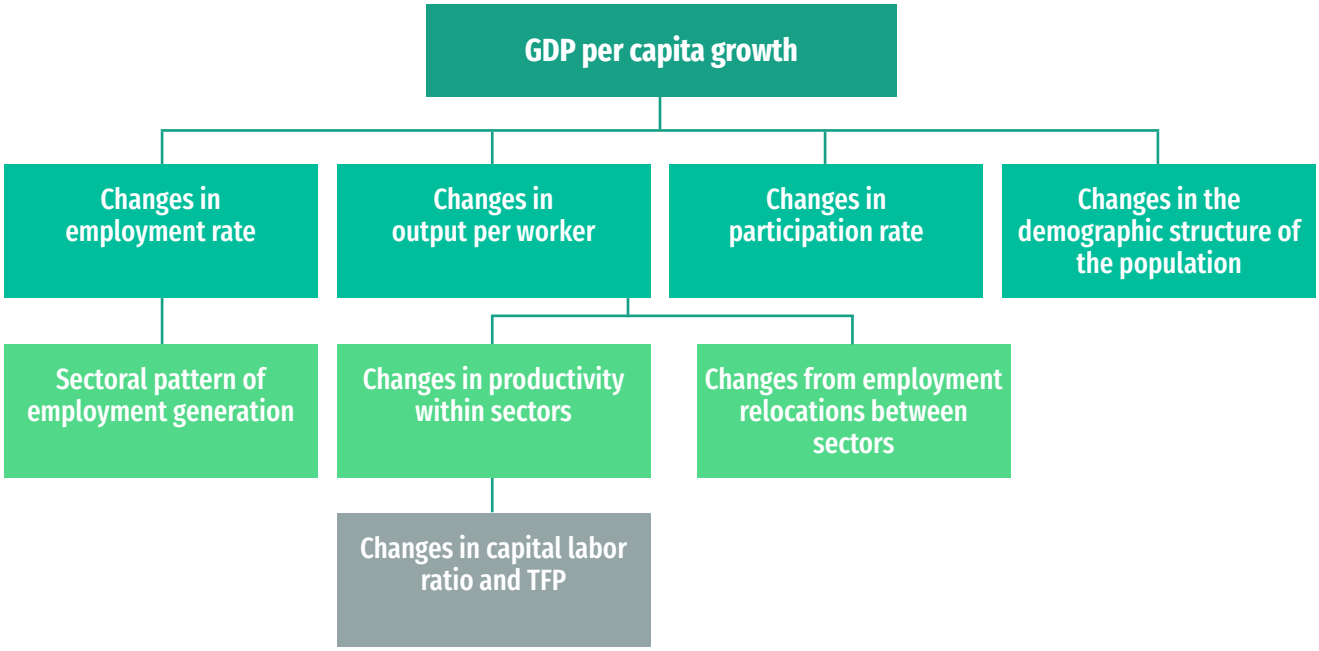
11 Calculated as total value of exports and imports of the country and dividing this by the country's GDP.

12 Indicators of economic complexity measure the knowledge in a society that gets translated into the products that it makes (Hidalgo and Hausmann 2009). Complexity reflects diversification and production capabilities and may be linked with higher productivity or greater scope for future growth. The economic complexity index (ECI) is not available for Niger. Available indicators include i) economic fitness, a country-level metric based on the diversification and complexity of a country's competitive exports where higher scores point to a more diversified and complex export basket and, ii) Export sophistication index (EXPY) that estimates the level of technological sophistication embodied in a country's export portfolio. A high EXPY indicates a more sophisticated export portfolio.

2. UNFAVORABLE DEMOGRAPHICS AND THE WEAK DYNAMIC OF LABOR PRODUCTIVITY DOES NOT SUPPORT SUBSTANTIAL INCOME GROWTH

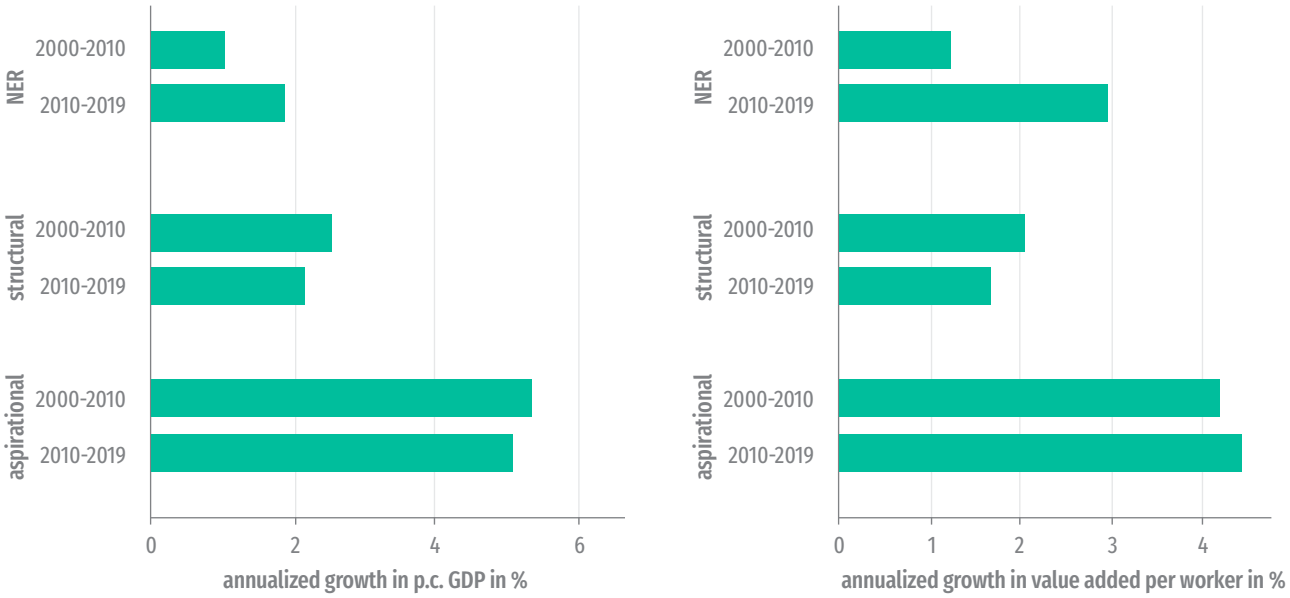
Productivity is a key driver of wealth and job creation. Productivity is about how well people combine resources to produce goods and services. Labor productivity, or the amount of output produced per worker in an economy, is a useful start for understanding the output productivity of an economy. For countries, it is about creating more from available resources, such as raw materials, labor, skills, capital equipment, land, intellectual property, managerial capability and financial capital. Higher productivity is therefore synonymous with higher production, higher value creation, and higher incomes. As a result, the higher the productivity of a country, the higher the living standards that it can afford, and the more it can improve the wellbeing of its citizens (e.g., healthcare, education, roads and telecommunications, security, and a stronger social support). At the economy-wide level, productivity also brings more jobs and better-quality jobs, paying higher salaries. If labor force participation remains constant, countries in which output-per-worker is declining face a daunting prospect of decreasing quality of life, leading to more rent-seeking behavior. Declining living standards can contribute to a perception of welfare being a zero-sum-game through stresses on public trust and erosion of the social contract Figure 6 represents how income growth can be decomposed in its main drivers. Further elements and definitions can be found in Appendix A.

Figure 6. The main drivers of per capita growth



Over the last two decades, Niger's per capita GDP growth has been lower than its peers and prospects for a catchup are limited. From 2000 to 2019, per capita valued added has increased by US$ 130 in constant 2010 prices, 85 of which came only from 2010. This flat change in per capita GDP growth over time tracked the evolution of labor productivity: Niger's productivity growth is disappointing despite the acceleration in recent years (Figure 7). Labor productivity grew at around 2 percent per annum and was the main force behind Niger's income growth in the 21st century. In contrast to most countries (at all income levels), Niger did not experience a slowdown in productivity growth after the global financial crisis (GFC). Instead, an acceleration happened in the decade following the crisis, when yearly growth jumped from less than 1 percent to just below 3 percent. However, this performance lags behind all peers (except Burundi), the productivity of which have been growing at rate between 3.2 percent (Burkina Faso, DRC) and 4.7 percent Laos) per annum (Table 2). A simple extrapolation (Table 3) shows (that if value added and employment will keep growing at the recent (2010-19) rates, in 30 years the level of output per worker in Niger will still be only slightly more than 70 percent of what is observed in the region, even though there will be a catchup process of the average productivity level in LICs.

Figure 7. GDP per capita (left panel) and per person employed (right panel) compounding annual growth rates and levels in Niger and peer countries



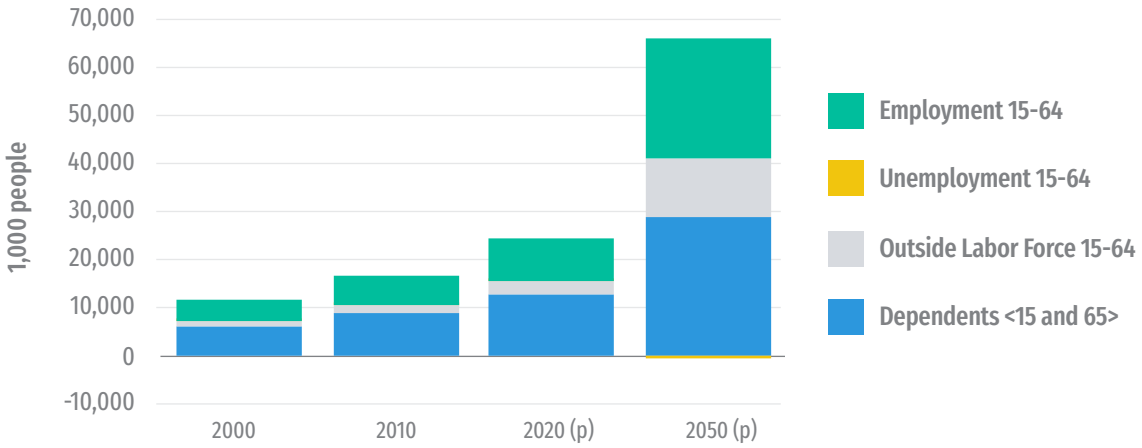
Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI

Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI

High population growth has put enormous pressure on the job market. Slow labor productivity growth combined with an early demographic transition suggests that Niger is not yet well positioned to take advantage of a demographic dividend. After years of steady increase in the population, driven by the highest fertility rate in the world, Niger is giving signals of an early transition stage (or first demographic dividend), characterized by lowering mortality rate, increasing share of the working-age population, and lower child dependency ratio.[13] However, the age structure in Niger is expected to remain dominated by the youth (under 15 years old), with a low share of elderly people. In 2050 the share of Niger's population under 15 years of age would still be very elevated at 44.7 percent, due to the projected slow decline in the fertility rate. As a result, in 2050 Nigerien workers will have to support a large number of youths, around 30 million (Figure 8).

The marginalization of young people due to limited economic opportunities and social exclusion can fuel grievances and make them vulnerable to illicit activities or radicalization, specifically in areas that are also affected by conflict or where impunity is high. Given poor quality of the education system and low attendance rates, many young people have little education and are largely unskilled. Even youths who reach secondary and tertiary education levels are offered few opportunities for work. Other challenges to include difficult access to land or assets and little voice in public fora leading to a sense of exclusion. Opportunities in areas at-risk or affected by conflict are even more limited given state of emergencies and curfews that have impacted sectors absorbing many youth (e.g., banning of motos, petty or informal trade) Some youth resort to illegal sources of income or join violent extremist groups. However, areas with more economic opportunities offer youth a more viable transition to self-reliance via a more dynamic local economy.

Figure 8. Demographic trends in Niger



Source: WBG staff estimations using "JobStructure Tool Demography", WBG, 2020

13 Since 1985, under-5 mortality rate has been declining sharply from 333 to about 80 per 1,000 children in 2019, catching up with the West African Economic Monetary Union (WAEMU) and SSA's average mortality rates. Consequently, life expectancy has improved by more than 20 years during that period going from 41.2 years in 1985 to 62 years in 2018. After decade where fertility rate has been close to 8 births per woman, it has turned below 7 for the first time in 2018. Still, this is more than the 2 children per woman above the average for LICs and SSA (excluding high income countries). The UN projects a gradual fertility decline in Niger but the rate would still remain at 5 children in 2040, while LICs will have brought down that value to 3.3 children per women.

Table 2. Decomposition of growth in per capita value added (2000-19)

Annual Change (percentage points)	Niger	Burkina Faso	DRC	Rwanda	Lao PDR	Uzbekistan	LICs	SSA
Total	**1.4**	**2.7**	**2.0**	**5.1**	**5.4**	**5.0**	2.2	1.6
Productivity	2.1	3.7	2.8	4.8	4.5	3.6	2.1	1.6
Employment Rate	0.1	-0.2	-0.1	0.0	0.1	0.4	0.0	0.0
Participation Rate	-0.5	-0.9	-0.7	-0.2	-0.1	0.2	-0.2	-0.2
Demographic Change	-0.2	0.2	-0.1	0.5	1.0	0.8	0.3	0.3

Source: WB staff using Jobstructure tool

Table 3. GDP per person employed, 2019/2050, Niger and comparators

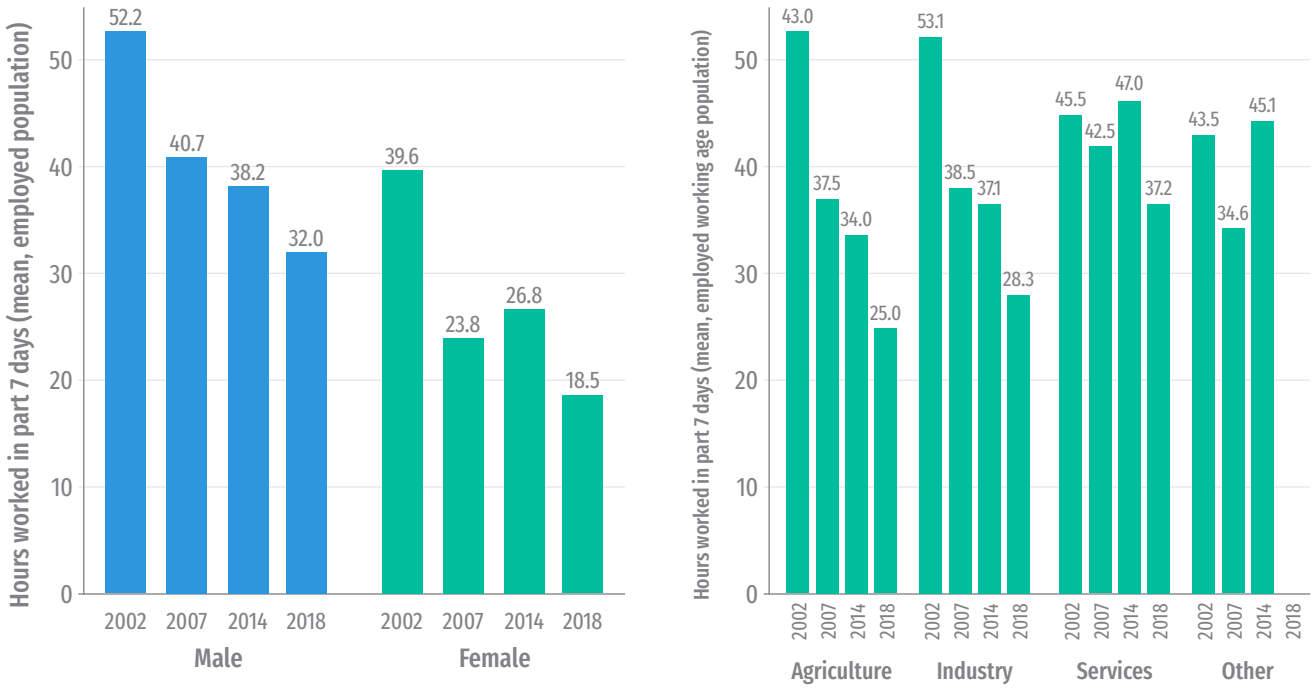
Total Productivity (constant 2010 US$ per person)	2019	2050
Niger	1,610	3,847
SSA (excluding high income countries)	4,740	5,246
LICs	2,260	2,877

Source: WBG staff estimations using "JobStructure Tool Demography", WBG, 2020. For LICs the base value is 2018.

Currently, employment is concentrated in small-scale, low-productivity activities, mostly in agriculture, and hours worked per week have been declining. Household surveys in 2014 and 2018 found that three-quarters of the working age population were employed or self-employed. However, this measure incorporates all residents of working age who worked at least one hour in the week preceding the survey, whether paid or unpaid, formal or informal. Approximately 30 percent of working Nigeriens were *unpaid* employees, and almost all earning incomes were self-employed, in 2018.[14] Underemployment is high, with working Nigeriens working on average 25.8 hours per week in their main job (down from 33.2 hours per week in 2014). This particularly reflects Nigeriens' continued reliance on small-scale rural agriculture where on average only 25 hours are worked per week, in contrast with the 37.2 hours worked in the service sector. Moreover, in the agriculture sector, 40.7 percent of work is unpaid, and a further 51.6 percent is self-employed (Figure 10). As a result, a third of working rural adults are unpaid, compared to just 8.7 percent in urban areas. Although urban residents are more likely to hold paid employment, and less likely to rely on unpaid work, they are also more likely to be out of work altogether; almost half the working age population in urban areas does not work – an outcome that has improved little since 1995.

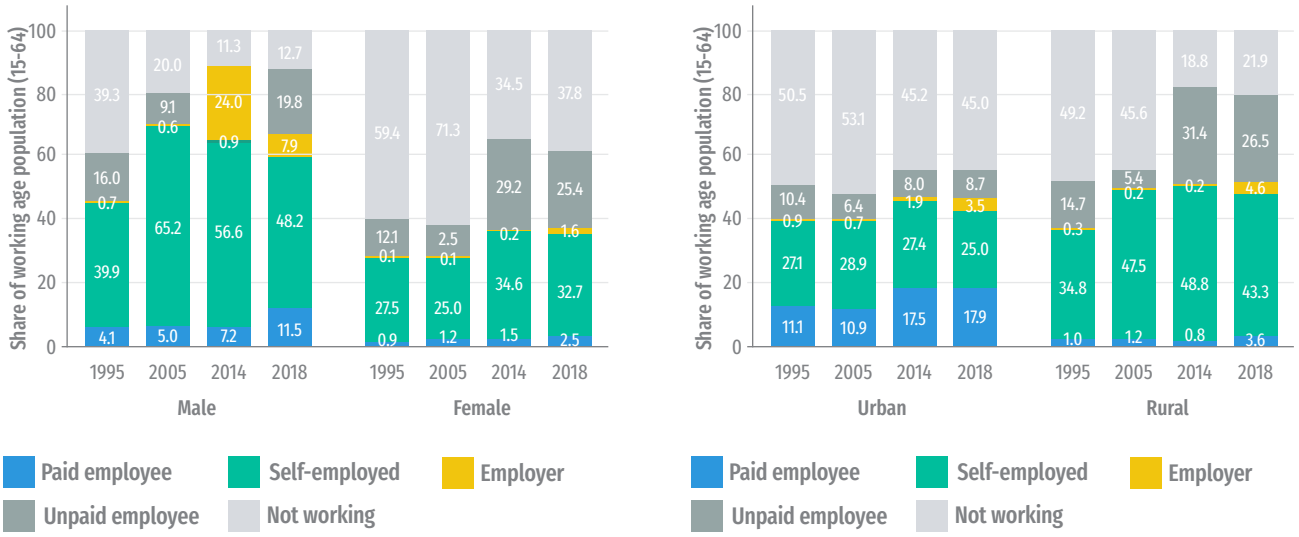
14 This may, in part, represent improved measurement of unpaid employment in household surveys. Unpaid employment most typically includes work on farms other than one's own.

Figure 9. evolution of the weekly worked hours in Niger



Source: Niger National Statical Office

Figure 10. Evolution of the employment structure



Source: WB, using I2D2 data from Niger LSS, LFS, and ECVMA surveys.
Note: In 2004-5, Niger was impacted by a severe crop failure and food crisis that depressed output and employment; changes from 2005 to 2014 should not be interpreted as a linear improvement. Indeed, WDI data shows a decrease in labor participation from 2010-2019.

Wide gender gaps continue to be a serious roadblock to sustained and inclusive growth. Niger has a Gender Inequality Index value of 0.647, ranking last at 189 in the 2018 index[15]. Gender inequality is prevalent in inequality of economic opportunities, access to financial services, labor force participation, and education attainment. Underemployment is more acute among women, as they work only 18.5 hours on average per week, less than 60 percent of the hours worked by men. In 2018, a woman was twice as likely to not be earning an income, compared to a man: 63.2 percent of women were either out of the labor force or in unpaid employment, compared to 32.5 percent of men. Moreover, only 2.5 percent of the women have a waged job, in contrast with 11 percent of men. Women face more complexities in accessing formal credit related to restrictive collateral requirements, shorter maturity of loans, and higher interest rates than men. Laws governing opening of bank accounts, property and land rights discriminate against women. Although the 2010 Constitution covers equality by law, women are confronting norms and cultural barriers that extend beyond the purview of formal legislation.

Women face stark gender inequality which has a high cost in terms of economic impact and social exclusion, increasing their vulnerability in an FCV context. Despite efforts the primary completion rate for girls aged between 15-18 reached 26.5 percent compared to that of boys which reached 41.4 percent and young women face especially daunting challenges related to early marriage and childbearing, low access to education and labor force participation, and limited representation in local and national governance structures, particularly traditional ones. Social norms and some legal barriers lead to gender inequality that result in women having fewer opportunities in the labor market than men, receiving less pay and being less productive. Niger has taken steps to address gender inequality with the second Economic and Social Development Plan of 2017-2021 (PDES II) where the government recognizes the disparities between men and women.

Weak human capital exacerbates Niger's low labor productivity and demographic challenges. Education is a strong predictor of labor market outcomes in Niger: 82.3 percent of adults who completed upper secondary school were in paid work or education in 2018, compared to less than 58 percent of those with only lower secondary, primary, or no education. Unfortunately, the vast majority of working age Nigeriens – 96.9 percent of women and 94.2 percent of men – lack education above the lower secondary level. Nigeriens with lower secondary or primary education are not substantially more likely to be in paid work or education than Nigeriens with no education – hence reflecting both the poor quality of education available, and the dominance of low-skilled employment opportunities.

3. THE SCOPE OF STRUCTURAL CHANGE HAS BEEN TOO LIMITED

Cross-country experience shows that the pattern of structural transformation tends to be associated with a hump-shaped curve for manufacturing output as a share of GDP (World bank, 2017). However, the turning point seems to be occurring at much lower levels of income for developing countries, such that their decline in manufacturing begins at levels of income that are a fraction of those at which advanced economies start to de-industrialize. Thus, developing countries transition into service economies earlier than developed ones, a phenomenon that is referred to as premature de-industrialization (Rodrik, 2016). This is the case of

15 United Nations, Gender Inequality Index 2018

many SSA countries that have experienced a decline in manufacturing shares in both employment and real value added since the 1980s. International evidence shows that without sustained structural change (high across-sector productivity growth), within-sector growth is not sufficient to sustainably generate higher quality jobs.

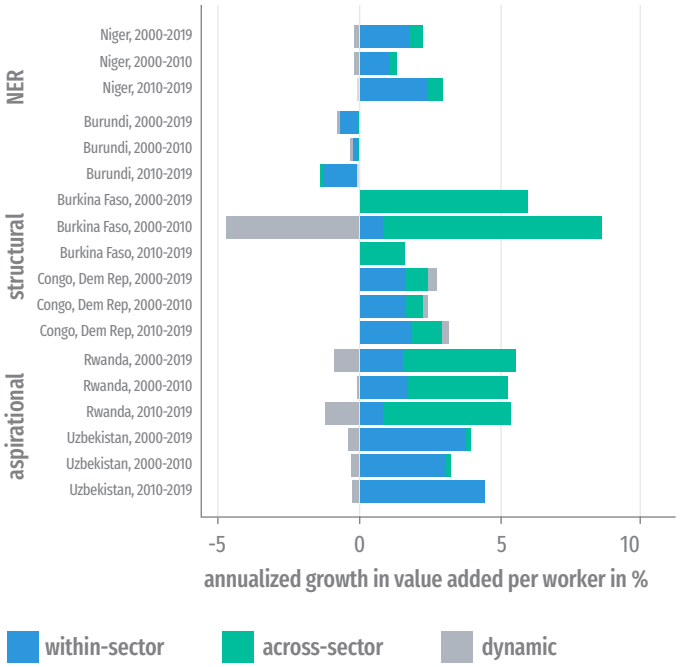
Structural change is happening very slowly, and does not involve manufacturing. Structural change in Niger over the last 20 years has been very limited, amounting to 12 percent of the total increase in productivity, and contributing only 0.25 percentage points to yearly per capita valued added growth (Table 4). However, that contribution rose from 0.16 percent in the first decade to 0.4 percent in the second. This contribution comes entirely from the services sector, but because of its limited size, the impact on the overall economy was much lower than in comparator countries (Figure 11). Despite having a higher productivity level than agriculture, due to a negative productivity growth within services from 2000-2010, real output per worker in 2019 in the sector was still at the same level as 2000. Services have been important in urban areas, where they account for 88.3 percent of paid employment and 62.8 percent of all work, and have supported better employment for women. However, in rural areas where the majority of Nigeriens still reside, a shift towards off-farm service-sector work (such as commerce and transport services, not to mention finance and business services) – which has been critical to poverty reduction in aspirational peers like Rwanda – has not taken place. Hence, 83.8 percent of the rural working population remain in agriculture, with 9.8 percent in services and 6.5 percent in industry.

Table 4. Decomposition of GDP per worker, Niger

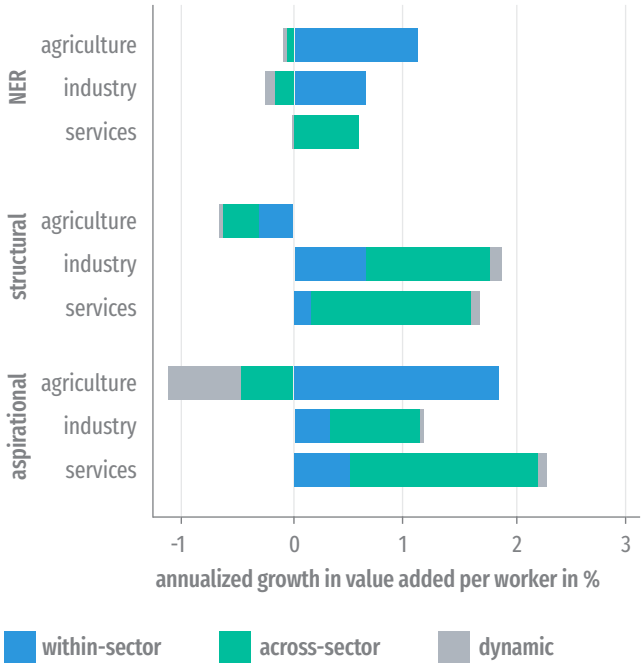
% Yearly Contribution to Growth	2000-2019	2000-2009	2010-2019
Total per capita Value Added	1.43	0.46	2.05
Productivity	2.07	0.70	3.17
Within-sector productivity	1.82	0.54	2.74
Across-sector productivity[16]	0.25	0.16	0.41
Participation rate	-0.41	0.14	-1.04
Employment rate	-0.04	-0.01	-0.07
Demographic change	-0.19	-0.37	-0.01

16 Across-sector productivity gain captures two elements, 1) labor relocation to sectors with high productivity level and, 2) dynamic-type across-sector movements, as highlighted in the charts (workers' relocation to sectors with *increasing* (or decreasing) productivity levels) (McMillan, et al., 2017). However, this second term alone can be difficult to interpret when, for example, reductions in the employment share are accompanied by increases in productivity. This is because the term becomes negative, seemingly acting as a drag on productivity, when in fact it could be viewed as a positive development in such sectors as agriculture.

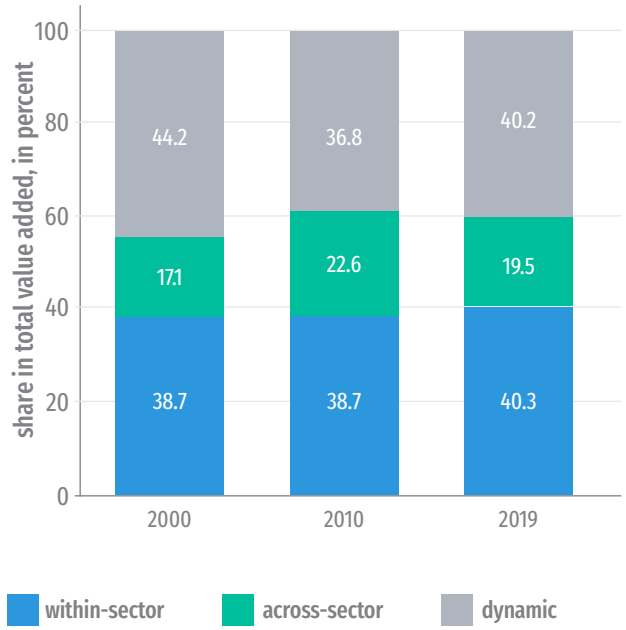
Figure 11. Productivity decomposition (upper panels) and sectoral evolution (lower panels)



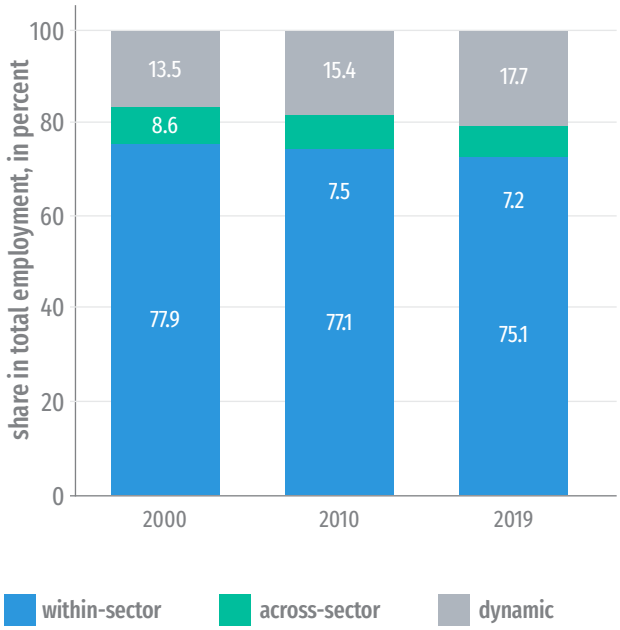
Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI



Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI

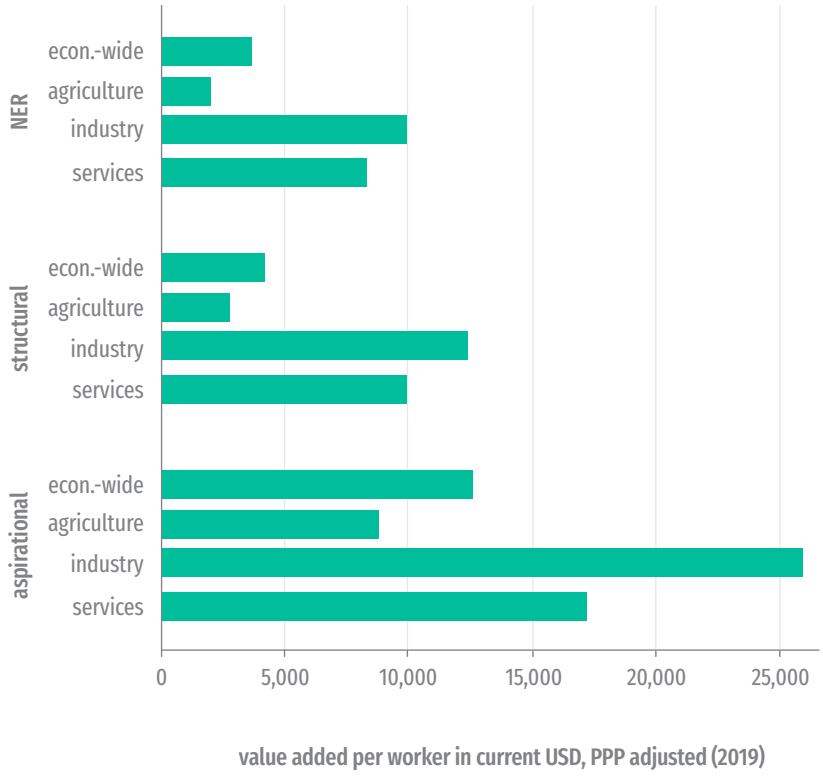


Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI



Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI

Figure 12. Productivity levels (Value added per worker)



Source: Jobs Group JD Standard Code (JDSC) on the basis of WDI

The dominance of within-sector growth is indicative of deeper problems in the business environment constraining allocative efficiency of the economy. Given the weak structural transformation, within-sector productivity gains have driven productivity growth, led by increased productivity within agriculture and industry. Within-sector productivity growth has been faster in Niger than in any other comparator country except Uzbekistan (5.2 percent) (Figure 11, left panel). However, the level of productivity (Figure 12) is still very low and lower than comparators for each sector, even in the agriculture sector where structural peers show a weak performance too. On a brighter note, empirical evidence shows that in resource-rich countries a lower rate of structural change does not necessarily imply lower overall productivity growth. Resource-rich countries tend to have highly capitalized enclave mining and extraction industries. The average productivity gains of moving one person from agriculture into industry are actually 30 percent higher in resource-rich than in resource-poor LICs ((Eberhard-Ruiz & Pela, 2020). This would imply that resource-rich countries can afford to have lower movement from agriculture into industry without negatively affecting overall productivity growth.

The low level of productivity per worker might be hiding underemployment and underuse of productive potential. This is particularly true in agriculture where the number of worked hours is significantly below other sectors, but it can also be true for many other sectors of the economy, where even the existing human capital

and technologies are underutilized. It might be related to unavailability of input (water, electricity) or inaccessibility to markets (costly transportation), and the few available are not used in an efficient way. Estimates from the growth-accounting decomposition framework reveals that while the contribution of total factor productivity (TFP) in Niger between 2000 and 2010 to labor productivity growth has been negative, it is also the only factor explaining the acceleration after 2010. The low level of TFP growth and the strong contribution of capital deepening are consistent with what happened in SSA and other low-income countries, where public infrastructure investment supported post-GFC output and productivity growth.

Low agricultural productivity and high population growth hold back structural change and affect food availability. The World Bank Systemic Country Diagnostic (SCD) suggests that permanently shifting labor from a relatively unproductive agricultural sector with high levels of seasonal underemployment to economic activities where one can be productive year-round is a potential source of growth. But to sustain a transition of workers out of agriculture, agricultural production must increase faster than the demand for food per head[17]. From 2000 to 2018 cereal yields have grown at 3.8 percent. This is almost the exact same pace as population growth while the level of value added per agricultural worker remains much lower than in comparators due to the lack of access to modern technologies. Accelerating agricultural productivity and develop and integrate food markets critical to save lives, improve livelihoods and it is a precondition for creating better jobs with structural change (see Chapter 3). Agricultural productivity in Niger is heavily correlated with an exogenous variable such rainfall, which is severely affected by weather shocks, with large consequences in term of food access and poverty, including frequent episodes where households lose their assets (See chapter 5). Households who have access to irrigation are less exposed to weather shocks while other farmers opt for relatively safe but low-return crops, such as millet and sorghum (World Bank, 2017).

Competition for grazing lands, global warming, and insecurity can have an impact on internal mobility and labor allocation across sectors. Given the lack of opportunities in cities, the proportion of the population living in urban areas has remained constant for over 20 years at the low level of 16 percent, (despite increasing by almost 2 million people in absolute value). However, this is expected to change as increasingly challenging conditions in rural areas might offer little alternative to the rural, often underemployed, population (especially youth). It is projected, under conservative estimates, that the urbanization rate will accelerate in the coming decades (i.e., to 21 percent by 2035 and 28 percent by 2050). See Appendix A for a discussion on the impact of structural change on urbanization in Niger. Such a dynamic will create challenges for the provision of public services for those living in those areas.[18]

An increase in agricultural productivity would stabilize food prices and availability and support urban migration, provided that productivity bottlenecks in both informal and formal sectors are addressed. Productivity per person employed in agriculture could be increased through a more extensive use of the labor input by removing the bottlenecks in market structure and accessibility that are impeding the use of labor productive capacity (see chapter 3). This will allow the increase of production while sustaining urbanization and non-agricultural production. On the other

17 In China, both in the period 1991-2017 and in the preceding three decades from 1961-1991, growth in cereals yields was almost twice the population growth rate.

18 At current and expected future rates of growth, the total number of people residing in urban areas will increase from 3.5 million at present to close to 20 million by 2050 (World Bank, 2021).

hand, the creation of formal, wage employment in sectors amenable to generating widespread productivity gains is required to both generate income, and accumulate enough savings for further investments in the country's productive capacity. So far, the small share of Niger's labor force that left agriculture predominantly moved into public services (such as education and health), and only to a lesser extent into manufacturing and transport services that saw small productivity improvements (World bank, 2017)[19]. These trends are consistent with surveys indicating that most of the population aspire to a job in the public sector, even when they have no education (World Bank, 2021). In 2018, the public sector and state-owned enterprises accounted for approximately a third of paid jobs (formal and informal) nationally, and four in ten paid jobs in urban areas (figures not including self-employment). Despite their higher levels of productivity, experience from other countries (especially in the MENA region) show how excessive reliance for employment on rent-seeking activities, like government services and extractives industries, could hamper long term growth potential, reduce the scope for private sector-led growth, discourage innovation, and exacerbate fiscal vulnerabilities.

Increasing agricultural productivity has a particular importance in the context of the coming on stream of oil. Oil rents will certainly be a driver of private demand growth (investment but also consumption if the local content follow up) and tax revenue. If gains in agricultural productivity are obtained, food production can accommodate demand, thus avoiding an increase in imports. An adequate supply-side response is required also in non-tradable sectors to ensure that reform efforts to strengthen the economy's competitiveness are not cut off at the source by the real appreciation of the exchange rate usually observed in economies experiencing an oil boom.

4. CONCLUSIONS

Despite recent progress and reform-oriented policies, Niger's economy today has fundamentally remained the same as two decades ago: undiversified, fragile, and extremely vulnerable to exogenous shocks. A suitable metaphor to represent this situation might be one showing an athlete trying to run as fast as he can, but he cannot advance given that he is actually running on a treadmill. In this sense, Niger is as far as it gets from the "automatic escalator" mechanism of economic growth associated with the expansion of manufacturing (McMillan, Rodrik, & and Sepúlveda, 2017).[20] Two structural characteristics limit Niger's capacity to experience an industrialization-driven growth based on the increase of waged jobs. First, countries at an early stage of demographic transition like Niger face particular difficulties in accelerating the process of structural change. Ceteris paribus, youthful countries must grow faster to create better, higher-productivity jobs because their labor force is growing faster. Second, Niger is replicating the same experience of many resource-dependent economies where the limited structural change taking place reflects shifts from self-employed agricultural work to self-employed work in low productivity services with few links to the rest of the economy and that produce little diversification.

19 The study of cross-country sectoral data (World Bank 2020) establishes that increased role of employment in some services sectors, where productivity tends to be lower than in the industrial sector, has played a major role in the slowdown in productivity growth after the 2007-09 global financial crisis.

20 A manufacturing-based growth strategy has two distinct advantages. First, a great deal of manufacturing is labor intensive, so it can absorb large amounts of relatively unskilled workers from other sectors at a substantial productivity premium. Second, for developing countries, where lagging manufacturing sectors are the norm, labor productivity tends to catch up with the productivity of developed countries, where technologies are the most advanced, at a rate of 2–3 percent per year.

In this context, gains in labor productivity within the sectors are critical. There is ample room to enhance growth by reforming the fundamentals of the economy and by removing bottlenecks to the development of the private sector. This will also make the economy better positioned to take full advantage of the substantial income gains coming from oil exports, without jeopardizing its fiscal and external position. The priority for resource-rich, low-income countries like Niger should be to keep investing in skills and physical capital (especially digital and energy networks) while removing regulatory bottlenecks, including access to finance, entrepreneurship and private sector development. This would attract underemployed labor input away from agriculture and create conditions from more waged jobs. In Niger's case, this hinges upon taking steps to foster the adaptation to climate shocks in order to sustain agricultural productivity, increase resilience, and reduce poverty, while improving governance and institutions to also ensure that revenue from natural resources is used in a transparent way that benefits the whole country.

CHAPTER 2

Policies for income growth and poverty reduction in Niger: Alternative scenarios up to 2050

This chapter explores the consequences of government actions aimed at addressing the interlocking constraints that stand in the way of income growth, job creation, and reduced poverty. As illustrated in Chapter 1, Niger is confronted with a web of constraints: weaknesses in human capital, governance, security, infrastructure, the consequences of climate change, and one of the world highest fertility rates. This chapter focuses on those that primarily are domestic in nature: infrastructure, human capital, and fertility. In the process, the analysis underlines the importance of improved governance.

This chapter applies two economic models to assess Niger's economic growth over the next 30 years under different demographic and economic scenarios. To increase the richness of the analysis and the robustness of the results, we have chosen to use two different economic tools. The two models presented here are the World Banks's Long-Term Growth Model[21] (LTGM) and the Sustainable Development Goal Simulation model (SDGSIM).[22] The LGTM used the Solow-Swan growth model to generates different simulations on income growth, based on the different parameters in the Cobb- Douglas production function, *in primis* the quality and the quantity of inputs (labor, capital, and total factor productivity). The SDGSIM is a recursive dynamic computable general equilibrium (CGE) model designed for country-level medium- to long-term policy analysis. For this analysis, both models were adapted and calibrated to the Nigerien context with a new dataset. A new social accounting matrix (SAM) for 2019, the most recent year with sufficiently detailed information, was built expressly for the purposes of this chapter and used to run the simulations under the SDGSIM model.

21 For more information visit the Long-Term Growth Model website: www.worldbank.org/LTGM

22 SDGSIM is documented in detail in Lofgren and Cicowiez (2019). The starting point for SDGSIM was MAMS, a model designed for analysis of strategies related to the MDG agenda. See Lofgren et al. (2013) for documentation that also is relevant to SDGSIM.

While the two models are calibrated in a way that mirrors the trends and the characteristics of the Niger's economy, they are built around different economic logics (a purely macro vis-a-vis a micro-funded with optimizing rational agents). Both models start from a baseline scenario and then illustrate the welfare and growth consequences of a series of positive economic shocks. The two models present some complementarity, as the first model is composed by only two economic sectors (oil and non-oil) while the second offers a breakdown of the economic sectors that allows to analyze structural change trends, while incorporating different demographic scenarios. In this way they can provide a full array of simulations on different economic, social and demographic scenarios, that it would have been hard to obtain from a single model.

The chapter is organized as follows: the two models are presented in two separate sections. In the first section, after a brief presentation of the LGTM model, we start with presentation of the base scenario and then a set of alternative policy scenarios presenting reforms in key growth drivers such as infrastructure, human capital, and productivity are simulated to assess the long-term effects on income, including by presenting an estimation of the growth rate needed to close the development gap with LMI countries by 20050.[23] The second section presents some of the results from the SDGSIM model, in particular 1) how different demographic scenarios could impact poverty and income; 2) the effects of different package of the reforms, combined with different assumptions on how these reforms can be funded. Given the richness of the analysis and also the originality in the construction of the model and in the structure of the SAM, we decided to present the full set of scenarios in a separate working paper associated to this main report while more details on the methodology and the results are presented in Appendix B.

1. THE LONG-TERM GROWTH MODEL

The LTGM takes assumptions about growth fundamentals—the *drivers of growth*—, such as investment and productivity, to generate a trajectory for economic growth over the next three decades.[24] This chapter uses the *Natural Resource Extension* (NR) of the LTGM. Niger is expected to become a large oil exporter in the near future. The NR extension allows for a disaggregation of the economy into oil and non-oil sectors. This decomposition is important because the dynamics of growth are highly heterogeneous across these two sectors. The non-oil sector takes assumptions on "standard" drivers of growth, such as total factor productivity (TFP), human capital, investment, and demographics (population growth, age structure, and labor force participation). In addition to the standard drivers, growth in the oil sector depends on the level of proven oil reserves and, hence, on the profile of oil discoveries and extraction.[25]

1.1. Baseline (business-as-usual) scenario

1.1.1. Recent trends in Niger and baseline assumptions

Below is provided a brief discussion of the key economic trends in Niger and how they are extrapolated until 2050 in the LTGM simulations.

23 Appendix B provides additional information about the LGTM model, tables with complementary simulation results, and a summary of a systematic sensitivity analysis of the simulations of the body text and their results.

24 The LTGM and its extensions are a suite of Excel-based tools to analyze future long-term growth scenarios, building on the celebrated Solow-Swan Growth Model (1956). The tools are designed to be simple, transparent, and to have low data requirements. The LTGM and its extensions are designed for long-run simulation exercises over the next 5-30 years, but not for short-run forecasting. The models only run at an annual frequency, do not include a Keynesian demand-side, and are too simple to capture the multitude of shocks to short-run growth.

25 For example, to produce petroleum, a country needs technology, physical capital, and reserves of crude oil. As reserves become increasingly scarce via extraction, more capital and technology are required to produce one barrel of petroleum since firms are forced to drill further underground or in less accessible locations. The production function draws from the work of Arezki et al. (2017) and Hansen and Gross (2018).

First, investment was low in the nineties but has risen sharply since 2000. The average investment rate in Niger raised from 10 percent of GDP in the nineties to 23 percent in 2000-2017. This shift in investment has been driven mainly by private investment, which rose from very low levels in the 1990s to an average of 15 percent of GDP in 2000-2017 (see Appendix Figure 8). On the other hand, public investment was on a smooth upwards trend since 2000, reaching 12 percent of GDP in 2016 (Appendix Figure 9). The baseline assumes that, after some short-term volatility, private and public investment will stabilize at 15 and 10 percent of GDP until 2050, respectively.

Second, productivity growth has been very volatile but picked up since 2000, while human capital has been growing at moderate rates but off a low base. As measured by TFP, average productivity growth accelerated from 0.5 percent in the nineties to 1 percent in 2000-2019 (see Appendix Figure 10).[26] Human capital, which for the LTGM is measured based on average years of schooling, has been more stable, growing 0.5 percent on average since 1990. However, Niger still reports one of the World's lowest schooling rates (see Appendix Figure 11). Based on these trends, the baseline assumes that non-oil TFP and human capital will grow at 1 and 0.5 percent from 2024 to 2050.

Third, Niger has exceptionally high population growth and the lowest share of working-age population in LIC and LMCs. Population growth was very high in the early nineties and kept accelerating until it stabilized at just below 4 percent after 2010 (see Appendix Figure 12). On the other hand, the working-age population (share of the population between the ages 15 and 64) has been stable just below 50 percent since the 1990s. In 2019, Niger had the lowest working-age population of LIC and LMCs (see Appendix Figure 13 and Appendix Figure 14). The baseline simulation incorporates the forecasts from the UN International Labor Organization (ILO). The UN forecasts that from 2020 to 2050, Niger's population growth will slow down to 3 percent, and the share of the working-age population will rise to 55 percent.[27]

Fourth, labor force participation has declined over the past decade. The labor force participation rate remained stable at 80 percent (around 90 for males and 70 for females) until 2011, after which it declined to 73 and remained stable since 2014 (see Appendix Figure 15). Despite this recent fall, Niger's participation rate is relatively high compared to regional peers and low-income countries, such as Nigeria, Mali, and, more generally, the average of Sub-Saharan Africa. The baseline assumes that the participation rate remains constant at 73 percent until 2050.

Niger has a high capital-to-output ratio and an estimated two billion barrels of oil reserves. The initial capital-to-output ratio in the baseline is set to 4 to match the estimate for Niger in 2019 (Penn World Table 10).[28] This value is unusually high for low-income countries and leads to a low initial effectiveness of investment (see Appendix Figure 16). In addition, the baseline assumes that reserves of oil stand at two billion barrels in 2020, and there are no further discoveries until 2050. This is a conservative assumption based on data from China National Petroleum Corporation (CNPC). The CNPC estimates one billion barrels in the Agadem block and, at least, another billion in the Tenere block. Alternative simulations with more optimistic assumptions on future discoveries have a small impact on overall growth (see Appendix B).

26 Recall that as TFP is calculated as a residual (growth less factor accumulation), it oscillates with the economic cycle and is very volatile.

27 More specifically, we use the high variant estimate of population growth for Niger from 2020 to 2050 provided by the UN's World Population Prospects, 2019.

28 In the LTGM, stock variables are usually set to the most recently observed data rather than the historical trend.

1.1.2. The Niger-Benin pipeline and baseline projections of oil production

With the conclusion of the oil export pipeline, oil production is expected to increase from 15,000 to around 100,000 barrels per day (b/d) by 2024. Currently, oil production in Niger is constrained by a limited capacity to transport crude oil from the oil fields to the coast. The Niger-Benin oil pipeline, constructed by the CNPC, will increase Niger's export capacity to 180,000b/d. According to experts, the pipeline becomes fully operational in 2023, and oil production is expected to increase from the current 15,000b/d to 100,000b/d by 2024 (IMF 2019).

Production of oil is projected to reach a plateau at 120,000b/d but to start declining in the mid-2030s. The LTGM-NR projects that the oil industry will keep growing until production hits 120,000b/d, remaining at that plateau until the mid-2030s (see Figure 13). After that, oil production is projected to decline slowly over time, hitting 80,000b/d by 2050. The decline in production is partially driven by depleting oil reserves, which are projected to halve by 2050 (see Figure 16).[29] In addition, investments in the oil sector fall sharply after 2030 (see Figure 15). The depletion of reserves reduces output per se and disincentive investment in the sector, reinforcing the initial contraction.

As a result of the fall in production, the extra income generated in the oil sector is not sustainable in the long term. Before the pipeline's completion, the oil sector is small, accounting for only 2 percent of GDP in 2022. With the boom projected for 2023-2024, the oil sector expands to 12 percent of GDP (see Figure 15). In per capita terms, oil income increases from US$13 to US$84 (2010 prices), which represents about 15 percent of the GDP per capita of 2020. However, this extra income is not sustainable, slowly plummeting to US$25 by 2050. Although the oil shock is unlikely to boost long-term growth per se, it provides Niger with a unique development opportunity. As discussed below, the fiscal revenues generated by the oil boom can be used to support key macroeconomic reforms with substantial potential to generate sustained growth.

Figure 13. Baseline production of oil, Barrels per day

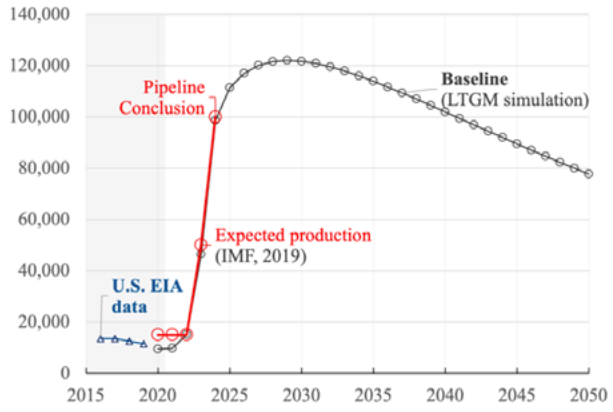
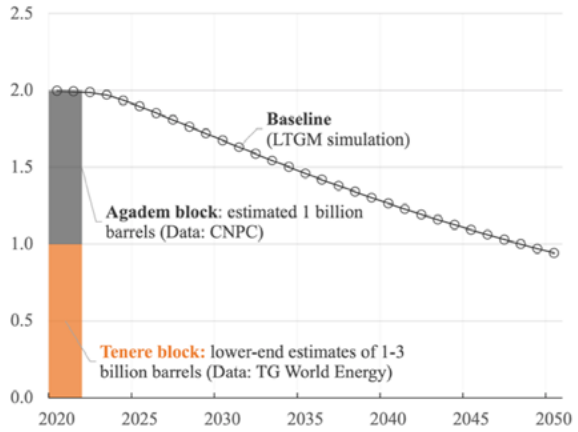


Figure 14. Baseline reserves of oil, Billions of barrels



29 The LTGM assumes that first reserves are relatively easier to extract—for example, being close to the surface—but later reserves require more capital and technology to generate the same output, as firms are forced to drill further underground or in less accessible locations. In this case, holding other inputs constant, oil output falls as oil reserves deplete.

Figure 15. Baseline investment, Percent of GDP

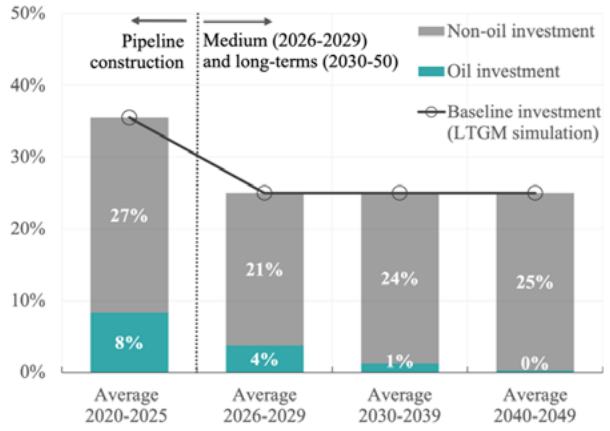
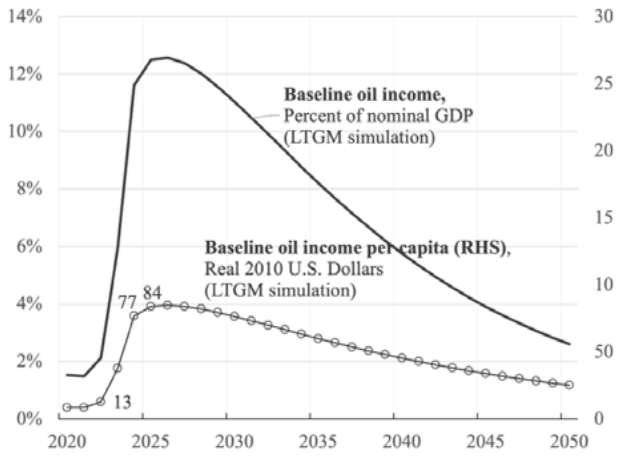


Figure 16. Baseline oil income



1.1.3. Baseline projections of GDP growth for Niger

The business-as-usual baseline measures the growth potential of the economy in the absence of future shocks or economic reforms. The first contribution of this chapter is to simulate the future economic growth path for Niger, assuming that recent historical trends continue—that is, the "business-as-usual" baseline. The simulation runs at an annual frequency from 2024 to 2050. The previous period, 2020-2023, is not simulated, and the model takes as inputs official forecasts for 2020-2023 (see World Bank 2021). Indeed, the LTGM is not suited to account for the short-term volatility induced in 2020-2023 by the COVID-19 pandemic and the completion of the Niger-Benin oil export pipeline.[30]

A key assumption of the baseline simulation is that recent trends of the drivers of growth will continue until 2050.

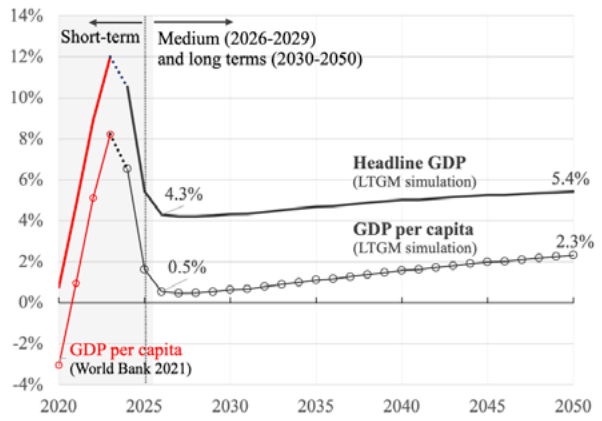
The LTGM projects that Niger's trend GDP growth will stabilize around 4 percent in the medium term (2026-2029), trending upwards to 5.5 percent in the long term (2030-2050). After the effects of COVID-19 and the oil boom taper off, the economy returns to its potential trend. In 2026, GDP growth is projected at 4.3 percent, gradually picking up over the years until it reaches 5.4 percent in 2050 (see Figure 17).

However, due to high population growth, GDP per capita growth is projected to be slow in the medium term, especially if compared to peer countries. Population growth slashes average GDP per capita growth to 0.5 percent in the medium term. This growth rate is comparable to the 25th lowest percentile of the growth distribution in LIC and LMICs over the last decade (see Figure 18). As a result, real GDP per capita would increase by just US$14 in four years: from US$698 in 2025 to US$712 in 2029.

Nonetheless, Niger's GDP per capita growth is expected to accelerate substantially in the longer term. The acceleration is gradual, with average GDP per capita growth rising to 1 percent in the 2030s and stepping up to 2 percent in the 2040s. This spur of growth is not trivial. A growth rate of 2 percent lies above the 75th (95th) percentile of the growth distribution in LIC and LMICs (Sub-Saharan Africa) over the last decade (see Figure 18). However, the trajectory of GDP per capita is still unsatisfactory, remaining below US$1,000 by 2050 (see Figure 17).

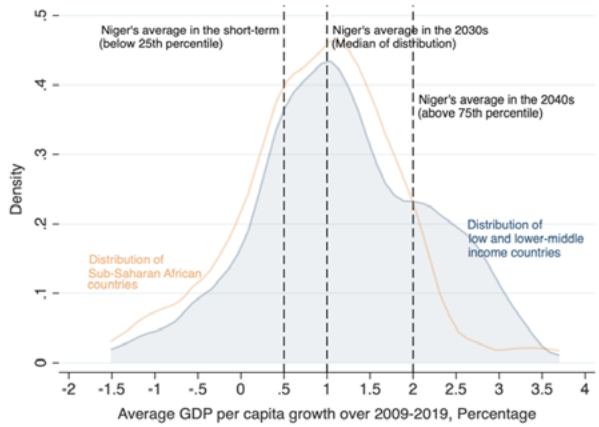
30 The LTGM is designed to analyze long-term trends of the economy's production potential but is not suitable for short-term forecasting.

Figure 17. Baseline GDP growth in Niger
Annual growth rate, Percentage



Source: World Bank's staff estimates based on the LTGM.

Figure 18. Distribution of GDP per capita growth in LIC and LMICs, Average over 2009-2019



Source: World Bank's World Development Indicators.

1.2. Decomposition of baseline GDP per capita growth

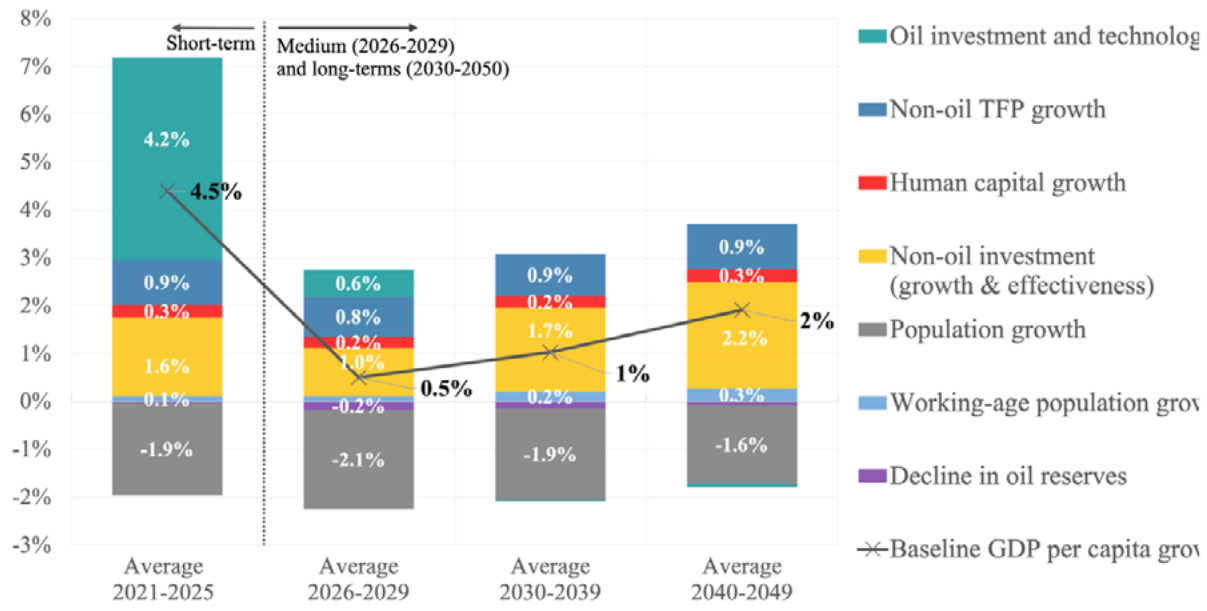
A decomposition of GDP per capita provides insights into the sources of low growth and subsequent acceleration (see Figure 19). The average growth rate of GDP per capita falls from 4.5 percent in the short term to 0.5 percent in the medium term. In the medium term, the main force behind the slowdown is the normalization of the investment rate, which converges from a historic high in 2021-2025 to its long-term trend of 25 percent of GDP. The oil sector is relatively more affected by the decline in investment. The contribution of oil investment to medium-term growth drops to 0.6 percentage points (down from 4.2 in the short term), while the contribution of non-oil investment drops to 1 percent (down from 1.6 percent).

In the medium-term, the demographics is the main headwind to GDP per capita growth. Population growth cuts average GDP per capita growth by 2.1 percentage points in the medium term. Although a higher population increases the labor force—and hence total GDP—, due to diminishing marginal returns to labor, each extra worker generates a lower increment to output (holding constant other factors of production). In this case, GDP *per capita growth* slows down with population growth. In a counterfactual with no population growth, GDP per capita would grow at 2.6 percent on average in 2026-2029.[31]

In the long term, growth accelerates due to a switch of the economy towards the non-oil sector and improved demographic trends. A key factor to explaining the acceleration of GDP per capita growth is the reallocation of physical capital away from the oil sector. The depletion of oil reserves and lack of productivity gains lead investment

31 The slowdown of growth in the medium term is also related to the higher participation of the oil sector in the economy. First, due to depleting reserves and a lack of productivity gains (TFP and human capital), the oil sector does not generate sustained growth. Second, because the non-oil sector shrinks as a share of total GDP, human capital and TFP gains apply to a lower base, having a smaller effect on overall growth. The same logic applies to demographics. Since the non-oil sector is more labor-intensive, an increase in the labor force (driven by population growth) has a lower impact on growth when the non-oil sector has a lower share of total GDP.

Figure 19. Decomposition of baseline GDP per capita growth, 2021-2050
Percentage points of growth due to each growth driver



Source: World Bank's staff estimates based on the LTGM

in the oil sector to collapse to nearly zero in the long term. As a result, investment in the non-oil sector increases from 20 percent of GDP in the short-term to 25 percent in the long term (see Figure 15). Moreover, due to substantial productivity gains in the non-oil sector—mainly through TFP but also human capital—the efficiency of investment (i.e., the marginal product of capital) increases over time. As a result, the contribution of non-oil investment to growth accelerates from 1 percentage point in the medium term to 1.7 in the 2030s and 2.2 in the 2040s. In terms of demographics, population growth declines, mitigating the negative impact on per capita growth to -1.6 percentage points. Finally, Niger starts collecting some small but positive demographic dividends as the working-age population rises from 47 to 54 percent, contributing 0.3 percentage points to growth in the 2040s.

1.3. Reforms to individual growth drivers: non-oil TFP growth, human capital, investment

Despite the increase in oil income, baseline GDP per capita is projected to remain below US$1,000 by 2050, limiting social and economic development in Niger. In response to this challenging outlook, this section provides a guide for policymakers to assess options to boost growth in Niger. These reforms would involve substantial improvements in critical areas such as education, infrastructure, and market efficiency. Implementing these reforms is no trivial task and would require not only high institutional capacity and pollical stability but also substantial financial resources (due to public investment needs, changes in tax and subsidies policies and so on). In this context, the oil windfall poses to Niger a challenge to avoid the "resource curse" but also a great opportunity to implement the needed reforms. As discussed in Chapter 4, the oil boom is projected to generate extra fiscal revenues of 3-4 percent

of GDP for over a decade. This windfall should not lead to fiscal mismanagement, economic distortions or political corruption but rather to provide a cushion for the financial needs associated with the implementation of the economic reforms discussed below.

More specifically, this section analyzes how Niger could increase its growth potential with reforms to boost each driver of growth. A weak baseline GDP per capita growth would limit social and economic developments in Niger. In terms of reform, the target for each growth driver is based on regional or income peers. The effect of each reform on growth will depend on (i) how sensitive growth in Niger is to the specific growth driver and (ii) how far Niger lags behind peer countries. Specifically, the section analyzes reforms to three growth drivers: (A) non-oil TFP growth, (B) human capital growth, and (C) investment (private and public). It considers two variants of reform - moderate and ambitious - for each driver (A)-(C). Typically, a moderate (ambitious) reform boosts a driver up to the 75th (90th) percentile of the distribution in LIC and LMICs. The focus of the section is in the medium- (2026-2029) and long-terms (2030-2050). Table 5 summarizes the key assumptions under the baseline and reform scenarios (Panel A) as well as the results for GDP level and growth (Panel B). For further details, see Appendix Figure 18 and Appendix Table 2.

Table 5. Summary of LTGM simulations under baseline and reforms scenarios

Panel A. Key assumptions

Reforms	Baseline	Economic reforms*	
		Moderate	Ambitious
A. Non-oil TFP growth rate, %	1	1→2	1→3
B. Human capital growth rate, %	0.5	0.5→1.5	0.5→2.5
C. Investment, % of GDP	25	25→30	25→32

Panel B. Simulated GDP level and growth

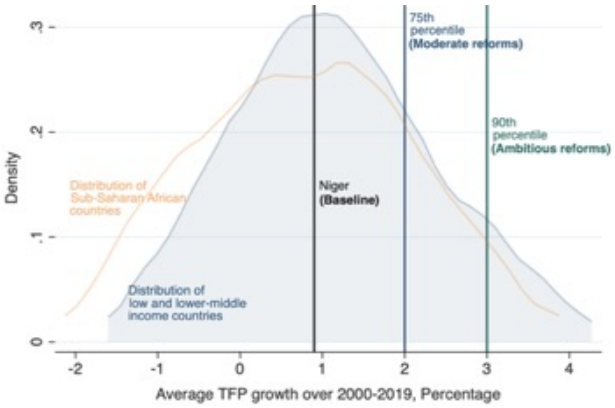
	GDP per capita (2010 US$)		GDP growth rates, % (2026-2050 average)	
	2020	2050	HL GDP	GDP PC
Baseline	563	976	4.8	1.4
Moderate reforms:				
A. Non-oil TFP	//	1,312	6.1	2.6
B. Human capital	//	1,139	5.5	2.0
C. Investment	//	1,084	5.3	1.8
Reforms package (A+B+C)	//	1,720	7.2	3.7
Ambitious reforms:				
A. Non-oil TFP	//	1,772	7.4	3.8
B. Human capital	//	1,330	6.1	2.6
C. Investment	//	1,126	5.4	1.9
Reforms package (A+B+C)	//	2,888	9.5	5.9
Peer groups:**				
Lower-middle income countries (avg.)	2,400	5,337	4.4	2.7
Sub-Saharan Africa (average)	1,830	3,125	4.4	1.8

Source: World Bank's staff estimates based on the LTGM calibrated to Niger.
* All reforms phase-in 2025-2030. ** Sub-Saharan African excludes Seychelles & Mauritius. The 2050 GDP level for peers is computed assuming that GDP growth in 2021-2050 is equal the average growth in 2000-2019.

A moderate reform that increases non-oil TFP growth from 1 to 2 percent would boost GDP per capita growth by 1.2 percentage points on average until 2050 (see Figure 21). Reforms to TFP could be driven by policy changes in innovation, education, market efficiency, infrastructure, and institutions (see Kim and Loayza 2019). The moderate reforms scenario assumes that non-oil TFP growth will accelerate to 2 percent by 2030, which is the 75th percentile of the TFP growth distribution in LIC and LMCs over 2000-2019 (see Figure 20). On impact, a one percentage point increase in non-oil TFP growth boosts non-oil GDP by exactly one percent. The effect on overall growth increases over time as the non-oil sector expands. Moreover, higher TFP leads to (i) more investments, which is assumed to be a fixed share of income; and (ii) better investments, as TFP increases the marginal product of capital. As a result, the incremental growth generated by the reform reaches 1.5 percent on average in the 2040s. Under this scenario, GDP per capita growth hits 4 percent by 2050 (vis-à-vis baseline of 2.3 percent).

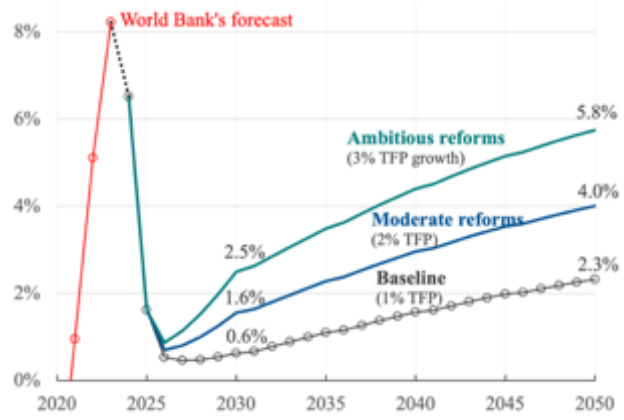
An ambitious reform that increases non-oil TFP growth to 3 percent would boost GDP per capita growth by 2.4 percentage points on average until 2050 (Figure 21). The ambitious reform assumes a very optimistic scenario in which non-oil TFP growth picks up to 3 percent by 2030, which is the 90th percentile of the distribution in LIC and LMIC. A growth at such a high rate for many years, requires not only deep pro-market reforms but also a continued process of structural transformation and urbanization. Under this scenario, average GDP per capita growth would reach 4.8 percent in the 2040s, and 5.8 percent in 2050.

Figure 20. Distribution of TFP growth in LIC & LMICs
Average TFP growth over 2000-2019



Source: Penn World Table 10. Outliers Tajikistan and Armenia dropped.

Figure 21. The effects of reforms to non-oil TFP on GDP per capita growth, Annual growth rate, %

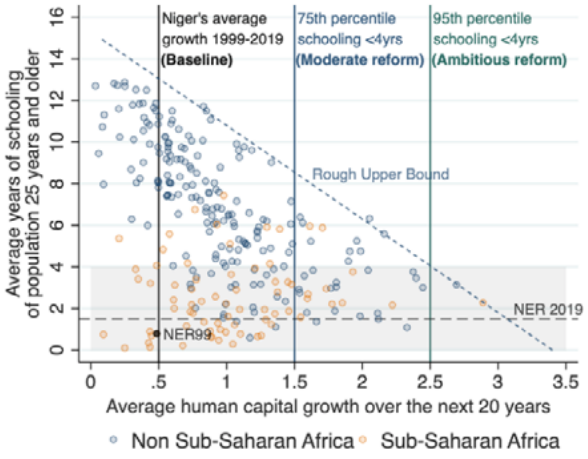


Source: World Bank's staff estimates based on the LTGM.

A moderate reform to increase schooling in Niger can boost human capital growth to 1.5 percent by 2030. Countries can accelerate human capital growth by increasing the average years of schooling of their populations (see World Bank 2019). A comparison with peers suggests that there is significant potential to accelerate human capital growth in Niger through reforms targeting schooling. In 2019, Niger's adult population had on average 1.5 years of schooling (PWT10), one of the lowest rates in the world. In addition, it is relatively easy to rapidly increase schooling off a low base (see Figure 22). For example, countries with less than four years of schooling in 1979 or 1999 had human capital growth ranging from zero to 3 percent over the next 20 years (1979-99 or 1999-19). On the other hand, countries with more than ten years of schooling reported average human capital growth below one percent in the same periods. Thus, the scenario assumes that a moderate educational reform in 2021 would reach its full impact by 2050, raising average schooling rate to 7 years. This would take Niger to the 75th percentile of the distribution of human capital growth in countries with less than four years of average schooling.

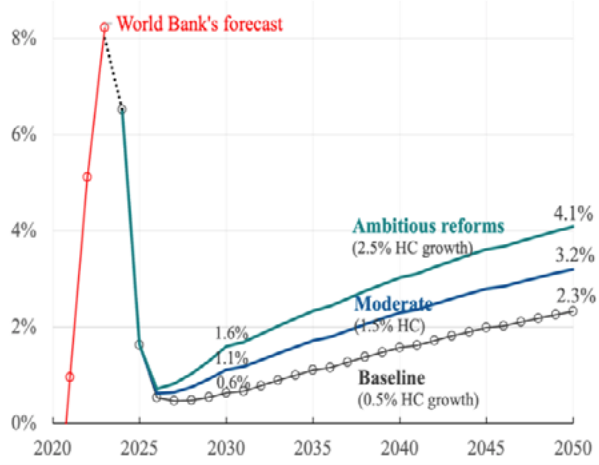
A moderate reform to human capital would boost GDP per capita growth by +0.6 percentage points on average until 2050. Human capital increases the effectiveness of the workforce in the production process, increasing output per unit of labor. Quantitatively, an extra percentage point of human capital growth generates, on impact, extra +0.5 percentage points of non-oil GDP growth (where β=0.5 is the labor intensity of the production technology). The impact on total GDP per capita growth amplifies over time as (i) the non-oil sector expands, and (ii) higher human capital leads to *more* and *more effective* investment. As a result, the moderate educational reform would boost growth to 3.2 percent in 2050, an increment of 0.9 percentage points relative to baseline (see Figure 22).

Figure 22. Human capital growth is faster in countries with low schooling rates



Notes: Three outliers dropped. Years of schooling predates the 20 years average. Samples are 1979-99 and 1999-19.
Source: Penn World Table 10

Figure 23. The effects of reforms to human capital on GDP per capita growth, Annual growth rate, %



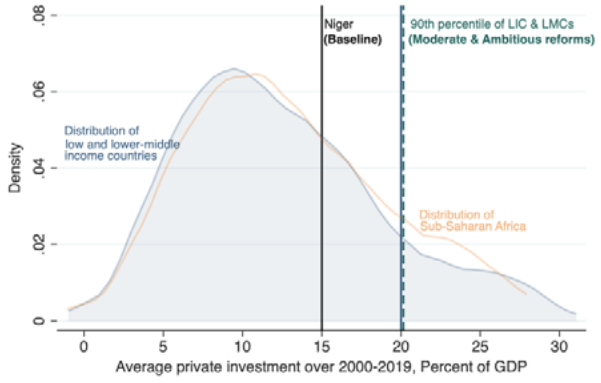
Source: World Bank's staff estimates based on the LTGM

An ambitious reform that increases human capital growth to 2.5 percent by 2030 would boost GDP per capita growth by +1.2 percentage points on average until 2050. It is also considered a very ambitious reform that takes Niger to the 95th percentile of the human capital growth distribution of countries with less than four years of schooling. This ambitious reform would have a much larger effect on the economy, boosting GDP per capita growth to 4.1 percent by 2050, an increment of 1.8 percentage points relative to baseline (see Figure 23).

Moderate reforms focusing on the private sector could boost Niger's investment rate from 25 to 30 percent of GDP, while ambitious reforms that also involves the public sector could boost the investment rate to 32 percent of GDP. Niger has a broad set of available economic reforms to strengthen private and public investment. On the private side, reforms could expand access to financing and infrastructure, reduce burdensome regulation, promote entrepreneurship and skills development. On the public sector, fiscal reforms could improve revenue mobilization and prioritize capital spending over consumption. The moderate scenario assumes that reforms would bring the private investment rate in Niger to the 90th percentile of the LIC and LMICs distribution (see Figure 24). This would lead to an increase in private investment from 15 to 20 percent of GDP. The ambitious scenario assumes that, in addition to private-sector reforms, public investment would raise from 10 to 12 percent of GDP, which is the top rate among low-income countries (see panel D of Appendix Figure 17).

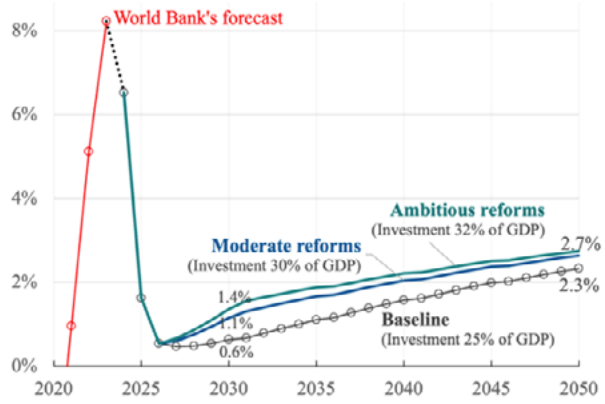
Moderate reforms to investment could boost GDP per capita growth by +0.4 percentage points on average until 2050. The simulated revival in investment has a strong impact on growth in the early years (+0.6 percentage points on average in the 2030s), but the effect tapers off over time. In the absence of complementary reforms to enhance productivity, the effectiveness of investment falls sharply in the late years—driven by declining marginal product of capital and increasing losses due to capital depreciation. As a result, the extra average growth generated by the reforms drops to +0.4 in the 2040s. The ambitious reforms provide a small extra boost to investment but also weakens over time. These simulations highlight that investment alone does not yield sustainable growth in the long term.

Figure 24. Distribution of private investment in LIC and LMICs, Average over 2000-2019 Average over 2000-2019



Source: IMF-FAD, Investment and Capital Stock Dataset

Figure 25. The effects of reforms to investment on GDP per capita growth, Annual growth rate, %



Source: World Bank's staff estimates based on the LTGM.

1.4. Reform packages

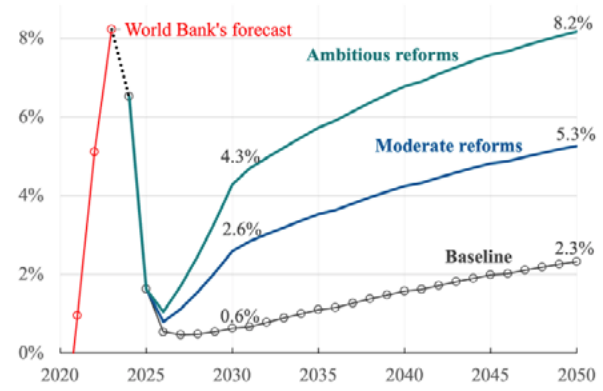
Reforms to individual drivers would boost growth substantially, but a combination of reforms would benefit from complementarity and result in the strongest growth trajectory.[32] This subsection considers packages of reforms that simultaneously increase (A) non-oil TFP, (B) human capital, and (C) investment. The reforms are equal to those discussed individually in subsection 1.3. In particular, the moderate reforms package is based on increasing (A) and (B) to the 75th percentiles of distribution in LIC and LMICs, and (C) to the 90th percentile. The ambitious reforms package increases all drivers of growth (A)-(C) to the 90th or higher percentile (see Appendix Figure 18).

A moderate package of reforms would boost GDP per capita growth by 2.3 percentage points on average until 2050. When all reforms become fully effective in 2030, GDP per capita growth would reach 2.6 percent, an increment of 2 percentage points vis-à-vis baseline (see Figure 25). This incremental growth would then increase over time, reaching 2.4 percentage points on average in the 2030s and 2.8 in the 2040s. A decomposition of growth shows that reforms to private investment generate significant extra growth in the medium term but wears out over time (similar to individual reforms to investment) (see Panel A of Figure 28). In the long-run, incremental growth is mostly driven by reforms to non-oil TFP and human capital. Combined they account for 2.4 of the 2.8 percentage points of incremental growth in the 2040s. Also, the effects of the reforms package fall almost entirely on the non-oil sector and have only weak spillovers to the oil economy.

Under the ambitious reform package, reforms would reinforce each other, hence putting Niger on the strongest growth trajectory and boosting GDP per capita growth by 4.5 percentage points on average until 2050. When all reforms become fully effective in 2030, GDP per capita growth would reach 4.3 percent, an increment of 3.7 percentage points vis-à-vis baseline (see Figure 26). This incremental growth would reach 4.5 percentage points on average in the 2030s and 5.5 in the 2040s. The ambitious reforms are strong enough to generate substantial complementarity, with the incremental growth under the ambitious reforms package is noticeably larger than the sum of individual reforms. Similar to moderate reforms, a decomposition of growth shows that reforms to investment lose momentum (although less sharply than individual reforms to investment), and only TFP and human capital reforms can yield sustainable incremental growth in the long term. Finally, the ambitious reforms would generate a net negative effect on the oil sector, due to a reallocation of investment to the more prosperous non-oil sector.

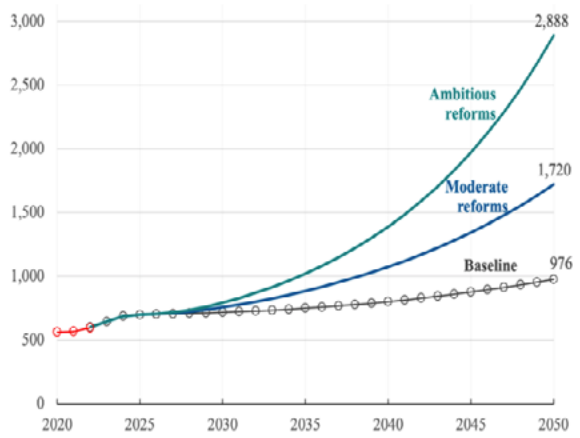
32 An example is a complementarity between TFP and investment. Reforms to investment benefit greatly from higher non-oil TFP growth, as it increases the marginal product of capital, preventing the efficiency of investment from declining too sharply over time. Conversely, reforms to non-oil TFP also benefit from higher investment, as the higher productivity applies to a larger base (stock of capital).

Figure 26. The effects of reform packages on GDP per capita growth, Annual growth rate, %



Source: IMF-FAD, Investment and Capital Stock Dataset

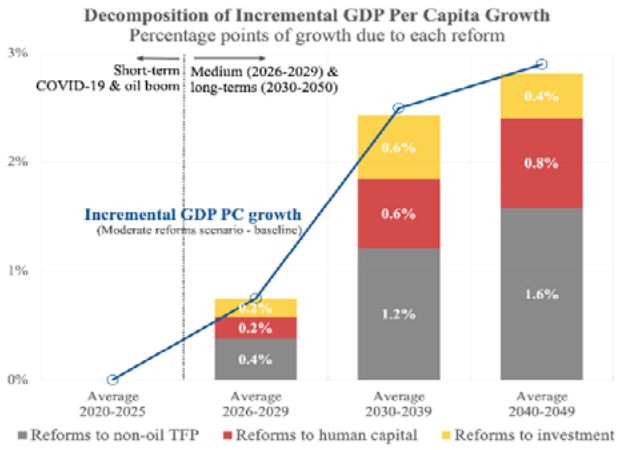
Figure 27. The effects of reform packages on GDP per capita. Real 2010 U.S. Dollars



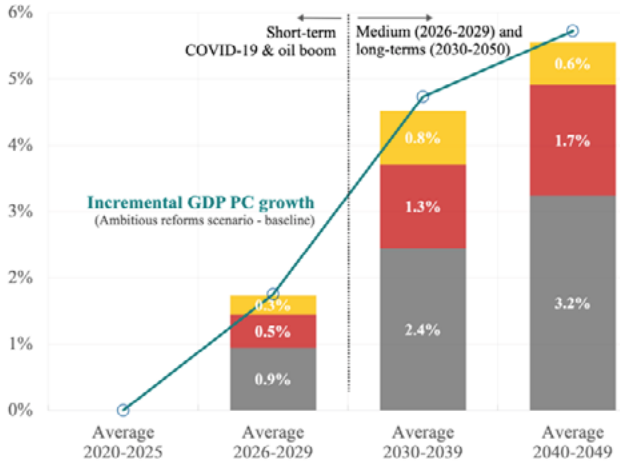
Source: IMF-FAD, Investment and Capital Stock Dataset

Figure 28. Decomposition of Incremental Growth, Percentage points of extra growth due to each reform

A. Moderate Reforms



B. Ambitious Reforms



■ Reforms to non-oil TFP ■ Reforms to human capital ■ Reforms to investment

Source: World Bank's staff estimates based on the LTGM

1.5. Prospects for income convergence

As a final simulation the LGTM model was used to calculate the average growth rate needed for Niger to catch up in 2050 with GDP per capita in the group of Lower Middle-Income countries, under the assumption that this group of countries will grow at the same rate observed between 200 and 2019 (2.7 percent). Niger's GDP per capita would need to grow at 9 percent until 2050 in order to catch up at a level of GDP per capita of USD 5,337. Instead, if Niger will grow at the trend observed under the baseline, the convergence is expected to happen only in year 2170. The reforms included in the ambitious reforms package will sensibly support income convergence, reducing the time needed for a complete convergence by 110 years, to 2060. If the reforms under the moderate reforms package will be implemented, Niger economy will still need until 2080 for a complete catchup.

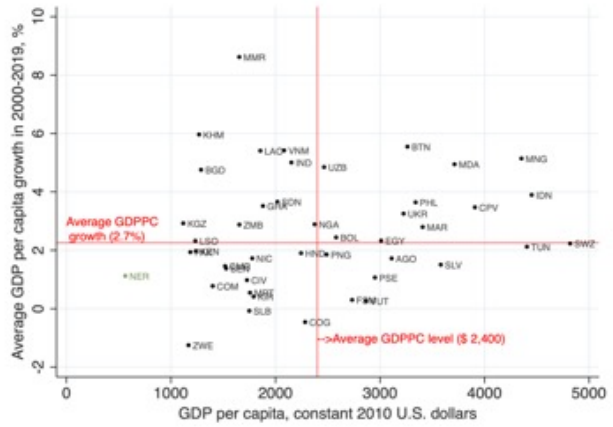
Table 6. Closing the gap with today's Lower-Middle Income Countries

	GDP PC in 2050		Average GDP PC growth in 2026-2050		Year when GDP PC reaches $5,337*
	Level	Gap to LMCs	%	Gap to LMCs	
A. Catch-up with LMCs	5,337		9.05%		2050
B. Baseline	976	4,361	1.4%	7.6%	2170
C. Moderate reforms	1,720	3,617	3.7%	5.3%	2080
D. Ambitious reforms	2,888	2,449	5.9%	3.1%	2060

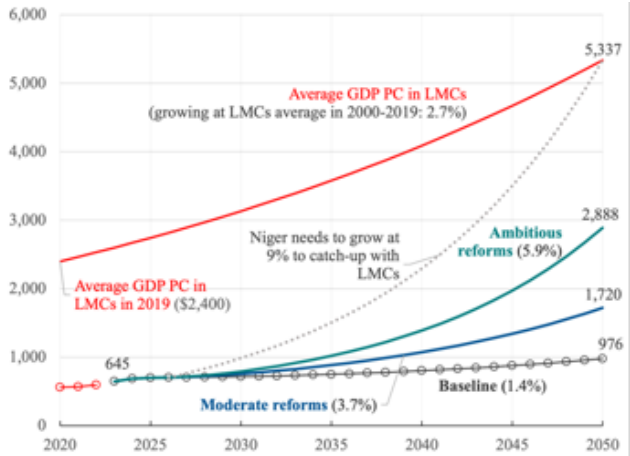
* The year when GDP per capita reaches $5,337 is computed assuming that the average growth in 2026-2050 continues indefinitely.

Figure 29. Closing the gap with today's Lower-Middle Income Countries

Panel A. GDP per capita in lower-middle income countries, Average annual growth rate in 2000-2019 (Y-axis) versus GDP per capita level (X-axis)



Panel B. Simulated GDP per capita: lower-middle income countries versus Niger's baseline and reform scenarios, Real 2010 U.S. Dollars



2. SUSTAINABLE DEVELOPMENT GOAL SIMULATION MODEL

a. Results for different demographic scenarios

SDGSIM is a CGE model designed for country-level analysis of medium- and long-run development policies with a focus on the SDG agenda and structural change. Technically, the model is made up of a set of simultaneous linear and non-linear equations. It is economy-wide, providing a comprehensive and consistent view of the economy, including linkages between disaggregated production sectors and the incomes they generate, households, the government (its budget and fiscal policies), and the balance of payments. It is an appropriate tool for analyzing structural change issues (like the ones faced by Niger's economy) given the fact that it captures household welfare, fiscal issues, and differences between sectors in terms of household preferences, labor intensity, capital accumulation, technological change, and links between international trade and the domestic economy, in an integrated manner.

The simulations consist of a base scenario and a set of counterfactual scenarios over the period 2021-2050. SDGISM simulations analyze the impact on growth of a reduced total fertility rate, a gradual improvement in the educational level of the labor force, and investments in infrastructure designed to increase factor productivity in targeted sectors. Moreover, it allows to compare the results for the different scenarios on household welfare, poverty, the labor market, different sectors, and trade balance.

The detailed assumptions for the base and a variety of reform scenarios and the results of the simulations are presented in a separate Working Paper. In this chapter we will focus rather on some results more directly linked to the impact of the demographic trends on income and welfare indicators.

Name	Description
Set 1	*Scenarios with shocks in selected areas*
pop-	Same as **base** except for population projection switch from UN medium to UN low fertility variant
pop+	Same as **base** except for population projection switch from UN medium to UN high fertility variant
pop-s+	Same as **pop-** except for the household saving rate increase from 20 to 25 percent of GDP
pop-edu+	Same as **pop-** except for stronger increase in labor share with completed primary education or more combined with increased government spending on education

The base scenario is designed to provide a central, business-as-usual case for the evolution of Niger's economy up to 2050. This is a scenario without changes in economic policy and without the emergence of major macroeconomic imbalances. It provides a yardstick against which the results for non-base scenarios are measured. For 2020 and 2021, the World Bank's estimated or projected growth in GDP at factor cost are imposed (World Bank 2021a). For the period 2022-2050, the model is set up so that, thanks to the anticipated oil expansion, it generates an expansion of 0.5 percentage points relative to the observed annual rate for 2000-2019 of 5.2 percent.[33] Beyond GDP, starting from 2020, payments related to the government, the balance of payments, savings, and investment, defined as shares of GDP are set to make sure that the path of the economy is sustainable. Moreover, it assumes that, starting from 2022, the growth in the different population age groups follows the UN medium fertility variant (UN 2019) which projects that the diminution in the total fertility rate will follow the same linear trend observed since 2000, moving from 6.95 live births per woman in 2015-2020 to 4.32 in 2045-2050.

The level of income per capita and the extent of poverty in Niger can change radically according to future demographic trends. The first two alternative scenario pop- and pop+ differ from the basis only for the population trajectory. In the first and more favorable scenario (the UN low fertility variant), the trend in the reduction of the total fertility rate observed since the begin of the 2000s will accelerate, moving to 3.82 live births per woman in 2045-2050. As consequence, the average rate of population growth will drop from 3.8 in 2020 to 3.1 in 2050. This alone will allow some benefit in terms of poverty reduction and income per capita, which will increase of around 4.3 percent in 2050 comparing to the base scenario. However, if the pace of the reduction in fertility rate should slowdown so that the number of live births per woman in will still be 4.8 (UN high variant), the level of income per capita will be sensible lower, to XOF 573,000 (2015 values).

The first scenario, *pop*, addresses population in isolation from other changes. It assumes that, starting from 2022, the growth in the different population age groups switches from the UN medium variant to the UN low fertility variant (UN 2019). As a result, by 2050, the total fertility rate decreases to 3.8 and total population reaches around 61 million as opposed to 4.3 and 65 million, respectively, for the medium variant while the dependency ratio decreases from 78 to 72 percent, something that creates a potential demographic dividend insofar as the addition to the labor force can be productively employed. Further discussion on the impact of this and other scenarios can be found in Appendix B.2.

Such a demographic change is likely to come hand in hand with improvements in educational outcomes and in the saving ratio. Accordingly, the third scenario, pop-edu+, combines the demographic assumption of the scenario pop with increased government spending on education, and an increase in the share of the labor force with completed primary education or more. In the model, the gain from this change in shares is due to the assumption that the more educated labor group has a higher marginal productivity and, as a result, receives higher wages. Finally, the fiscal space that is needed for this spending expansion is generated via scaled-up domestic taxes (direct and indirect, not including trade taxes). More details are covered in Appendix B.2.

33 Technically, the base scenario was constructed in two steps: (1) It was assumed that the oil sector was stagnant and growth in GDP at factor cost exogenous while, at the same time, the model has an endogenous variable that, in each year, scales TFP in selected production activities so that the exogenous GDP level is generated; and (2) The scenario was rerun with endogenous GDP growth, without endogenous TFP scaling (but imposing the scaling results from step 1), and an expanding oil sector (due to expanding access to the natural resource). The analysis uses the results from step 2, which is what is referred to as the base scenario.

Table 7. Selected data for demographic analysis (values in 2021 and by scenario in 2050)

	2021	Base	pop-	pop+	pop-edu+	pop-s+
Headcount poverty rate (%)	47.5	34.4	32.8	37.7	25.9	282.2
GDP per capita (CFA fr, constant 2019 prices)	314,303	616,030	643,069	575,326	693,661	720,871
Household savings (% of GDP)	12.1	11.9	11.9	12.0	12.0	16.0
Dependency ratio (%)	110.3	78.0	72.0	84.4	72.0	72.0
Working age population (% total population)	47.6	56.1	58.6	54.2	58.1	58.1

Source: SDGSIM

Finally, the highest level of GDP will be reached in a scenario such as pop-s+, where the saving-investment channel is fully at work. The lower fertility allow household to increase the share of their revenue which is saved and used to fund domestic investment. This is fundamental element through which the demographic dividend materializes. In this case, even by keeping unchanged the demographic variables, the level of GDP per capita deviate from the baseline.

b. Reform packages

A more elaborate set of reforms scenarios combines elements of the simulations in the first set with reform aiming at expanding public investment and tests the role of selected assumptions on fiscal space. The first simulation, combi, combines changes toward lower population growth, a better educated labor force, and the provision of infrastructure that raises the productivity of the widest range of sectors. The remaining simulations test the impacts of alternative assumptions in the context of the combi scenario: (a) *combi-0* assumes the same increases in government spending as for combi but without gains in education or productivity – this reflects the impact of deficient governance; (b) *combi-fg* assumes that instead of higher taxes, the need for increased government funding is covered by foreign grants; and (c) *combi-eff* introduces a parallel increase in government efficiency (reduced government spending on public administration without any negative impacts) sufficient to create the fiscal space needed to increase spending on education and infrastructure. A detailed discussion of each scenario can be found in the Appendix.

3. CONCLUSIONS

A series of economic simulations were performed with the purpose to illustrate potential scenarios for the economy growth and poverty reduction until 2050. The LTGM baseline growth scenario suggests a slow transition towards the lower-middle-income level, with Niger's trend GDP per capita growth is projected to stabilize around 0.5 percent in the medium-term, trending upwards to 2 percent in the long term. The acceleration of growth is due to a switch of the economy towards the non-oil sector (which has better fundamentals) and improved demographic trends. Under this baseline projection, Niger's GDP per capita will remain just below US$1,000 (real of 2010) by 2050. This weak economic growth would limit poverty reduction and social development in the country. However, moderate reforms to investment, human capital, and non-oil TFP growth can boost long-term GDP per capita growth to around 5 percent, even with unchanged population growth. In this case, GDP per capita would surpass US$1,700 by 2050. Under a scenario with a package of ambitious

reforms, long-run GDP per capita growth would reach 8 percent, leading to a GDP per capita close to US$3,000 by 2050. In all simulations, the non-oil sector is the engine of growth, and there are no large spillovers from one sector to the other.

This chapter also explores the impacts of alternative actions aimed at promoting development in Niger, using a CGE model built around a new Niger SAM for 2019. Here, we find that packages of policy interventions that address Niger's core challenges in the areas of demography, education, and infrastructure, promise to deliver substantial if not dramatic gains compared to a base scenario that follows current trends. More specifically, a comparison between results for the most successful policy package and the base scenario suggests that, during the period 2021-2050, a combination of reduced population growth (a switch from the UN medium to low population projection) combined with education expansion and productivity-raising investments in infrastructure, may raise annual growth in household consumption per capita by 0.6 percentage points (from 1.9 to 2.5 percent) and reduce the 2050 poverty rate by 12 percentage points (from 34 to 22 percent). The gains from such a policy package are not highly dependent on the specifics of Niger's oil expansion even though the latter may deliver substantial benefits and contribute fiscal space for policy packages. However, the success of the envisaged program depends critically on good governance. Expanded foreign grants may play a positive role by reducing the need for higher taxes on a population with a high poverty rate.

Closing on a note of modesty, while simulations with economic models imposes rigor and logic on the analysis, it is nevertheless only exploratory considering limited knowledge about the details of the workings of Niger's economy, and given the fact that future developments are subject to many uncertainties, both domestic and external.

CHAPTER 3

Leapfrogging private sector-led growth with New Technologies

Several bottlenecks prevent the private sector in Niger from becoming the main driver for economic growth. Among the main challenges is the pervasive economic informality and weak access to finance which contributes to the low level of labor productivity evidenced in chapter 1, thereby limiting tax revenue and thus development spending. The business climate, market landscape, and governance system rather than support private sector development and job creation hamper Niger's attractiveness to foreign investment. Against this background, this chapter analyzes the potential for new technologies to radically transform the country's development trajectory. After providing a brief description of the main characteristics of the private sector, the chapter points to agri-business and finance as the sectors best positioned to benefit the most from a rapid expansion of digital technologies. By channeling more resources to rural areas, digital technologies also allow to exploit the significant complementarities between the two sectors, thus exceeding the gains obtainable by the digital transformation of the individual sectors.

1. NIGER PRIVATE SECTOR DEVELOPMENT

1.1. Niger private sector profile

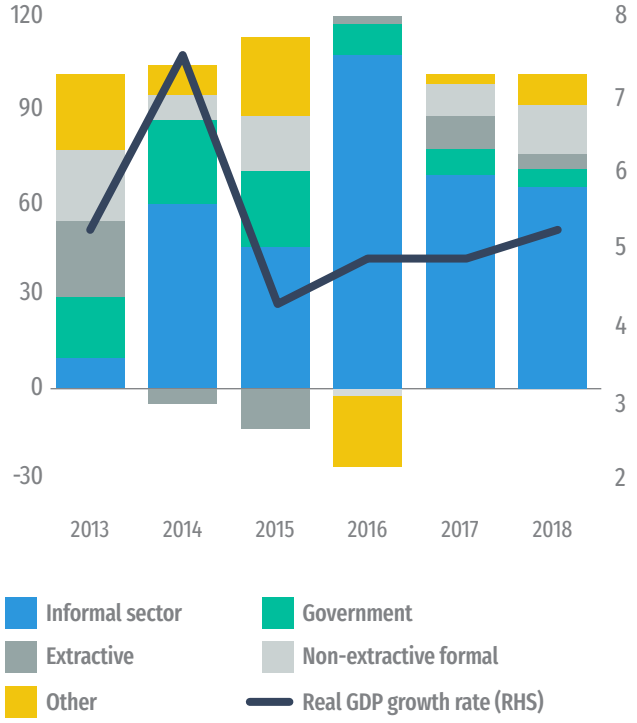
Private sector development in Niger is crippled by pervasive informality. Compared to peer and aspirational countries, Niger is the country where unfair competition from the informal sector is the biggest constraint to firms' development (Figure 31). The formal private sector, which accounts for less than 10 percent of GDP, remains among the smallest in Sub-Saharan Africa (SSA). Private companies outside of the two main towns of Niamey and Maradi are very limited. On the other hand, the informal sector has been growing very fast, representing between 40 to 50 percent of GDP during the last five years. It employs about 91 percent of the population, including 96 percent of women, and 87 percent of men.[34] The informal economy's greatest contribution to Gross Value Added (GVA) comes from trade (31.4 percent), followed by manufacturing (15.2 percent), construction (13.4 percent), repair and personal services (11.2 percent),

34 IMF (2019). Article IV, IMF Country Report No. 19/239, July.

and food and beverage preparation and trade services (8.9 percent).[35]

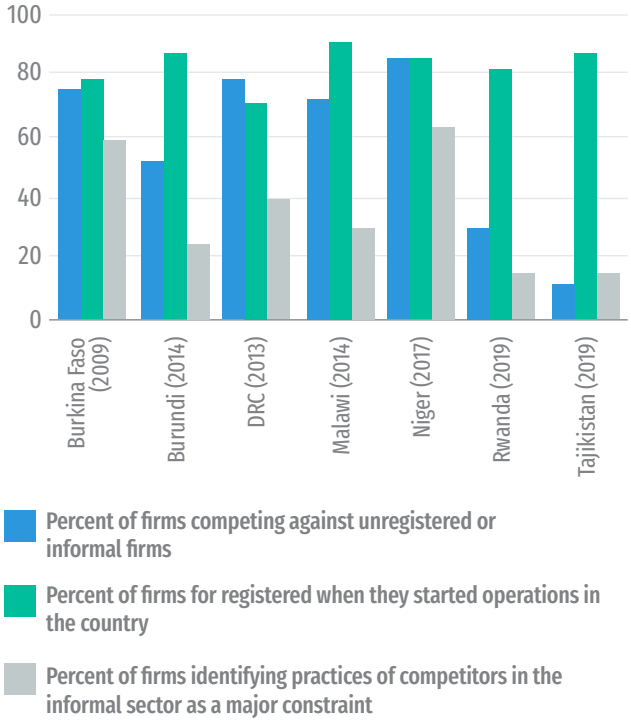
Women's participation in the private sector is limited to the informal and agriculture sectors, and their contribution to the economy is small. Almost all of the economically active working women in Niger (95 percent) work informally, and 91 percent are self-employed. In fact, only the lucky few (4 percent) have found work in the formal sector. With high fertility rates, at over six babies per woman, limited access to training, and no family support system, it is very difficult for women to conduct productive and income generating activities. However, although women dominate the informal economy in Niger, they account for only 28.7 percent of the informal economy's contribution to GVA, in contrast to the men's share of 71.3 percent. To address the negative impact of the household dependency ratio on women's activity in Niger, there should be a strong focus on reducing fertility and exploring policy options such as community-based childcare, and technical support to the self-employed. This would not only allow women to spend more time on productive activities and on supervising farm labor but would also allow women to participate in groups such as producer organizations, which can be an important source of technical information and learning.

Figure 30. Sectoral contributes to Niger's real GDP growth, 2013-2018



Source: IMF, article IV, 2019

Figure 31. Widespread informality creates unfair competition with the formal private sector



Source: World Bank Enterprise Surveys

35 IMF (2017). "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years", IMF Working Paper WP/18/17. On average over the period 1991-2015, the IMF estimates the size of the shadow economy at 51.5 percent using the predictive mean matching and 39.7 percent using the multiple indicators multiple causes (MIMIC). The MIMC, which uses the night lights intensity approach, estimates that the ratio of the shadow economy over GDP has decreased from 43 percent in 2004 to 34 percent in 2015.

Productivity of the private sector is low, as structural transformation has been very limited and most productivity gains occur within sectors. Productivity is stifled by low levels of education as around 70 percent of Nigeriens have not completed any level of schooling, although this number is decreasing rapidly in younger generations. Productivity is even lower for women, and the agriculture sector. It is estimated that 34 percent of Nigerien women are out of the labor force at some point due to family reasons. Productivity gains in agriculture have been limited over the past decade. Over 80 percent of Niger's labor force is working in low skill agricultural activities, depending on rain-fed agriculture and livestock. While productivity is much higher in industry, boosted by the extractive sector, workers have not relocated to sectors where productivity grows above average.

1.2. What will it take to change Niger's private sector development trajectory?

Recent progress in the investment climate is a good start, but a lot remains to be done to create fundamental conditions to support private investment. The National Development Plan (PDES) for the period 2017-21 clearly focuses on the private sector as one of the main drivers for accelerating economic growth in the medium to long term. The Government of Niger (GoN) has taken good steps to improve the investment environment, implementing 15 reforms from 2017 and 2020.[36] Unfortunately, many of these improvements to the business environment do not translate to material improvements. While many reforms are taken, most of them are unknown by Nigeriens. It is unclear if they are not effectively implemented due to lack of capacity or simply due to a lack of political will. Consistent misapplication of official policy and legal frameworks has colored the business environment with the perception of corruption. Various foreign firms operate in the nascent gold and oil sectors, but several businesses have been turned off by the outdated and opaque bureaucratic investment framework.

The framework for market competition is very weak and driven by informal rules. The failure to develop a level playing field over the years had a negative effect on the private sector. Continued lack of transparency at all levels has undermined trust in Niger's institutions.[37] According to the Economist Intelligence Unit's operational risk model as of June 2021, investors in Niger perceive that the risks in doing business related to competitive conditions are driven by vested interests. In the absence of effective contract enforcement, economic operators tend to remain within their family or social networks. These types of arrangements could harm productivity and incentives to innovate as they grant a comparative advantage only to certain firms, which is not necessarily associated with their efficiency.[38] Another big constraint is the state and elite capture. Interviews across donors' projects have shown that grants of publicly financed projects supporting the agriculture sector tend to be captured by elites or to go farmers who were themselves civil servants. An example of state capture mechanism that has been observed in Niger relates to the use of taxation to maintain or influence competitive advantages of politically connected firms.

36 For instance, Niger has reduced the cost of registry and the capital requirements to start a business, which is expected to facilitate the formalization of businesses. In addition, in 2018, Niger made registering property faster by decreasing the time needed to transfer and register property. It now takes 13 days and 4 procedures to register a property (down from 35 days and four procedures). The GoN also removed restrictions on women's employment in mining, construction and manufacturing, which is a welcome step to harness the untapped potential from a better integration of women in the labor force (Women, Business and Law (WBL), 2021).

37 Dollar, David. 2000. "Governance and Social Justice in Caribbean States." Development Research Group, The World Bank. May. Discussion draft

38 Fiebelkorn, Andreas Henrik. 2019. State Capture Analysis: How to Quantitatively Analyze the Regulatory Abuse by Business-State Relationships (English). Governance Discussion Paper; No. 2. Washington, D.C.: World Bank Group.

The business climate does not support private sector development and job creation. Nigerien firms spend an average of 21 percent of their time dealing with regulatory requirements, against an average of 7 percent in Sub-Saharan African, based on the results of the World Bank Enterprise Surveys. With little accreditation services, difficult contract enforcement, and limited access to credit among several constraints, there are few incentives for firms to be formally established even in the formal sector. Both costs and benefits need to be tilted to encourage businesses to enter the formal sector. In particular, getting electricity and paying taxes are areas with major obstacles for business operations. While Niger has made the enforcement of all contracts easier by creating a specialized court in Niamey, this does not help affected parties outside of the capital where an effective legal enforcement mechanism remains absent. Property disputes are common in rural areas subject to customary land titles.

Governance and control of corruption need to be reinforced. Corruption ranks fourth among obstacles for businesses in Niger (World Bank Enterprise Survey, 2017) and the IMF's analysis finds a large negative effect of bribery on sales and productivity growth, especially for young firms and exporters. Customs and tax administrations are perceived as the worst offenders, followed by the police and public procurement. Niger has over 160 state-owned enterprises (SOEs) and parastatal companies, that are important economic actors, particularly in the oil, gas and mining sectors, and in the provision of public services. Difficulties in controlling corruption in these SOEs, and lack of transparency in procurement aspects are hindering private companies' access to opportunities.[39]

Going forward, considerable efforts will be needed to attract and retain private companies and FDI. In addition to high levels of corruption, the small size and high disparity of the Nigerian market, and unattractive returns have contributed to reducing Niger's capacity to attract and retain large companies. In recent years, three international companies such as Unilever, Orange, BraNiger (Subsidiary of Castel) have abruptly left the country. Although two of these companies have been acquired by local investors, this situation left a negative perception of Niger's market and business environment. Interviews across private formal and informal companies reveal that worries about possible state capture remain important. Private investment has contributed to a relatively high capital endowment driven by the availability of external financing. Although at a decreasing rate, FDI has been flowing into the country, with inflows stabilizing at around 5 percent of GDP in 2016-2017. Over the past five years, in preparation for the African Unit Summit, Niger has attracted large-scale private investments in hotels, and the construction sector, aiming to make the country a regional conference hub. Nonetheless, investment has not contributed to lifting labor productivity from its low level and capital per labor hour remains low, constraining productivity gains. The mining sector could represent a steppingstone to developing a formal private economic ecosystem. Linkages between the large companies and local MSMEs barely exist. Building such linkages will be important to create new opportunities for them, as discussed in Chapter 4.

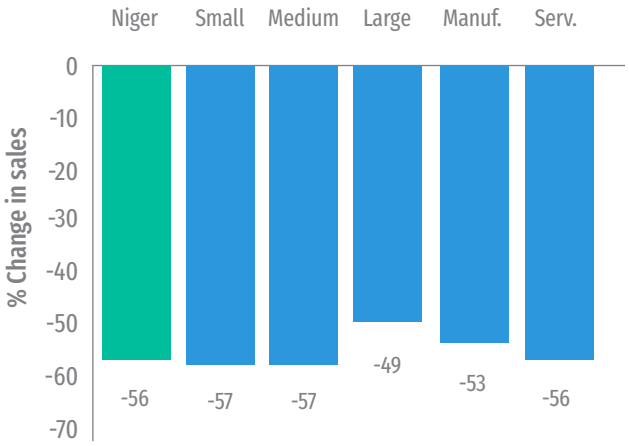
Niger's chronically high exposure to natural disaster risks challenge private sector development and calls for a new approach. Droughts and flood risk are the most prominent, with the likelihood to adversely impact both the agricultural and non-agricultural sectors. Firms in the western part of Niger are exposed to significant flood risk that could affect buildings and access to infrastructure,

39 World Bank Group (2019, December). "Niger Integrated State-Owned Enterprise Framework".

with the potential to disrupt trade. The World Bank Group's disaster risk modelling shows that over US$ 500 million of damage to the building stock may occur in at least one flood in a person's lifetime and that on average, flooding each year is expected to cause exposure of 200 kilometers of transport infrastructure.[40] The insurance sector is poorly developed, with limited options to offer protection to the private sector against the risks it faces due to climate change and other reasons.[41] With no insurance support system and a limited disaster risk approach as discussed in chapter 5, advances might not last long.

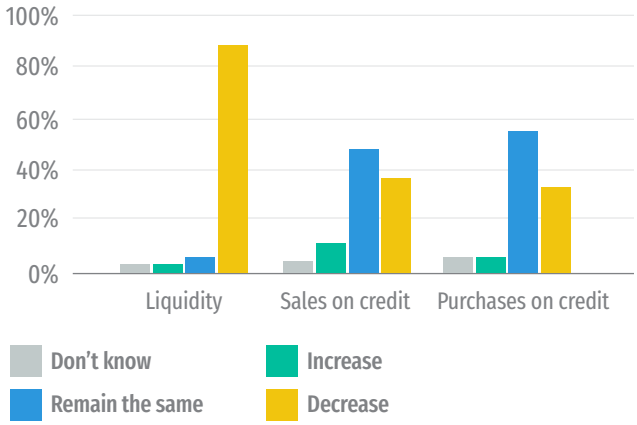
The COVID-19 pandemic has added to the existing challenges. During the first three months of the pandemic, monthly sales by firms in Niger declined by 56 percent with small and medium firms and those operating in services being the most affected.[42] Around 95 percent of firms experienced a decrease in hours worked relative to the same period in the previous year, while 85 percent saw their cash flow availability reduced. To deal with cash flow shortage, over 60 percent of them delayed payments to suppliers, landlords or tax authorities for more than a week while 18 percent of businesses used loans from commercial banks, 22 percent used equity, and 11 percent delayed payments to suppliers or workers. During the same period, 60 percent of large firms reported receiving COVID-19-related government support against 4 percent of small firms and 12 percent of medium firms. The Government recently began some initiatives to facilitate access to credit and assist in the recovery of firms affected by the pandemic, but they have been inefficient thus far. The guarantee program of CFAF 150 billion (US$ 300 million equivalent to 2 percent of GDP) to backstop credit to enterprises hit by the COVID-19 pandemic had very little results.[43]

Figure 32. Average change in monthly sales of Nigerien firms between June 2019 and June 2020



Source: World Bank 2020 Enterprise Survey Follow-up on COVID-19

Figure 33. Share of Nigerien firms that have experienced changes in liquidity and cash management between COVID-19 outbreak and June 2020



40 WBG 2019. "Niger disaster risk profile". https://documents1.worldbank.org/curated/en/720421574234645191/pdf/Disaster-Risk-Profile-Niger.pdf

41 Two life insurance companies, with cumulative assets of less than 1 percent of GDP, and six non-life insurance companies share the market.

42 World Bank 2020, Niger Enterprise Survey Follow-up on COVID-19.

43 The program, which provides a 25% guarantee for large enterprises and 50% guarantee for SMEs, is accessible to all commercial banks in Niger. So far, the results are far below the expectations. In January 2020, the program had provided guarantee of only FCFA 4 billion to cover a total of FCFA 11 billion equivalent loans.

Very limited efforts have been made to build a stronger and more competitive financial sector where private enterprises can flourish. As many countries in SSA, Niger has created several state-owned banks to serve the unbanked populations. Although this model has been disappointing in terms of financial performance and social impact, it continues to attract Niger's policymakers. For instance, a new housing bank was created in recent years. Despite difficult attempts to revamp some state-owned banks, a lot of consideration is given to using public agencies to deliver financial services, or nationalizing some private microfinance institutions. This has led to a low level of competition which in turn contributes to keeping the market shallow and immature. The microfinance sector, which in peer countries strives to serve rural populations, has been very inefficient in Niger, totaling only about 296,000 clients – the weakest outreach of the WAEMU region. As of 2020, Niger was among the countries with the lowest levels of financial inclusion in the world, with 84 percent of the adult population lacking a formal transaction account. 68 percent of adults were saving through informal rotation savings associations or by investing in livestock.

Failure to provide the private and agriculture sectors with sustainable access to finance continues to be highly detrimental to growth. Firms in Niger have been – for the past three decades and counting – continue to be severely credit constrained. Domestic credit to the private sector as a percentage of GDP was one of the lowest in Africa hovering around 11.2 percent in 2019, lower than both the average of 13.8 percent in fragile countries in Africa, and the WAEMU region's average of 23.2 percent. The potential demand for MSME finance was estimated at US$3.4bn compared to an actual supply of US$329m.[44] Public and private banks together dedicated only 0.8 percent of their total portfolio to agriculture in 2017.[45] While few private banks have undertaken efforts to lend to agricultural production, thereby making use of the partial credit guarantees provided by donors, these experiences have in some cases resulted in losses for the participating entities, thus diminishing their willingness to lend to agriculture. BAGRI, Niger's public bank dedicated to agriculture, is playing a key role by continuing to increase its lending to this sector, and remarkably fine-tuning its approach. Despite these positive developments, the size and quality of the agricultural loan portfolio remains limited, in the absence of adequate risk mitigation policies and instruments.

More space needs to be given to commercial credit over subsidies. Persisting pouring of direct subsidies to MSMEs and farmers by donors over the decades contributed to the crowding out of commercial credit, and inhibited the development of a financial culture. Experiences in Niger show that providing direct concessional funding/ subsidies to MSMEs are generally ineffective. Beneficiaries of these programs, even when they become creditworthy, tend to wait for a second round of subsidies instead of turning to commercial banks. The Government's recent effort to boost financial inclusion and allow the financial sector to support access to finance is starting to create a new and growing interest in credit. This much-welcomed attention will need to be realized as soon as possible in order to provide a sustainable supply of funds for MSMEs, which will allow for Niger's private sector to grow.

The limited focus on youth employment and training policies is alarming because it inhibits all efforts to boost private sector development, and it creates a vicious circle – those who remain excluded from the job market or entrepreneurship are more vulnerable in the context of fragility and violence. The formal labor market is poorly developed, making it difficult for private enterprises to find trained staff and to attract new enterprises in the country. Recognizing this key constraint should call for

44 World Bank. Feasibility Study of the Financial Inclusion Fund for Niger, 2019
45 Ibid.

new approaches. Opportunities are emerging, empowered by wider digital connectivity and the use of WhatsApp, and other mobile-based apps. E-commerce on WhatsApp is increasingly trusted and growing—despite tremendous challenges—across urban communities and, surprisingly, across age groups, education levels, and genders. However, these opportunities will not be enough given the low level of literacy, the large proportion of untrained people, the frequent crisis situations, and the social and cultural norms tolerating or sometimes promoting unemployment of women or discriminating certain castes. Real and well calibrated policies will have to be put in place by the Government to provide decent training in key sectors such as agriculture production, food processing, mining and construction. Recent reforms supported by the World Bank are going in the right direction, by giving the training institutions the necessary institutional and financial autonomy, and granting apprentices with a small scholarship in order to make sure that the poorest students can also attend the classes.

Entrepreneurship can be an efficient way to facilitate economic inclusion of youth if a conducive ecosystem is created. Very few initiatives have been carried out by the Government to promote entrepreneurship over the last three decades. Reforms have been done on paper to facilitate opening of a business, but all the foundations to create an entrepreneurship ecosystem have not been put in place. Aspiring entrepreneurs face lack of access to training, finance, and social support in general. Further, the education system in Niger focuses on encouraging a culture that socializes and prepares people to depend on seeking government employment in the state-owned sectors of the economy rather than starting a new business. Most entrepreneurs thus operate in informality. Encouraging the formalization of activities and developing social protection mechanisms to reinforce the application of labor laws and enable workers, including the self-employed, to receive the benefits they may eligible for with regards to health, unemployment, family, retirement, etc. can be a potential way forward. Training, access to finance, access to markets and linkages to opportunities will be key as well.

2. SECTORS WHERE TECHNOLOGY CAN HELP CREATE A STRATEGIC AND DYNAMIC SHIFT

2.1. Brief overview of penetration of digital technology in Niger

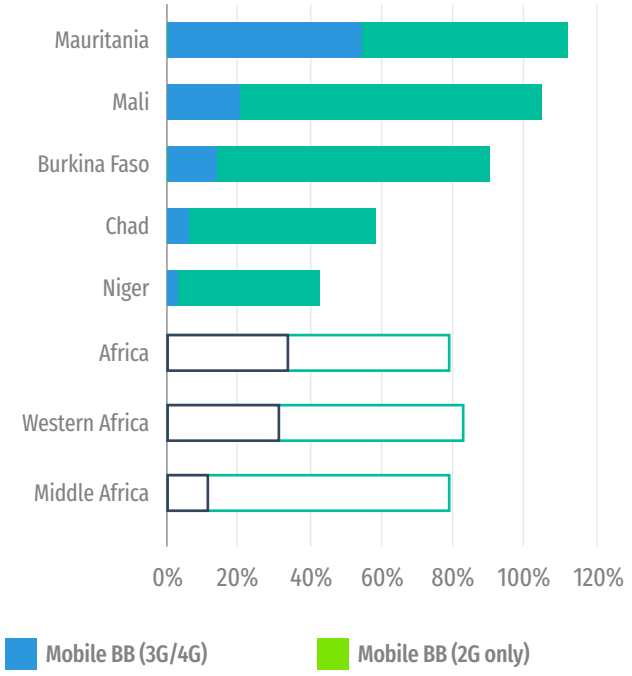
The technology shift in Niger is gaining momentum even if it is happening slower than in most countries in the WAEMU region. The market structure in telecommunications is reasonably competitive, with four players competing for the market, including three private companies and a state-owned one. As of late 2019, Airtel was the market leader with around 42 percent of the market, followed by Moov (26 percent), Orange (24 percent), and Niger Telecom trailing with just 7 percent. However, Niger Telecom benefits from an effective monopoly in backbone fiber as it has legal protection which prevents other operators from laying fiber on routes where it already has capacity available. Investor confidence in the market received a jolt with the decision of Orange Group to sell its entire share in Orange Niger to Zamani Com, which is owned by local business interests, effectively withdrawing from the Niger telecom market. In terms of coverage, the gap is still important. Even though 81 percent of Niger's dispersed population is now covered by a mobile network, the quality of coverage needs to be improved. Around half of the population is not covered by mobile broadband. 3G is available to less than 50 percent of the population. Awareness of mobile internet was increasing thanks to the growing interest of the population in using social media such as WhatsApp, but it was far from ubiquitous.

Significant efforts are currently in place to reduce the rural-urban and gender digital divide and allow Niger to leapfrog. Since the adoption of the Niger 2.0 strategy, the country has taken concrete actions to launch its digital transformation. The digital transition is expected to be boosted thanks to: a) recent large investments in digital infrastructure (such as fiber optic and connectivity) with the support of the World Bank and other donors, to improve mobile and internet network in rural areas, and, b) investments to improve digital skills and mobile finance services for about 1.4 million people through the Smart Villages initiative and the fiber optic project. The recent launch of an app to offer public services online such as the renewal of birth certificates, and other administrative forms, will contribute to facilitating the adoption of digital services. While these efforts will not solve all the issues, they will create strong foundations for Niger's digital revolution and will open possibilities for rolling out of innovative mobile-based services in the health, education, and agriculture sectors.

To fully reap the benefits of a digital economy, more efforts are needed to ensure the affordability of internet enabled devices and encourage the adoption of digital services. Smartphones are progressively becoming more affordable thanks to a growing secondhand device market, and increasing adoption of smart feature phones[46] , but affordability remains the main barrier to mobile ownership, especially for at least the 40 percent lowest income earners. The total cost of mobile ownership (TCMO) is very high in Niger, representing more than 30 percent of monthly incomes for the bottom 40 percent income group compared to 6 percent in Ghana. Value added tax (VAT) on handsets, for example, is still at about 20 percent and considered a key constraint to improving the affordability of devices. Taxation represents about 23 percent of the TCMO which includes the cost of purchasing a handset, cost of activation, and cost of usage (voice, data, and SMS). Gender gaps in device ownership will need to be addressed with a stronger support of the Government While the upcoming 150 digital centers are expected to boost digital skills, it will be crucial to scale up digital campaigns to reach more women, rural populations and businesses. Access to electricity to charge the devices will also be key.

46 These are usually more affordable than smartphones. While they do not share the full capabilities of a smartphone, they typically allow for the installation of popular apps, such as Facebook, YouTube, WhatsApp and Google Assistant.

Figure 34. Mobile penetration rate for voice (2G) and broadband (3G, 4G), % pop., 2018



Source: GSMA Intelligence
Note: Penetration based on number of SIM cards

Figure 35. Percentage of offline people

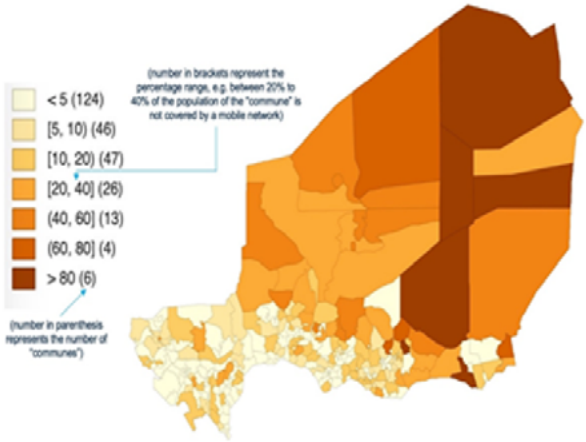
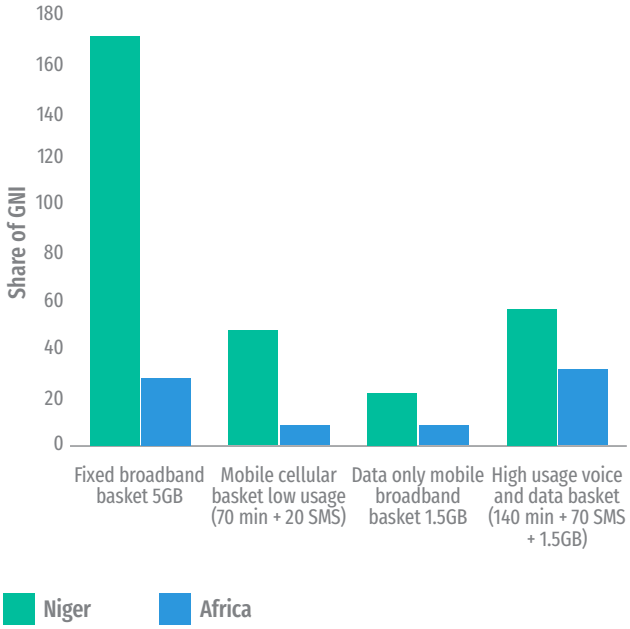
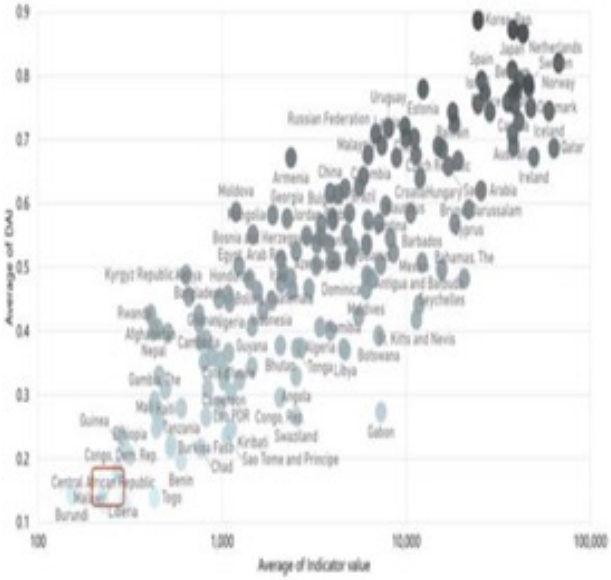


Figure 36. Average cost of digital services per capita



Source: ITU, 2018

Figure 37. Low adoption of digital services compared to the rest of the world



Source: WBG and ITU, 2018

2.2. Opportunities to use technology to boost commercial agriculture in Niger

Promising technologies offer opportunities to improve productivity and competitiveness of agriculture value chains. New technologies can help Niger develop a commercial agricultural sector and address some of the challenges it faces. The performance of agri-products could be expanded with better technologies, better knowledge of export procedures, and streamlined regulatory provisions. For a sustainable growth of commercial agriculture in general, it will be key to have a strategy much more focused on products and technologies that could generate higher revenues per liter of water used.

While there is a wide variety of technological innovations being tested and implemented globally, Niger would especially benefit from promoting the following:

- **Niger has abundant solar energy that could significantly contribute to expanding the availability of electric energy generated by solar panels at a reasonable cost.** In agriculture, such energy can for example be used to power irrigation schemes (e.g., through pay-as-you-go solar services to pump water, cooling of produce, or milling of grains such as those that have been successfully implemented commercially in India and Kenya),[47] to cool storage warehouses, or to power communications equipment.

- **Precision agriculture and drip irrigation have emerged in many places as a profitable way to increase the efficiency in the use of agricultural water and inputs and are already being tested in Niger.**[48] Under such schemes, the doses of inputs and water applied to plants and animals are determined considering the specific situation of the crop or herd, thus significantly reducing costs while ensuring high productivity. In the case of drip irrigation, water is delivered just to the plants to be irrigated and is turned on or off considering the time of the day, and the humidity of the soil. Some of these technologies can even determine the doses to be used depending on the situation of each individual plant or animal using sensors that scan the color and other factors of each plant. In addition to increasing efficiency, these innovations, together with more resilient varieties of crops and animals, can also contribute to managing better with the impacts of climate change.

- **Similarly, new technologies ensure that products are properly stored and managed as they move along the value chain, so they can be used as collateral in the financing of the value chain.** Sensors that monitor humidity and temperature, for example, can help to ensure that produce is stored and transported adequately to maintain their quality. In addition, Blockchain technologies can help trace the movements of agricultural produce from farm to market, recording compliance with quality standards and ensuring the traceability of produce. This technology makes it possible to generate information, allowing the use of smart contracts (self-executing contracts) that issue payments once certain steps are satisfactorily complied with. This type of blockchain-based value chain financing, plus the availability of 3rd Party Logistic (3PL) service providers, allows small farmers to keep the ownership of their products until the product is sold at the final destination, capturing higher margins. It also assures consumers and governments that the food is safely produced,

47 See: https://www.oorjasolutions.org/ and https://spectrum.ieee.org/energy/renewables/offgrid-solars-killer-app

48 The Niger – Agricultural and Livestock Transformation project will be implementing 65 such schemes using both diesel pumps and solar pumps. IFC has already implemented a project to pilot in Niger climate smart irrigation techniques and solar pump fed drip irrigation systems with support from the Climate Investment Funds, CIF.

processed and transported in a way that it complies with applicable social and environmental standards.

- **Technology could be used to improve the performance and transparency of SMEs and of Farmer Organizations (FOs):** Several countries have implemented projects to strengthen the management capacity of SMEs and FOs engaged in agricultural value chains though training and supporting updates to their management information systems (MIS). This allows them to obtain timely information and make informed decisions that enhance their performance. Further to enhance the efficiency and management capacity of these entities, it is advisable to promote adequate external oversight and/or audit mechanisms. This would provide an independent assessment of their operations and performance, thus increasing the transparency and reliability of the information they provide, and with it their creditworthiness. Such external oversight mechanisms can include independent auditors, as well as qualified private entities and associations of SMEs and FOs

- **Lastly, Niger should continue the launch of models that leverage the potential of multi-function digital agri-platforms (DAPs) to increase access to markets and finance.** While relatively new and diverse, the DAPs have attracted much attention because of their potential to reach large numbers of geographically dispersed actors as long as they have access to the internet and to a mobile device. It is expected that the upcoming platforms under the Smart villages project will connect a wide variety of stakeholders, including smallholder farmers, input suppliers, buyers and processors of agricultural goods, financial service providers, and providers of information, helping them to transact with one another.

Significant funding will be necessary to finance the introduction of infrastructure that is adapted to the conditions and resources available in Niger and that leverage the country's access to solar energy. The introduction of the needed technological improvements in irrigation, logistics and digital infrastructure will make it necessary to substantially increase the available resources and to extend the terms of financing from short-term financing that allows for a cycle of crop production, to medium-term and long-term financing.

Niger's efforts in this space are recent, and it will be important to leverage the experiences of other countries to bring together private firms, government ministries and agencies, and agriculture value chain stakeholders to develop a joint approach. India's Aadhar system, and Kenya's experience with setting up the "Million Farmer Platform" could provide valuable lessons to learn from.[49] High potential risks related to lack of data protection, cybersecurity, and consumer abuse are to be taken into account while implementing all of these technologies for Niger. Finally, high availability of physical access points to help the population's use of the DAPs and in general all digital solutions, should be prioritized.

49 Kenya launched in 2019 with international support a challenge competition that has brought together the country's most promising agri-tech innovators to implement a multi-purpose digital platform to facilitate access to extension, finance, markets and data driven applications. The platform is already serving 100,000 farmers. See: https://kenyaomf.webdev.comunity.me/

2.3. Going beyond the Intra-African/ Sahel regional trade and using technology to become the future 'garden'

Niger needs to go beyond the Intra-African/Sahel regional trade to use agriculture to transform its economy. It could adopt the strategies of extractive-based economies like Chile or Peru that have now become agricultural powerhouses by focusing on exporting high value-added products to high-income markets such as the US and Europe. This structural transformation needs to start by:

a. **Understanding the limitations of the present trading patterns –** Where products are defined by logistical handicaps on the supply side and distorted markets on the demand side

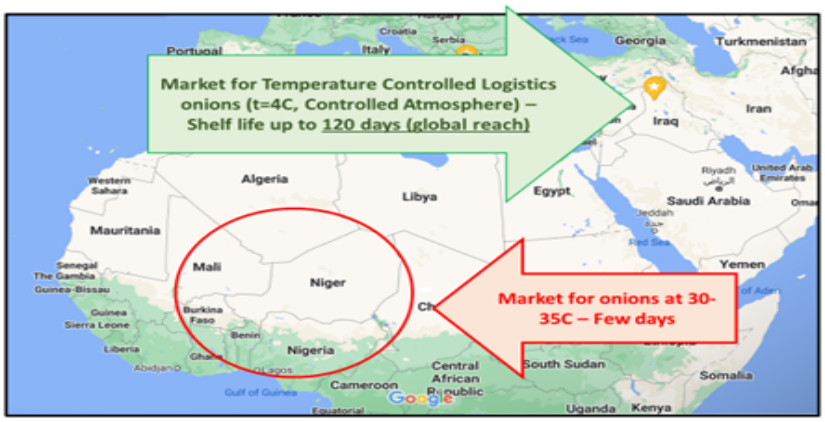
b. **Redefining target markets where Niger will have sustainable competitive advantages –** Using counter seasonality and estimates of climate change impact on the main competitors

c. **Investing in irrigation, logistics and digital infrastructure for the next 20 years –** The investments need to start now to build the production, logistics and information systems for the future

a) Understanding the limitations of the present trading patterns

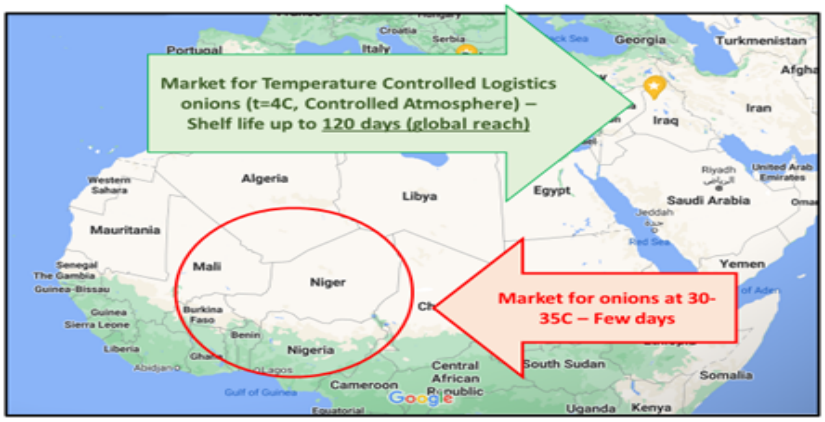
The absence of Temperature Controlled Logistics (TCL) technology automatically limits the trade capabilities of Niger to the natural shelf life of its products: "stockables" such as sesame can reach far ways countries like China; resistant perishables, like onions are limited to neighboring countries in 2–3-day trips by non-refrigerated truck, whereas "walkables", like livestock can be taken just across the border. By staying only within a local/ regional level of trade, Niger's benefits from its comparative advantages remain limited.

Figure 38. Market limits without Temperature-Controlled Logistics



Source: Cold Storage Chart & Reference Guide Robert Hadad – CCE Cornell Vegetable Program

Figure 39. Market with Temperature-Controlled Logistics



Source: Cold Storage Chart & Reference Guide Robert Hadad – CCE Cornell Vegetable Program

In the example above (Figure 38), Niger can serve the West African market for onions without having a TCL value chain, since onions can withstand a few days' high temperatures. With TCL and Controlled Atmosphere, the onions could last up to 4 months. That could open access to new markets but would also open the West African market to global cost competitors, like China, prompting the Nigerien producers to focus on quality and differentiation, for example in organic markets in Europe that appreciate the Violet de Galmi variety. However, once the TCL value chain is made available, other products not considered today could become more attractive, especially when the competition is not global, and seasonal aspects can give Niger an edge. In the case below (Figure 39), using grape tomatoes as an example, the market area with TCL can reach the EU market, competing counter-seasonally.

The detrimental effect of the present trading patterns extends to other sectors: it makes import difficult, creating "protected" markets that divert private sector attention towards uncompetitive products. Intra-Sahel trade opportunities and technology could act as a deterrent to those "protected" markets if neighbor countries opened to lower cost imported alternatives but could have the opposite effect if they end up ring-fencing these regional distorted markets, to be served only by regional players. The "import-substitution trap" may hit the region with a triple negative effect: i) harming consumers through higher prices; ii) harming the environment, by producing water and fodder intensive products such as commercial livestock; iii) crowding out the evolution towards high value export markets in products with a real competitive advantage and a high return on water.

The most obvious advantages of intra-regional trade – specialization and complementarity – may not be so evident for the countries in the Sahel region. For example, specialization, such as combining economies of scale or learning activities in certain countries, while moving labor intensive operations to lower cost neighboring countries, may not be applicable in this region, since these differences are more evident within country. Similarly, the complementarity in agricultural production requires the countries to be in different climate zones, specializing in certain products. The North-South Regional Trade Agreement allows Spain to focus on oranges and Denmark on dairy. The Sahel countries, even though they do have strong North-South differences within their own borders, may be too similar to be complementary across countries.

b) Redefining target markets where Niger will have sustainable competitive advantages

Niger could be in a privileged position to enjoy comparative advantages in agriculture but requires a radical change in strategy and mindset. Climate change and agricultural water depletion are changing Global Value Chains (GVC) for food. Markets, products, production systems, logistics routes, and the new technologies to support them need to be redefined. Niger has the potential to build a sustainable competitive advantage against European, Middle Eastern and South African producers, that will suffer more from water scarcity, or the Latin American ones, that have a much higher carbon footprint. Competitive advantage in horticulture does not mean that the conditions in Niger will be ideal, but that Niger can be better placed than its competitors to serve those markets within the shelf life of the products. But firstly, a mindset change needs to address two conventional wisdom constraints: i) ***"Niger doesn't have enough water for agriculture"***; and ii) ***"Niger's landlocked position limits its export capacity"***

i. ***"Niger does not have enough water for agriculture".*** **Paradoxically Niger and the Sahel region in general has seen an increase in their underground water, according to the GRACE satellite mission which has been measuring changes in water levels since 2002.** This does not mean that the region is water rich[50], but the trend shows that while underground water availability is increasing in the Sahel, it is decreasing in the countries that today are feeding the European and Middle East countries. This can present an opportunity to supplant Spain, Italy, Greece, Morocco, and Turkey as the main suppliers of horticultural products to European markets. The timing requires an analysis beyond this study, but in the case of California, which is undergoing a similar depletion, the estimate is that in less than 25 years, it will no longer be producing horticultural products, while today it supplies 85 percent of the fresh products in the US.

ii. ***"Niger's landlocked position limits its export capacity".*** **Niger has a strategic position in the Trans-Saharan Road to Algiers that can become the lifeline of fresh products flowing to Europe.** While access to seaports is important for agricultural commodity exporters that require bulk shipments of *stockable* products to reduce costs, most shipments of fresh products are done by truck, since it offers more flexibility, smaller sizes, and higher frequency. The distances between Niger and Rotterdam by truck are similar to the ones between Southern Mexico and New York, transited daily by refrigerated trucks that transport more than US$ 12 billion in fresh products per year. The equivalent amount from West Africa to Europe is insignificant, while Europe sources most of its tropical products from Latin America.

Intra-regional rivalry can be more important than intra-regional cooperation and could help market control. For example, the rivalry between Peru and Chile in avocados has improved the competitiveness of both, with a constant fight for innovation and quality. Within that rivalry, seasonal complementarity is an important reason for collaboration, as these two countries cover slightly different seasons that can complement each other. Peru covers April-September and Chile October-March, responding to market needs and keeping shipping routes viable all year around. In the Sahel region this may be more complex given the more similar growing patterns, but the different windows for fresh products needs to be studied further, looking for products with seasonal complementarities to cover the needs of destination markets.

50 For further explanation on the multiple causes and effects see M. Rodelli, J. S. Famiglietti et al. (May 2018) "Emerging trends in global freshwater availability", *Nature*.

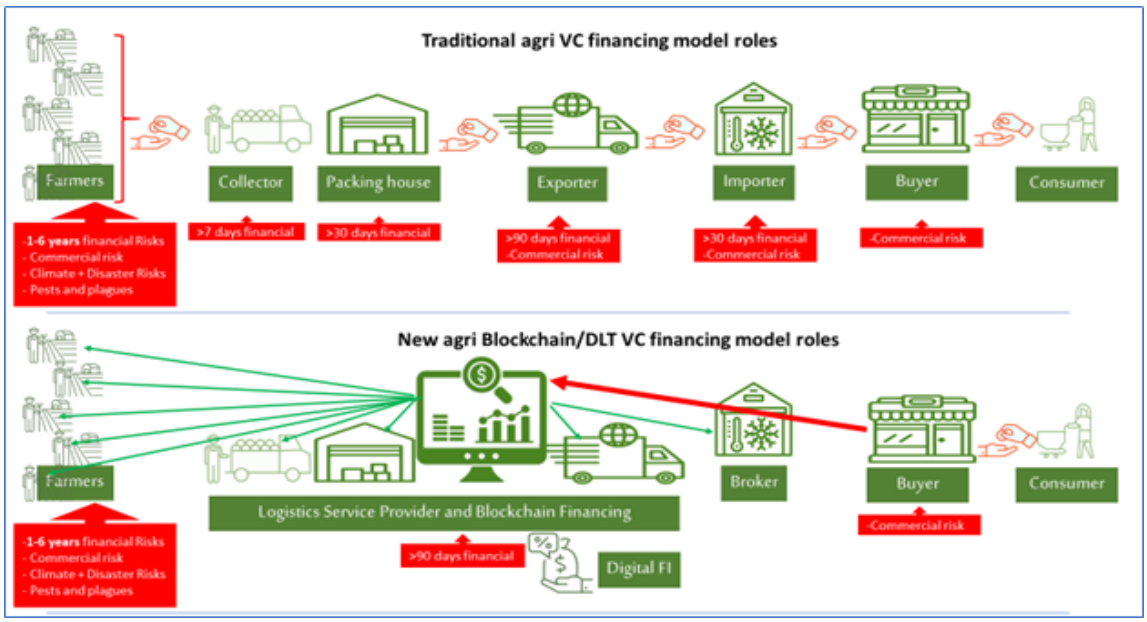
c) Invest in irrigation, logistics and digital infrastructure for the next 20 years

Niger should use its extractive value chains capabilities to help its water transformation. Recent work by the World Bank is looking at how to apply the organizational and technical skills of the extractive industries to water for agriculture. For example, a recent study for the Chad Oil and Gas (O&G) sectors, has identified three areas of knowledge from O&G that could be used for other purposes: i) the analysis of big data for geological research can be used to analyze the localization of underground water; ii) drilling and extraction capabilities can be turned into water drilling and management for agriculture; iii) pipeline capabilities can be turned in shared infrastructure management (e.g. water, electricity and fiber optics), and creating oases in lagging regions along the routes. Niger could benefit from a similar study looking at the specific capabilities of the uranium and gold mining and see how they can contribute to the transformation required in agriculture.

To take advantage of the new business models in agriculture that use blockchain technology, Niger should invest in telecommunication networks. Blockchain and IOT technologies allow 3PL service providers to follow Standard Operating Procedures[51] that allow the farmers to sell directly to final destinations, capturing higher values and obtaining supply chain financing, using the products registered in the blockchain as collateral.

All these technologies and infrastructures are already available; however, putting them into place will require local capacity building, investments, and time. In countries that have undergone similar transformations such as Peru and Chile, a strong coalition between public, private sector and scientific institutions has been key. Niger should pursue this coalition building to carry such an ambitious transformation program.

Figure 40. New Blockchain based Agri Value Chain Financing model



51 The World Bank is implementing this model in several countries, including in West Africa.

2.4. Will the use of technology be enough to seize these opportunities?

While technology can help to seize some opportunities, additional actions must be undertaken to address the challenges faced in advancing commercial agriculture.[52] These actions should take the following into account:

The atomized structure of the sector is a significant obstacle for the generation of a larger supply of homogeneous high-quality agricultural products that can satisfy the demand of promising urban and international markets, which in most cases require a minimum volume of production to be viable. Larger volumes can be either produced by larger units or aggregated by value chain firms, which in turn can be either private or cooperative in nature. Three options that are not mutually exclusive but rather complementary will be much needed in Niger:

a. Strengthening of existing firms (of which there are few),

b. Setting up of new firms by local or international entrepreneurs (including local FOs), which would require risk capital provided ideally by firms already operating in similar markets in Niger or abroad (at this stage there do not seem to exist any potential providers of equity for such firms),

c. Opening of branches of existing international firms entering the market in Niger.

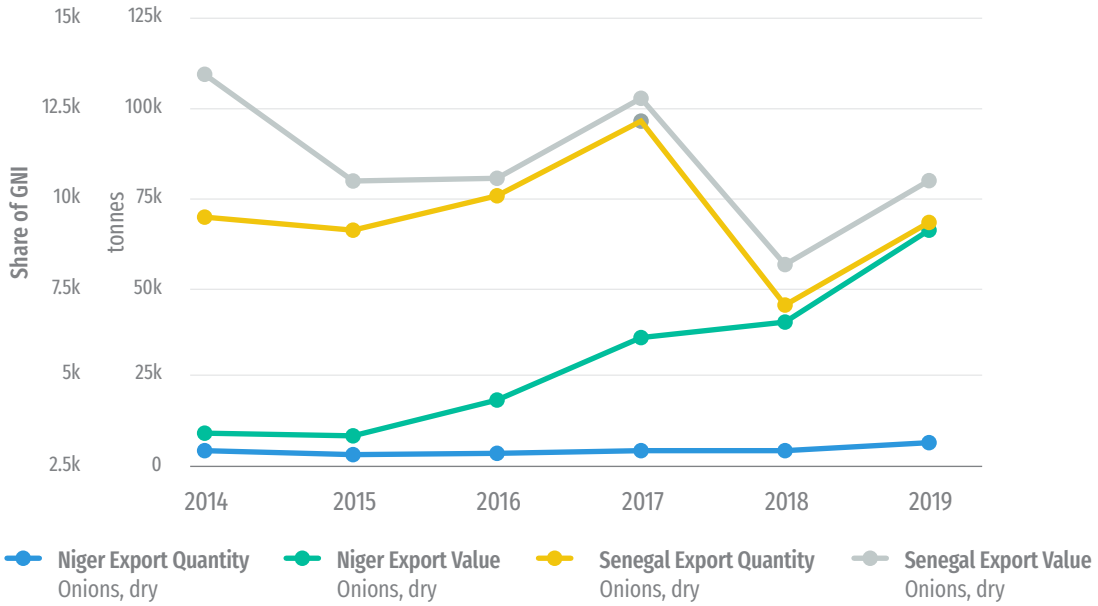
If adequately supported and overseen, Farmer Organizations can play a significant role in aggregating the produce of smallholder farmers. In addition to facilitating the aggregation of produce, they can also contribute to enhancing its quality and, more importantly, increasing the bargaining power of their members, while facilitating access to business services and inputs. As the experience in Niger and other countries shows, activities to strengthen and professionalize the operation of FOs need to take a long-term perspective, as they have to address several shortcomings, including: poor or weak business and management skills, lack of transparency, insufficient participation of members in the decisions of their organization, and poor access to financial services, markets and market information. Measures to strengthen such organizations should include, on the one hand, direct support and capacity building, and on the other, the establishment of suitable control and oversight mechanisms that foster transparent operations. The impact of projects that have not been given sufficient time and resources to address these issues is significantly diminished, resulting in producer unions that are not able to take over the management of their organizations upon project completion.

Government oil revenue, Percent of GDP

An additional significant area for improvement is the weak market performance of Niger's agriculture, which has led to a significant decline in the value of exports of live cattle and onions from 2013 onwards. The situation of the onion value chain, which has been losing ground to competitors such as Senegal, illustrates the issues that must be addressed to enhance the competitiveness and profitability of agricultural production in Niger. According to the aforementioned World Bank report on the diversification of exports, "... processors are continuing to use the traditional large jute bags which contribute to crop loss during transport and lower value. Exporters prefer using the larger bags to lower export tariffs which are calculated based on the number of bags and not on weight." In addition, the competitiveness of this product is reduced due to: "low quality and availability of inputs and

52 See Appendix for more details.

Figure 41. Dry onion exports quantity and value, Niger and Senegal



Source:

equipment; lack of access to certified seeds; the limited financial capacity of producers; lack of certification and traceability; inadequate storage infrastructure; low value processing; lack of bargaining power of producers vis-à-vis traders; oversupply during onion main season; competition from regional and European markets; and lack of innovation and private sector investment." As a consequence, Niger is not taking advantage of existing market opportunities for onions. In contrast, Senegal has been able to significantly grow the value of its dry onion exports by improving the quality of its production, storage and transport systems, allowing it to target European markets,[53] while Niger has continued serving its traditional markets in West Africa with only slightly improved processes.[54] In 2019, the exports of dry onions generated a total income of about US$ 9.26 million for Senegal, which is similar to the exports from Niger (US$ 9.18 million).[55] The main difference is that Niger exported that year a total of 79,500 tons, while Senegal only exported 6,300 tons, reflecting the significantly higher price that Senegal could achieve due to the high quality of its produce. As Figure 41 shows, the total value of exports from Senegal has increased continuously in recent years, while the value of onion exports from Niger has stagnated at a low level.

The introduction of new digital technologies entails new risks that should be addressed. One of them is the risk of exclusion of large segments of the population along a "digital divide", which can accentuate the exclusion of people who already have limited access to many goods and services. While some of these constraints are being addressed by the Smart Villages project that is being implemented with support from the World Bank, it will be

53 See: https://www.selinawamucii.com/insights/market/senegal/onions/
54 See: https://www.selinawamucii.com/insights/market/niger/onions/
55 See FAOSTAT agricultural trade data, available at: http://www.fao.org/faostat/en/#data/TCL

important to also monitor their effects on the labor market, as "digital technologies increase the demand for skilled labor while decreasing it for unskilled labor, meaning that they can exacerbate and perpetuate labor market inequalities and further widen the gender gap in rural areas. Women and girls face barriers to digital inclusion that reflect their inequalities in access to education, careers, and other opportunities."[56] Lastly, it should be noted that digital platforms may require regulations to deal with the observed tendency to concentrate their market power given high fixed costs, strong network effects, and low marginal costs to their expansion.[57] Such regulations should, among other things, enforce privacy controls, provide data usage protocols, and define inter-operability standards.

3. BOOSTING FINANCIAL INCLUSION TO SUPPORT THIS STRATEGIC SHIFT

3.1. Digital finance: Drivers and perspectives

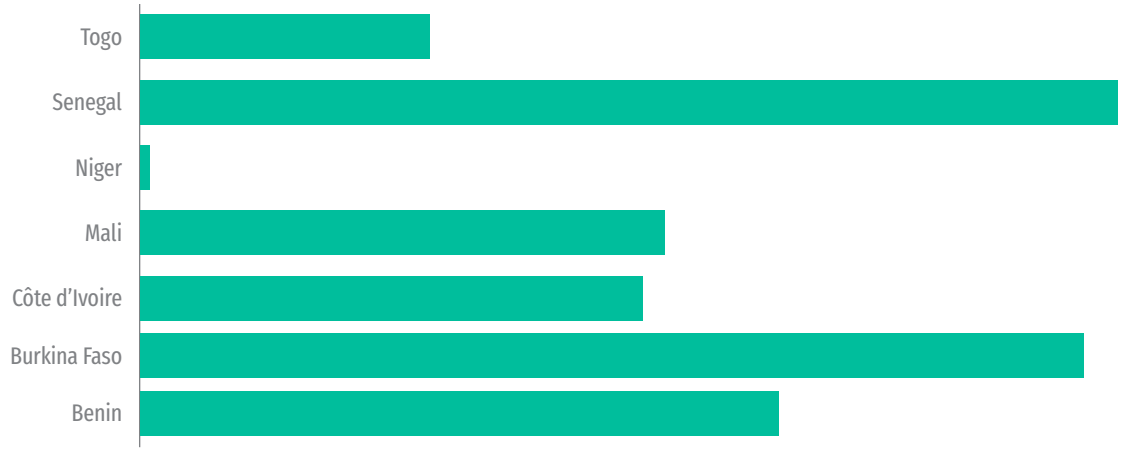
In Niger, recurrent floods and droughts, as well as the COVID-19 crisis, have underscored the importance of efficient digital financial systems to deliver rapid, reliable, and transparent financial aid to vulnerable populations and MSMEs. While most countries in the world were able to rapidly deliver monetary support to their populations and MSMEs during the COVID crisis, Niger was unable to do so because of the precarity of its financial system, the underdevelopment of digital finance, and the low level of financial inclusion. Millions of dollars of financial aid poured out to individuals were distributed in cash despite the risk that this could create a leaky pipeline for expenditure and tax revenue and can enable corruption. It was a missed opportunity to boost financial inclusion which could have opened doors for the poorest households and farmers, allowing them to be more resilient, smooth out consumption, and invest in productive activities. It would also have enabled formal businesses – but also informal ones through credit – to increase investment in activities with high value added, thereby increasing economic growth.

The undermining of the link between a well-developed financial sector and increased financial inclusion by Nigerien policymakers over the past 20 years has contributed to keeping segments of the country's population financially excluded. Niger's banking system, although robust, is the least efficient in the region. This is due to its outreach being limited to high income populations, its high reliance on deposits coming from donors and parastatal companies, and its risk aversion. With a high proportion of domestic savings not going into the Nigerien formal financial system, it will take time for macroeconomic efficiency gains from financial intermediation to be realized. Niger has the lowest level of deposits in the region despite having the highest level of deposit interest rate (5.7 percent). Lending is concentrated; there is a lot of competition to lend to three main groups – the parastatal companies given the perceived state guarantee, to politically linked or well-connected businesses, and to formal employees. During the last decade, the percentage of the adult population that was able to access a loan from banks oscillated between 2 to 4.5 percent.

56 Schroeder, Kateryna; Lampietti, Julian; Elabed, Ghada. 2021. What's Cooking : Digital Transformation of the Agrifood System. Agriculture and Food Series;. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/35216 .

57 See: George J. Stigler Center for the Study of the Economy and the State, University of Chicago, 2019, Draft Report of the Committee for the Study of Digital Platforms, Market Structure and Antitrust Subcommittee, available at: https://research.chicagobooth.edu/-/media/research/stigler/pdfs/market-structure---report-as-of-15-may-2019.pdf?la=en&hash=B2F11FB118904F2AD701B78FA24F08CFF1C0F58F

Figure 42. Number of P2P payments in WAEMU compared to peer countries



Source: BCEAO, 2020

The fact that financial service providers lack presence in rural areas and do not rely on digital finance to expand rural finance, further exacerbates financial exclusion. In 2018, banks had a total of 169 branches and 183 ATM / POS devices. This translates into about 1.6 bank branches and 1.8 ATM/POS devices per 100,000 adult inhabitants respectively, a level of coverage well below that of Niger's peer countries. Since 56 percent of Niger's bank branches and 65 percent of the ATMs are in Niamey, which hosts less than 10% percent of the country's population, these ratios decrease outside the country's capital to about 0.41 bank branches and 0.36 ATMs per 100,000 inhabitants respectively, and down to a negligible presence in rural areas.[58] In addition to banks, MFIs were operating 125 branches. In contrast, mobile network operators (MNOs) and money transfer companies (MTCs) have large networks with about 830 and 9,300 service points respectively. While MNOs and MTCs have a stronger presence than the other providers, their service offering is very limited.

The penetration of mobile finance has improved but usage rates have been disappointing even during the COVID-19 pandemic. While countries worldwide have registered unprecedented growth of mobile money, the number of mobile money users has stalled in Niger between 2017 and 2019 at 9 percent, after increasing from 3.5 to 9 percent between 2014 and 2017. Data collected from the telecom regulator in 2020 indicate a rise of mobile money account holders from 2.7 to 3. 4 million, but the usage was extremely low. Only 4 percent of the accounts were active compared to the average of 33 percent of active accounts in the WAEMU region. Competition is considered decent between the three mobile money operators[59] and one bank, but the offering is undiversified and inadequate. It only includes first generation services such as person-to-person (P2P) payments, bulk payments, bill payments and mobile wallets. The number of P2P payment transactions – which are the most basic services – was extremely low, reflecting the lack of adoption of mobile money in the country (see Figure 42). It amounted to 356,000 in 2019, compared to 29

58 See Fadika and Varcando Consulting. 2020. "Financial Inclusion Fund in Niger Feasibility Study" EFI Insight-Finance. Washington, DC: World Bank

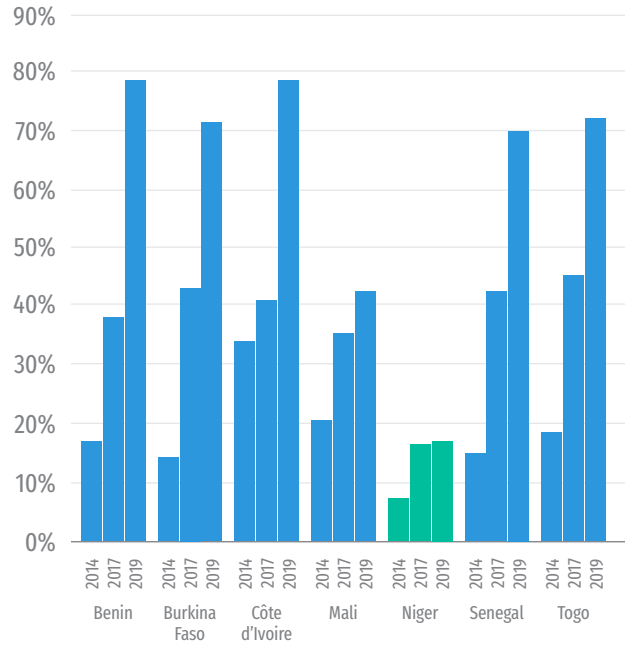
59 All the telecom companies are working with banks to offer mobile money as the underlying funds are typically held by a bank in a dedicated stored value account or a linked current account.

million in Mali and an average of 30 million in the WAEMU region. High competition of cash transfer solutions, lack of liquidity of mobile money agents, lack of digital literacy, and lack of awareness are the main reasons for this low level of P2P payments. Second level services such as savings, loans, and insurance via mobile are not available.

Experiences of countries with structural similarity to Niger have confirmed that mobile technology could drive financial inclusion even in fragile environments. Indeed, mobile finance has changed the landscape of the financial markets in six out of eight countries in the WAEMU region by doubling or even tripling in some countries, the percentage of adults with transaction accounts. In Mali and Burkina Faso, the percentage of adult population with formal accounts grew by 115 percent from 20 to 43 percent, and by 335 percent from 14 to 71 percent, respectively. More than two-thirds of the growth in each case is attributed to mobile money. The value of mobile money transactions to GDP was at 2.90 percent in Niger compared to 33.90 percent in Mali and 51.92 percent in Burkina Faso. In most WAEMU countries, mobile finance uptake was linked to the vast network of liquid access points, digitization of Government payments, alleged Know Your Customer (KYC) measures for opening of mobile money accounts, acceptance of mobile money payments by merchants, micro-credit, and savings via mobile.

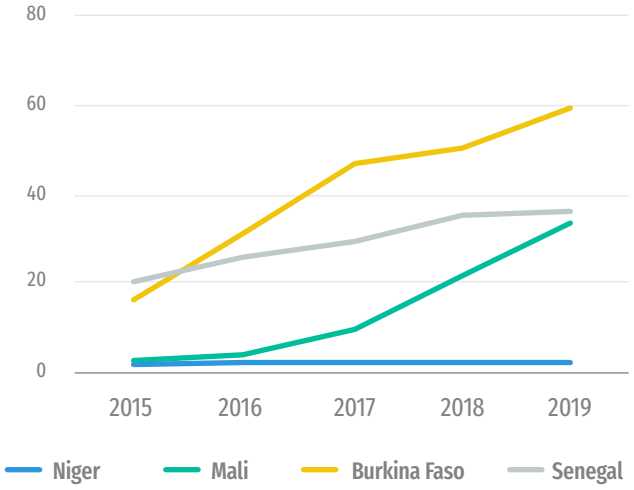
The future seems promising if the Government decides to effectively digitize all its payments, and ensure that the Smart Villages and other digital initiatives are properly implemented. Policymakers in Niger have shown a growing

Figure 43. Growth of percentage of adult population with a formal transaction account (bank microfinance and mobile money)



Source: WBG Findex and BCEAO

Figure 44. Value of mobile money transactions/ GDP
Value of mobile money transactions/GDP



Source: IMF Financial Access Survey

interest in the last four years for financial inclusion in general. However, it is only recently that this interest is being converted to concrete actions such as the adoption of the revision of national financial inclusion strategy with a better focus on digital finance, and the launch of the Smart villages project for digital inclusion. Structural challenges, including limited financial literacy and awareness, low connectivity in rural areas, limited presence of active mobile money agents, limited numbers of use cases, and the lack of a more conducive environment for mobile payments are expected to be addressed in the next five years through this project. This will require concerted efforts between the Government and the private sector including MNOs, banks, and others. A stronger commitment from the Government to digitize its payments will be crucial. As of now, it is unclear if it is due to the change of regimes or limited political will, that the reforms prepared in the past two years on the digitalization of Government payments via mobile have stalled.

It will be crucial to create much more momentum around digital finance by also involving traditional and religious authorities along with the public and private sector, given the benefits for the Nigerien population and economy's growth, which include:

a. **Safety, empowerment, and financial independence for individuals.** With insecurity in many regions in Niger, mobile money provides an opportunity for farmers and herders to store money in more efficient and secure ways and to facilitate their access to opportunities. Studies of the Kenyan market show that mobile money use led households to save more. Households with mobile money accounts were 16–22 percent more likely to save and their average household savings increased by 15–21 percent, the equivalent of US$2.7 to US$3.7 per month.[60,61] The researchers posit that mobile money could give women in male-headed households, who are also usually secondary income earners, more financial independence.

b. **Hindering informality and improving transparency.** Mobile payments can help reduce cash payments which not only contribute to reinforcing informal economies that hinder competition, but also deprive governments of tax revenue and deter business investments. While no data were available to confirm this in Niger, experiences of other countries show that mobile money could help the GoN save millions annually through reduction of leakage in public expenditure and tax revenue.

c. **Increased mobilization of deposits for better financial intermediation.** Mobile finance could facilitate the collection of deposits. For that, banks should either partner with MNOs or launch their own digital transformation programs.

d. **Opening doors for better financing for MSMEs, including informal ones.** The data trail these technologies leave could enable lenders to assess the creditworthiness of borrowers, and help businesses better manage their finance. Mobile finance records all transactions electronically, which improves the security of payments as well as their transparency, the consequences of which could be far-reaching on the economy.

e. **Boosting economic growth.** McKinsey's proprietary general equilibrium macroeconomic model shows that digital finance could raise the level of GDP of emerging economies by about 6 percent. Two-thirds of this GDP

60 Parekh, Nidhi & Aimee Hare (2020, October 22) "The rise of mobile money in Sub-Saharan Africa: Has this digital technology lived up to its promise?" Innovations for Poverty Action (IPA). https://www.povertyactionlab.org/es/node/2955386

61 Bill & Melinda Gates Foundation (2021, April). "The Impact of Mobile Money on Poverty". https://docs.gatesfoundation.org/Documents/ImpactofMobileMoneyonPoverty_ResearchBrief.pdf

growth would likely come from improved productivity enabled by digital payments. About a-third would be from the additional investment that broader financial inclusion of people and micro, small, and medium-sized businesses would bring. The small remainder would come from time savings by individuals enabling better intermediation.[5][62]

3.2. Lessons from peer and aspirational countries

The COVID-19 crisis has highlighted the need for many countries to adapt their regulatory and policy frameworks regarding the provision of digital payments and financial services by nonbanks, especially on KYC and AML/CFT issues, questions related to taxation or data privacy, as well as requirements on interoperability in the realm of digital financial services.

a. **Ghana:** Ghana has removed fees for low-value remittances, relaxed transaction and wallet size limits for mobile money, made KYC transferable from SIM registrations to allow for remote mobile money account openings, and zero-rated all interoperable transactions made through the interbank switch

Digital or national IDs have been leveraged to facilitate financial inclusion even more during the COVID-19 pandemic:

b. **Pakistan's biometric-based digital ID system.** Pakistan's biometric-based national digital ID system developed and managed by the National Database and Registration Authority (NADRA) has been used for more than 10 years to support account opening by poor people. According to NADRA, Pakistan's Computerized National Identity Card (CNIC)—a smart card that stores demographic and biometric data of a citizen and has a unique 13-digit ID number—covers nearly 100 percent of the adult population. NADRA data are used for ID verification of individuals relating to both bank account opening and mandatory mobile SIM card registration. Where a user holds a SIM card that is already verified, an financial service provider may remotely open a basic account for that person (SBP 2016).[63]

c. **Togo, through its Novissi platform, was able to deliver contactless, emergency cash transfers based on national identification (election cards), machine learning techniques and mobile money.** The system allowed for the financial inclusion of about 500,000 people after the first six months of operation.

Payments applications based on mobile interfaces and quick responses (QR) codes have paved the way for a whole spectrum of financial services ranging from not only digital payments, but also small loans for merchants based on traceability of digital payments they received, and small loans for health expenses.

d. **Ghana launched a digital financial policy requesting all merchants in the country to accept payments through QR codes and reduce transaction fees.** The GSMA Connected Women program found that this payment service catalyzed digital payments especially among women's businesses. It empowered women microentrepreneurs in markets through the digitization of their transactions, and deepened their financial inclusion. It is also driving greater mobile money use and engagement among female customers.[64]

e. **In India, the Central Bank permitted the use of alternative credit data to make credit decisions, and structure financial products that can unlock financing for health expenses.** Arogya Finance offers unsecured medical loans targeted at low-income borrowers in the

62 McKinsey Global Institute (2016, September). "Digital finance for all: Powering inclusive growth in emerging economies."
63 World Bank, COVID Briefing rapid account opening
64 GSMA (2020). "MTN MoMo Pay Merchant Payments: Expanding Female Mobile Money Usage in Ghana." https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/MTN-MoMo-Pay-Merchant-Payments-Expanding-Female-Mobile-Money-Usage-in-Ghana.pdf

informal sector, using alternative credit data to make assessments. Customers can take out loans ranging from $300 to $7,000 for a variety of medical needs, for tenures up to four years, at lower interest rates than are often available with other types of loans.

3.3. Building a financial system that could support Niger's digital and strategic shift into commercial farming to become a future 'garden'

Overall, the business case for lending to agriculture in Niger is weak as substantial demand side challenges generate high costs while several factors constrain lending income. The main issues are:

- The poor market performance of the main agricultural value chains
- The limited capacity of firms and FOs engaged in agricultural value chains to provide relevant and reliable financial and performance information
- The high costs for the acquisition and servicing of individual customers in rural areas, many of whom do not have an official identification, and about whom there are only scant records of any sort
- The legal uncertainties that limit the capacity of firms and individuals to provide land and real estate as collateral, and that affect especially women farmers and entrepreneurs
- The limited use of potentially cost-saving digital technologies by banks and MFIs
- The prevailing interest rate caps that limit the capacity of banks and MFIs to cover the high administrative and risk costs of lending to some borrowers engaged in agriculture
- The under-development of the financial infrastructure (paper-based collateral registries, etc.), which make use of movable assets as collateral difficult
- The constraints resulting from insecurity and conflict in parts of the country

The supply of financing through larger value chain firms such as input providers and processors of agricultural goods is also very limited; the scarce financing available is provided mostly informally by large traders or by some of the agricultural cooperatives.[65] In contrast to other countries, in which the financing of agriculture through larger value chain firms is important, in Niger this type of financing is limited by the informal nature of most value chains, and by the small number of larger enterprises that could channel and manage such financing to their suppliers or buyers.

The Government of Niger and its international partners have already undertaken important steps that will strengthen the supply and demand of financial services for agriculture, yet more remains to be done. It is important to note that the implementation of reforms and programs to facilitate a sustainable supply of financing for commercial agricultural investments needs to take a long-term perspective, and include specific efforts to increase the available information about agriculture and rural areas. Many of the suggested reforms will require time to design and implement. At the same time, their implementation will also require that important efforts are undertaken to enhance the availability of data, for instance, about different agricultural value chains and the flow of funds. This will facilitate the formulation of public policies and private market strategies as well as provide a way to monitor the progress of the reforms themselves.

65 See Fadika et al. (2020). "Note de politique sur le développement du crédit agricole au Niger" EFI Insight-Finance. Washington, DC: World Bank.

Critical measures to be put in place by the GoN	Timeline for implementation	Fiscal implications
Remove the obstacles for the growth of the country's private sector		
Strengthen investment climate reforms	Medium term	Medium
Reinforce the governance of SOEs and the control of corruption	Medium term	Medium
Strengthen the public private dialogue mechanisms	Short term	Low
Level the playing field to attract and retain FDI by ensuring rule-based decision making and transparency in business regulation	Medium term	Medium
Support entrepreneurs and women in the digital and commercial agriculture sectors	Medium term	Medium
Improve linkages between FDI and local entrepreneurs	Medium term	Medium
Leverage technology to commercial agriculture and enter global value chain, and focus other policies as well.		
Invest in solar energy systems, irrigation, logistics, technologies such as precision agriculture and drip irrigation, digital agri-platforms and blockchain	Medium term	High
Focus the strategy for commercial agriculture on target markets and products where Niger will have sustainable competitive advantages taken into account climate changes and intra-regional collaboration/ rivalry	Medium term	High
Create better conditions to encourage the opening of new firms by international businesses and local groups (including farmer organizations and entrepreneurs) in agriculture value chains	Medium term	Medium
Foster the adoption of digital finance		
Implement reforms around the digitalization of government payments to improve transparency and traceability, and raise awareness on digital finance	Short term	Medium
Foster the legislation and regulation for digital finance to allow partnerships between mobile money operators and traditional financial institutions to launch second generation digital services	Short term	Medium

Critical measures to be put in place by the GoN	Timeline for implementation	Fiscal implications
Learn from peer countries to revise policies around digital finance to increase its adoption	Short term	Low
Ensure effective implementation of the Smart Villages Initiative to improve coverage, digital skills, and adoption of digital services	Short term	Medium
Improve the framework for consumer protection and digital literacy to make use of technology simple and trouble free for the population	Short term	Medium
Promote women and vulnerable groups' access to digital services through revision of taxes on handsets and digital services, and through creation of learning centers	Medium term	Medium
Foster the supply of finance to shift to commercial agriculture and enter global value chains		
Reinforce policies around the digitalization of the financial sector through shared digital platforms	Short term	Low
Strengthen the design and governance of the Financial Inclusion Fund so that it can attract further private financing in time	Short term	High
Streamline the policies around subsidies to smallholders	Short term	Medium
Promote the use of blended finance to crowd in private sources of finance	Medium term	Medium

Notes: short-term (1 year); medium-term (2-3 years); long term is +3 years; fiscal implications are estimated as low: affordable within current spending structure; medium: requires budget reallocation; high: need further reform, funding sources and domestic revenue mobilization.

4. CONCLUSIONS

The obstacles to the growth of the country's private sector must be removed. These efforts should focus on strengthening investment climate reforms, reinforcing the governance of SOEs, and controlling corruption and improving the private sector's access to credit. This is critical as greater transparency in business regulations and rule-based decision-making will expand the country's capacity to attract and retain FDI. Further, the Government should improve linkages between FDI and local entrepreneurs, for instance, by strengthening private-public dialogue mechanisms. Lastly, concerted efforts to support entrepreneurs and women in the digital and commercial agriculture sectors, for instance by expanding digital connectivity, providing resources to improve their financial and digital literacy, and increasing their access to digital finance, should be prioritized.

Leverage technology to commercial agriculture and enter global value chain, and focus on other policies as well. Niger should focus its strategy for commercial agriculture on target markets and products where it will have sustainable competitive advantages, taking into account the impact of climate change and potential intra-regional collaboration / rivalry. To increase the efficiency of agricultural production and agricultural markets, the Government should invest in digital agri-platforms, precision agriculture and drip irrigation, solar energy systems, and new technologies such as Blockchain to ensure transparency along the entire value chain. The Government should also create better investment conditions to encourage the opening of new firms by international businesses and local groups (including farmer organizations and entrepreneurs) in agriculture value chains.

Better gains could be made to advance private sector and commercial agriculture by leveraging digital finance to increase access to finance. This will require concerted efforts of all players including the Government which could set the tone for digital finance by digitalizing its own payments. To ensure that the use of digital technology is safe, simple and trouble-free for the public, the Government should improve the regulatory framework for digital finance and the related consumer protection framework. Efforts should be maintained to ensure effective implementation of all digital economies related initiatives.

Foster the supply of finance to shift to commercial agriculture and enter global value chains will be key. This can be done through reinforcing policies around the digitalization of the financial sector through shared digital platforms; strengthening the design and governance of the Financial Inclusion Fund so that, with time, it can attract further private financing; streamlining the policies around subsidies to smallholders, and promoting the use of blended finance to crowd in private sources of finance.

CHAPTER 4

The Extractive Sector in Niger: Impact on Jobs, Governance and Fragility

Chapter 4 discusses the importance of Niger's extractive sector on economic growth, job creation, governance, and fragility. The extractives sector has historically played an important role in Niger's economy. With the expansion in petroleum production, it is likely to play an even bigger role in the near future. This is particularly welcome against the backdrop of declining uranium revenues due to mine closures and depressed global market prices. The chapter begins with a brief overview of the country's resource endowments of uranium, gold, and petroleum; and the risks associated with the extractive sector. Subsection 2 applies the World Bank's Long-Term Growth Model (LTGM) to assess (i) the impact of the expansion of the oil sector on economic growth and government revenues, and (ii) how it depends on different price scenarios and fiscal frameworks. This subsection finishes with a brief discussion of short-term spillover effects of oil prices, Dutch disease, and the pre-resource curse in the context of Niger. Analyzed the fiscal-macro consequences of the extractive boom, subsection 3 turns to the potential for local content policy to integrate the extractive sector with the wider agriculture-based economy. Finally, this chapter discusses the risks posed by the expansion of the extractive sector on Niger's institutions, governance, and fragility.

Overall, the chapter concludes that even in a scenario of high oil prices and an appropriate fiscal framework, the expansion in the oil sector would not alone support Niger's long-term economic growth and development. On the other hand, the economic literature suggests that the oil boom can have substantial short-term spillovers to the local economy but also represents a risk to the macroeconomic stability in Niger. In terms of job creation, the chapter concludes that the expansion of the oil industry would be good opportunity for local content policy. A good target for Niger would be a local content policy that promotes foreign capital and new technologies but also targets increasing Nigerien employment. Finally, the chapter concludes that strengthening governance systems is critical for Niger to translate its extractive resource into drivers for growth and inclusive broad-based development, rather than fragility.

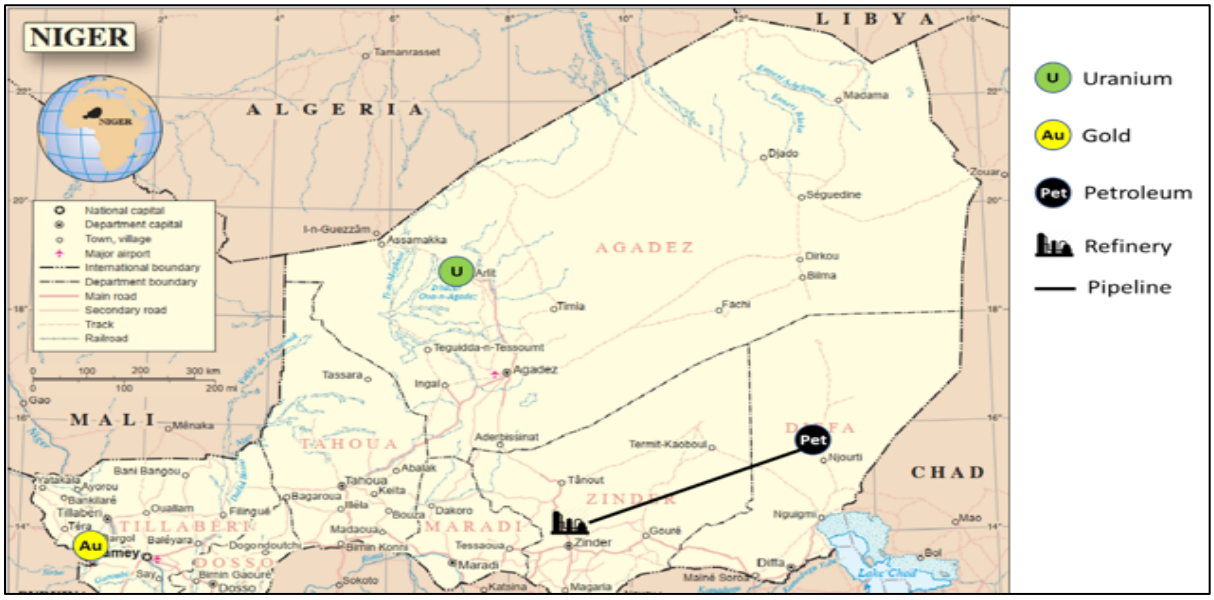
1. OVERVIEW OF NIGER'S RESOURCE ENDOWMENT

The economy of Niger is heavily dependent on agriculture which accounts for 28.5 percent of GDP as of 2018 and is the main source of income for over 80 percent of the population. The extractives industry is another important sector but its contribution to GDP has been relatively low, estimated at 4.4 percent as of 2018. The main minerals produced include uranium, of which Niger is the world's 7th largest producer as of 2020, oil and gold (OECD/NEA & IAEA, 2020). 70 percent of extractives revenue come from oil whereas uranium accounts for 28.5 percent. Most of Niger's gold – about 10 tonnes – is produced through artisanal and small-scale mining (ASM), with the country's only industrial gold mine at Samira Hill producing 1.3 tonnes a year (EITI, 2021). Additionally, there is artisanal and small-scale mining (ASM) production of lower-value commodities like gypsum (in Tahoua), salt (in Dosso and Agadez), and natron (in Diffa, Dosso and Zinder) (World Bank, 2020). The ASM sector has profound economic and social implications as it employs about 450,000 people, with 20 percent of the population depending on it as a single or supplementary source of income (UNECA, n.d).

1.1. Uranium

Niger has historically been a significant uranium supplier at the international level. Uranium mining in Niger began in 1971, and has been largely dominated since then, by entities under the control of the state of France (principally, Orano, formerly known as Areva). Uranium resources are located relatively close to the town of Arlit in the Agadez region. Of these resources, three major deposits are, or have been developed/operated by Orano. These are SOMAIR (producing), COMINAK (closed March 31, 2021), and Imouraren (potentially to open based on market conditions). An additional resource is SOMINA, which was operated by China National Nuclear Corporation (CNNC) but closed in 2015. The Nigerien state has held an equity position via state entities in each of these mines, typically in the region of 1/3 of the equity in question. Following the mining code of Niger, the state issues mining permits on condition of receiving 10 percent of the equity of a mining company as 'free shares' and is then entitled to purchase additional shares for consideration, either in cash or kind, up to a maximum of 40 percent of the equity of the company.

Figure 45. Location of industrial-scale extractive industry in Niger



Global demand for uranium has declined in recent years, negatively impacting Niger's production. In principle, Niger may be in a position to benefit should there be a resurgence of demand for nuclear power. However, it is not clear that the spot price of uranium provides good market signals for the startup of mines, considering that (a) uranium demand is very lumpy (that is, tied to new nuclear power station plant-ups), (b) the cost of fuel is a small fraction of the overall cost of nuclear power and, (c) there are various stockpiles of strategic and commercial uranium in the world. Hence, the major international nuclear power companies, like Orano, are a critical intermediary to the uranium supply chain. They appear to have been historically willing to pay quite a high price for Nigerien uranium, indeed well above production cost.

1.2. Gold

Niger has one commercial, industrial-scale gold mine at Samira Hill in the Tillaberi region, which has been in operation since 2004. It was formerly operated by Canadian concerns (80 percent), with a 20 percent equity stake by the Government of Niger. However, Samira Hill mine is at the end-of-life. In fact, it had been handed over to local Nigerien concerns, who were attempting to undertake new prospecting. It appears that these efforts have been unsuccessful. Other attempts at new prospecting are currently underway with new international junior miners. However, for practical purposes, these would be new deposits rather than existing Samira Hill reserves.

1.3. Petroleum

Petroleum production is around 13,500 barrels per day (bbl/d) and occurs in the Diffa region. It is thereafter transported by pipeline to a 20,000 bbl/d refinery at Zinder. Both production and refining are managed by the China National Petroleum Corporation (CNPC).

The limited production volumes arise from two characteristics of Nigerien petroleum. Firstly, the landlocked nature of Niger makes export challenging. This may be ameliorated by the planned Niger-Benin pipeline, which has an estimated 150,000 - 185,000 bbl/d capacity. Secondly, proven reserves in Niger are limited, with the US Energy Information Administration (EIA) estimating them at 150 million bbl, equivalent to 20 years production at current rates. It is possible that proven reserves may rise significantly if oil prices, and transportation options become more attractive. Indeed, there are some indications that CNPC may estimate the true oil reserves in Niger to be more than 1 billion bbl, contrary to the US EIA estimates. However, the actual quantum of proven reserves is not certain at this stage.

While oil was discovered in Niger in 1975, it was only in 2012 that production began on a commercial scale. Between those two periods, various International Oil Companies (IOCs) attempted to develop Nigerien petroleum but pulled out for different reasons. Among the reasons for these earlier IOCs pulling out was that they were unable, or unwilling, to comply with the Government of Niger's stipulation to build a refinery as part of the overall development of Nigerien petroleum. This was likely because it is extremely challenging for very small refineries to meet typical IOC investment hurdle rates, with, the capacity of a 'world scale' refinery today set at around 300,000 bbl/d. Thus, the Zinder refinery is much smaller than expected for a new build in the current environment, with attendant implications for operational efficiency. Nevertheless, the existence of the 20,000 bbl Zinder refinery can be taken as an example of where CNPC was willing to extend itself in the area of local content as specific to Niger.

1.4. The economic value of the extractive sector

The aggregate value of extractives production in Niger swings from year-to-year and is fairly variable given the concentration in a limited number of resources. Nevertheless, certain observations can be made, based on public estimates of annual production and reasonable estimates of commodity pricing. Nonetheless, these should be taken as 'order of magnitude' estimates in order to frame the discussion on local content.

Given a rough estimate of overall annual profits of the formal extractives sector in Niger at approximately US$ 90 million a year (sum of 16.6 M, 26 M and 48 M, see Table 4), we then have a starting point for considering the kinds of local content policies which could be applied. In principle, they must (a) meet the basic objectives of a local content policy and (b) be viable within the context of the revenues and hence 'reasonable' cost structure of the industry. This is because while a non-existent local ccontent policy may risk missing opportunities for capabilities development and economic diversification over time, an excessively tight one may risk either dissuading capital investment or negatively impacting the state's fiscal revenues.

We start from an assumption that the maximum reasonable cost of a 'local content policy', (beyond what industry might do in their own commercial interest) might be in the region of 1-10 percent of profits, depending on assessment of the long-term attractiveness of the investment. In principle, the interests of the government and private sector should be aligned on the point of project profitability, that is, both parties wish the extractive industry to be viable and commercially attractive in the long term.

An additional point of consideration is the potential for future growth. For instance, should oil production in Niger expand to 150,000 bbl/d (based on CNPC aspirations), this would imply petroleum industry revenues in the region of US$ 3 billion, with an attendant increase in the potential funds available for local content.

Particular consideration should be given on managing the relationship between the Government of Niger (GoN) and CNPC, with a view to enhancing local content. This is because of the three main extractive resources in Niger, petroleum is the one expected to grow in the medium term. Additionally, CNPC is the only IOC currently operating in Niger.

Table 8. Estimated value of extractives in Niger[66]

Resource	Uranium	Gold*	Petroleum^
Annual Production	1,700 tonnes	100,000 oz	5.3 M bbl
Price	US$ 66,000/tonne (US$ 30/lb)	US$ 1750 /oz	US$ 60/bbl
Annual Gross Revenue to industry	US$ 110 million	US$ 175 million	US$ 320 million
Annual Profit to Industry (~15%)	US$ 17 million	US$ 26 million	US$ 48 million

Source: Order-of-magnitude estimate based on public data

66 Note: Gold production appears to be in decline in Niger. Nevertheless, for the purposes of 'Local Content, an assumption has been made that, subject to new mines being developed, an industry with revenues of similar order of magnitude to historical ones may be possible.

2. THE IMPACT OF THE EXTRACTIVE SECTOR ON GROWTH (LTGM)

This section applies the World Bank's Long-Term Growth Model (LTGM) to assess how the expansion in the petroleum sector could affect Niger's economic growth and fiscal revenues, and how it depends on different price scenarios and fiscal frameworks. More specifically, this section uses the Natural Resource (NR) Extension of the LTGM, which allows for the disaggregation of the economy into oil and non-oil sectors, as well as the evaluation of the effects of oil prices on medium- to long-term growth under different fiscal rules. In the model, oil price shocks generate a fiscal oil revenue windfall, and a simple fiscal rule determines the share of the windfall to be invested in physical capital. Rules that invest a high share of the windfall lead to faster economic growth than rules that prioritize other types of spending.

This section also discusses other channels outside the framework of the LTGM-NR. It is important to note that, as an extended neoclassical growth model, the LTGM-NR does not account for all potential channels through which the resource sector could affect growth. Most importantly, the model lacks an aggregate demand side, which means there is no stimulatory effect of extra commodity-related spending on the local economy in the short run. For that reason, at the end of the section, it is provided a brief discussion of mechanisms connecting the extractive sector and growth that are not captured by the LTGM-NR, such as short-term spillover effects, Dutch disease, and the resource curse.

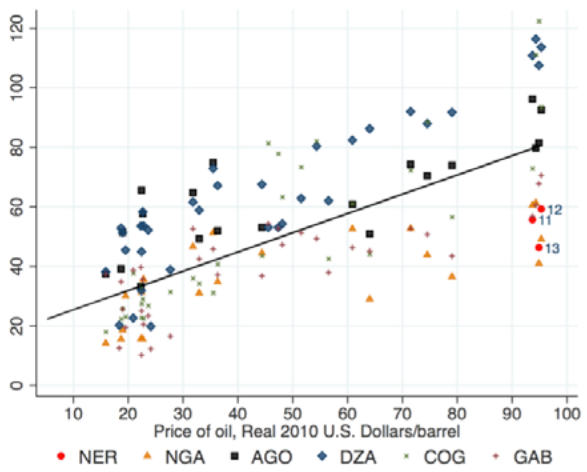
2.1. Baseline projection of oil production, income, and fiscal revenues

Niger will soon become a large oil exporter, but the oil windfall is not permanent. With the completion of the Niger-Benin pipeline, oil production is expected to rise from 15,000 to around 100,000 barrels per day by 2024. Assuming oil prices at US$60/barrel in 2010 constant prices[67], the production boom will lead the oil sector to account for 13 percent of Niger's GDP (up from 2 in 2020). However, in the absence of future discoveries, the baseline projects that depleting oil reserves will set oil production on a steady decline after 2030. By 2050, the oil sector is expected to contract back to 2 percent of GDP (see Figures 13-16 in Chapter 2).

Recent data suggests that the government captures about 40 percent of the income generated in Niger's oil sector. Fiscal oil revenues include all oil-related government revenues, such as royalties from exploration concessions, tax-receipts from private extractive enterprise (e.g., China National Petroleum Corporation, CNPC) and profits from state-owned companies. The 40 percent share is based on two observations. First, the IMF reports that Niger's fiscal oil revenues accounted for 40-60 percent of total oil income over 2011-2013. Second, typical production sharing agreements tend to increase the government share in times of high commodity prices, such as 2011-2013 (see Figure 46). The second observation generates a concern that the 2011-2013 data would overestimate the true government share in the long-term (when the oil prices would be US$70 or US$40). As a compromise, the LTGM-NR sets Niger's future share in oil income to 40 percent, which is the lower-end of the observed values in 2011-2013. Moreover, this share is consistent with the cross-country evidence that

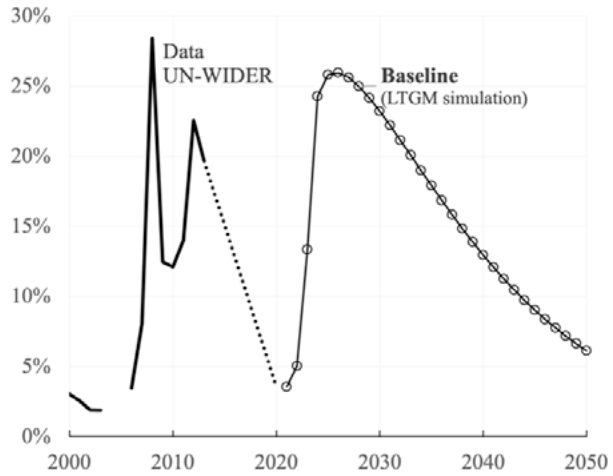
67 As the cumulate US CPI inflation from 2010 to 2020 was 18 percent, the corresponding value in current US dollars would be US$70. However, the World Bank's Pink Sheet deflates prices using the Manufactures Unit Value (MUV) Index. The MUV index was flat from 2010 to 2020 so the current price of oil would also be US$60.

Figure 46. Government resource revenues in large African oil exporters*, Percent of resource GDP



Data Source: Resource GDP from the IMF-WCE; resource revenue from UN-WIDER Government Revenue Dataset (GRD). Dropped outliers: NER 2008 and AGO 1993. UN-Comtrade data: Average oil exports over 2008-12 (percent of GDP): NER=1%, NGA=21%, AGO=59%, DZA=22%, COG=57%, GAB=46%.

Figure 47. Government oil revenues, Percent of total government revenues



Source: Resource revenue data from UN-WIDER GRD is only available for the years 2000-2003 and 2006-2013.

governments retain on average 65-85 percent of rents in the hydrocarbons sector (see IMF 2012).[68]

The oil boom is expected to generate substantial fiscal oil revenues for Niger. Nevertheless, Niger's dependence on oil revenues would remain moderate compared to other commodity-exporting countries. Oil revenues were slim before the boom, accounting for less than one percent of GDP or ten percent of total fiscal revenues. Under the baseline growth path, oil revenues are expected to climb to five percent of GDP or nearly one-fourth of total fiscal revenues (see Figure 47). Although Niger would be much more exposed to oil-price shocks, it would be only moderately dependent on oil revenues relative to other large commodity-exporting countries. For instance, regional peers like Nigeria, Angola, and Congo have oil revenues that account for over 70 percent of total revenues (See Appendix Figure 23).

2.2. The impact of oil prices on long-term economic growth in Niger

In the LTGM-NR, oil price shocks generate a fiscal oil revenue windfall, and a simple fiscal rule determines the share of the windfall to be invested in physical capital. The impact of oil prices on growth depends crucially on the fiscal framework. The impact of an increase in oil prices on income is evident, as it mechanically increases the dollar value of each barrel of oil exported. However, economic growth, as measured by GDP, is not *directly* affected by price

68 Oil rents are defined as the total revenue that can be generated from the extraction of oil reserves, less the cost of extraction (including the return to capital). The LTGM-NR assumes oil rents close to 50 percent, which is the median value for Sub-Saharan Africa (GTAP data). In this case, a 40 percent share in total oil income would correspond to about 80 percent of oil rents.

movements.[69] The literature discusses several channels through which commodity prices may affect economic growth.[70] The LTGM-NR focuses on a simple but important mechanism: higher oil prices generate windfall fiscal oil revenues that could finance public investment in physical capital, boosting GDP growth.[71] Fiscal rules are key as they determine the share of the windfall to be invested in physical capital (versus saved or consumed). An important caveat of the LTGM-NR is that, as a growth model, it analyzes only the long-term trends of the economy's production potential and abstracts from any potential short-term "Keynesian" effects of oil prices on growth.[72]

This section analyzes alternative price scenarios for Niger's potential economic growth over the next three decades. Assuming that the price of oil would remain constant at US$60/barrel until 2050, the LTGM-NR baseline projects that Niger's trend GDP per capita growth would stabilize around 0.5 percent in the medium term (2026-2029), trending upwards to 2 percent in the long term (2030-2050). This section assesses two alternative price scenarios—a permanent increase to US$70/barrel and a permanent drop to US$40/barrel—, and two simple fiscal rules. Subsection (2.2.1) describes in detail the fiscal rules considered. Next, it is analyzed how the oil boom (expected for 2023-2034) could impact Niger's fiscal revenues (subsection 2.2.2) and public investment (subsection 2.2.3). Finally, we present the model's projections for economic growth in Niger under two alternative price scenarios (subsection 2.2.3). Subsection 2.2.4 provides a robustness simulation with a higher government share in the oil sector.

The main finding is that oil price fluctuations are unlikely to have a large impact on Niger's long-term economic growth, even under a fiscal rule that invests all oil windfall. For instance, a permanent ten-dollar increase in oil prices would generate a modest fiscal windfall (less than one percent of GDP) and yield only an extra 0.1-0.4 percentage point of growth in the medium term. Furthermore, this extra growth would vanish in the long term as oil reserves deplete, the fiscal windfall dries up, and public investment returns to normal levels.

2.2.1. Simple fiscal rules for public investment

In the LTGM-NR, simple fiscal rules determine how public investment responds to fluctuations in oil prices. In the two simulations for oil prices (US$70/barrel or US$40/barrel), public investment is determined as the sum of baseline public investment plus a term that responds to windfall fiscal oil revenues (i.e., the deviation of fiscal oil revenues from baseline):

$$I_t^{scenario} = I_t^{baseline} + \pi \underbrace{(Oil\_Rev_t^{scenario} - Oil\_Rev_t^{baseline})}_{=Windfall\ Oil\ Revenue} \qquad \text{(Equation 1)}$$

Where π is the fraction of the windfall that is spent on public investment. Also, fiscal oil revenues are assumed to be a fixed share (μ) of the income generated in the oil sector, which, in turn, depends on the oil production

69 In an open economy with a large oil sector, it is important to distinguish the effects of oil prices on real GDP and real domestic income (GDI). GDI, as a measure of income, is directly affected by a change in commodity prices. Real GDP, as a measure of production, is only affected indirectly as the initial price shock propagates into further economic activity. See Kehoe and Ruhl (2008) for a comprehensive discussion on the methodological differences between GDP and GDI in an open economy and their relation with commodity prices.

70 The literature on natural resources and economic growth is still inconclusive and under the scrutiny of academic debate. Theoretically, a country's natural wealth can be reinvested in human and physical capital, new technologies, and infrastructure, boosting social and economic development. On the other hand, the Dutch disease literature argues that natural resources can appreciate the terms of trade, making other industries less competitive. The resource curse hypothesis suggests that natural resources lead to corruption, socially inefficient rent-seeking activities, and fiscal mismanagement, becoming a drag on long-term growth. Empirically, the international experience is mixed. Some countries have greatly benefited from their natural wealth. Others seem to be led to economic vulnerability (see Terry Lynn 1999 and Wood 1999, Cust and Mihalyi 2017, Richmond et al. 2013, and Medina and Soto 2007).

71 For example, Suescún (2007) argues that fiscal policy can boost long-term growth with public investment in infrastructure and spending targeting the accumulation of human capital.

72 Commodity prices can affect growth at the business cycle frequency through several "Keynesian" channels. These channels work through the demand side of the economy. They involve the impact of commodity prices on the country's interest rate (the policy rate or spread), exchange rate, government spending and so on (for a comprehensive discussion, see Fernández et al. 2007 and 2020).

(barrels per year, Q) and the oil price (US$ per barrel, P). That is: Oil_Rev= μPQ.

For each price scenario, two fiscal rules are considered: a *strong procyclical* rule that invests *all* windfall oil revenue (π=1), and a *moderate procyclical* rule that invests only half of the windfall (π=0.5). A procyclical fiscal rule is defined as one that increases spending when oil prices are high and cuts back when prices fall. Under the strong procyclical rule (π=1), each extra dollar of oil revenues generated by an increase in oil prices (relative to baseline) leads to an exact one-dollar increase in public investment. Note that the rule is symmetric, so investment falls by the same amount when oil revenues fall relative to baseline (a negative windfall). The moderate procyclical rule sets (π=0.5). In this case, a one-dollar increase (fall) in oil revenues leads to a 50 cents increase (fall) in public investment.

The moderate procyclical rule would resemble the adoption of a balanced budget rule (BBR) in Niger. BBRs are popular fiscal rules in the developing world. They usually impose limits on the primary fiscal balance, possibly excluding some expenditure or revenues items. Although BBRs are very effective in fostering debt sustainability, they usually lead to a procyclical fiscal stance. Under a BBR, each extra dollar of windfall oil revenue would be spent, with a share of that extra spending falling on public investment. In this case, if it is set to match the share of public investment in total government expenditure, the simple fiscal rule (Equation 1) and a BBR would generate the same path for public investment. The moderate procyclical rule sets π=0.5 which is Niger's average share of public investment in total government expenditure over 1995-2017 (IMF WEO). In this case, in terms of public investment, the moderate procyclical rule could be viewed as an approximation of a BBR.

The strong procyclical rule resembles a Hartwick rule. To discipline the management of resource windfall, some countries adopted fiscal rules based on the "Hartwick" principle that all resource revenue must be invested in financial, human or capital assets. A celebrated application of the Hartwick principle was Botswana, one of the very few African countries that managed its natural resources appropriately and avoided adverse consequences of resource abundance (the so-called "resource curse", see Arezki et al. 2011). The strong procyclical rule could be viewed as a simplification of the Hartwick principle in which all oil windfall is invested in physical capital (π=1).[73]

The LTGM-NR focuses on public investment and abstracts from other aspects of natural resource management. The LTGM-NR focuses on the effects of public investment on long-term growth. In the model, only the invested share π of the windfall affects growth, and the model fully abstracts from the allocation of the remaining 1-π share, or its potential effects on growth. The LTGM-NR also abstracts from the well-known adverse consequences of procyclical fiscal policy on macroeconomic stability (see Gavin and Perotti 1997; and Frankel et al. 2013).

2.2.2. The impact of oil prices on fiscal oil revenues

High oil prices would generate extra fiscal revenues of about one percent of GDP by 2030, but that windfall is not permanent. Under the optimistic scenario, the oil price would increase from US$60/barrel to US$70 by 2030 (see Figure 48). This increase would boost oil income by 17 percent (10/60), equivalent to just above 2 percent of GDP (as the oil sector accounts for about 13 percent of GDP). Since the government captures 40 percent of oil income, the price shock would generate extra fiscal revenues of almost one percent of GDP vis-à-vis baseline by 2030. However, this windfall would narrow over time as oil reserves and oil output decline. By 2050, windfall fiscal oil revenues fall below 0.25 percent of GPD (see Figure 49).

73 A caveat is that Hartwick rules are not necessarily procyclical as resource revenues could be saved in financial assets during periods of high commodity prices.

Figure 48. Oil price, Real 2010 U.S. Dollars per barrel

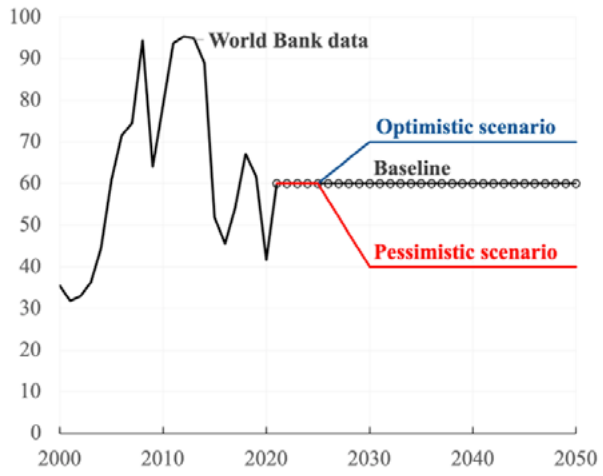
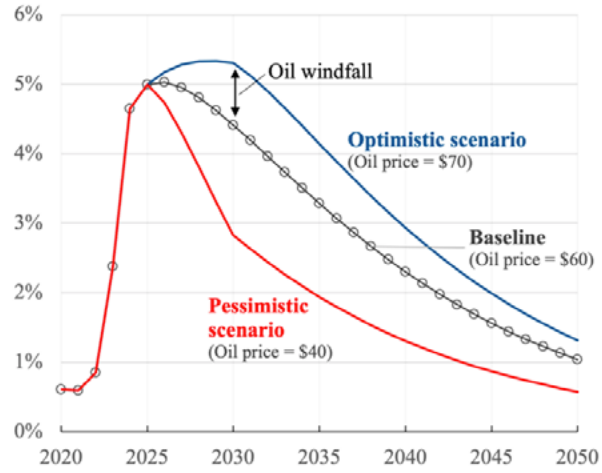


Figure 49. Government oil revenue, Percent of GDP



On the other hand, low oil prices would imply a loss of fiscal revenues of about 1.5 percent of GDP by 2030. Under the pessimistic scenario, the price of oil would fall from US$60/barrel to US$40 by 2030. This shock would depress oil income by 33 percent (-20/60), which amounts to an overall income loss of about 4 percent of GDP. Relative to baseline, fiscal oil revenues would shrink by about 1.6 percent of GDP by 2030. As in the other scenarios, fiscal oil revenues fall over time, hitting less than one percent of GDP by 2050.

2.2.3. The impact of oil prices on public investment and long-term GDP growth

Under the optimistic price scenario, public investment would increase somewhat, but the impact on medium-term growth would be small. Under the strong procyclical fiscal rule, the government invests all windfall oil revenues generated by higher prices. In this case, public investment would increase by almost one percent of GDP vis-à-vis baseline by 2030 (see Figure 50). The extra investment would accelerate capital accumulation, but the quantitative impact on growth would be limited. Incremental growth—i.e., growth above the baseline growth path—would reach its highest point in 2030 at 0.2 percentage points. Under the moderate procyclical fiscal rule, public investment would increase less than half a percent of GDP, and incremental growth would remain below 0.15 percentage points (see Figure 51).

The impact of high oil prices would vanish in the long term. Under either rule, incremental growth would peak around 2030 and then fall slowly, hitting zero by 2045. Three factors explain the slump. First, incremental public investment plummets as oil reserves deplete and the oil sector generates fewer fiscal revenues. Second, the effectiveness of investment falls sharply in the late years—driven by declining marginal product of capital and increasing losses due to capital depreciation. Third, higher oil prices would attract more investments to the oil sector. This would accelerate the depletion of oil reserves and slowdown aggregate productivity (as the oil sector experiences low productivity gains relative to non-oil). To summarize, average incremental growth over 2026-2050 would reach 0.1 percentage points under the strong fiscal rule but remain close to zero under the moderate fiscal rule (see Appendix Table 5).

Figure 50. Incremental public investment, Percent of GDP, (Incremental = scenario - baseline)

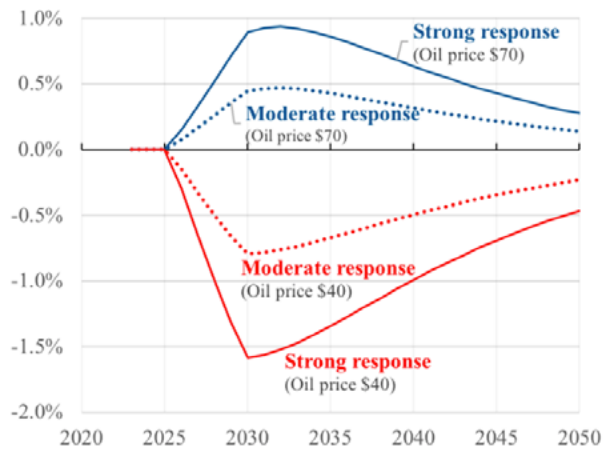
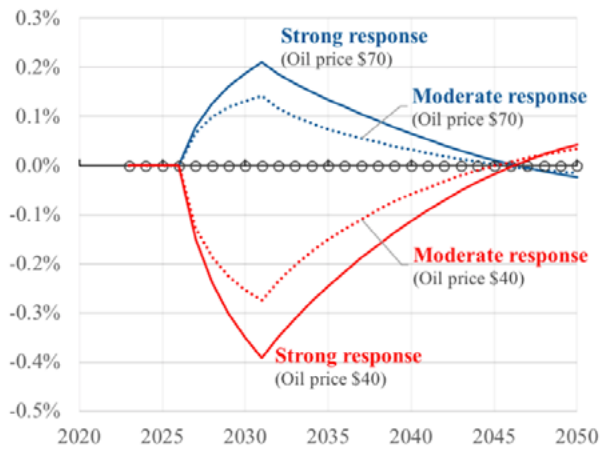


Figure 51. Incremental GDP growth, Percentage points (Incremental = scenario – baseline)



Under the pessimistic price scenario, public investment and medium-term growth would fall moderately, but they would gradually recover over the long term. Under the strong procyclical rule, the government would cut public investment to cover the fall in oil revenues. In this case, public investment would drop by 1.5 percent of GDP by 2030. Consequently, growth would slow down by 0.4 percentage points vis-à-vis the baseline growth path. The moderate procyclical rule would have a weaker effect, with public investment dropping less than one percent of GDP and growth slowing down by around 0.25 percentage points by 2030. For either rule, growth would gradually recover, catching up with the baseline by 2045. Incremental growth would average -0.1 and -0.2 percentage points over 2026-2050 under the moderate and strong procyclical fiscal rules, respectively. The implication is that the gains from improved infrastructure investments are not very sensitive to the level of oil prices.[74]

i. The impact of oil prices on domestic income

In the medium-term, oil prices have a substantial impact on gross domestic income (GDI). The fact that oil price shocks have a small impact on GDP growth does not necessarily mean they are irrelevant for welfare. Naturally, the terms of trade do affect real income and consumption in Niger. More specifically, the impact of oil prices on income can be decomposed into the effect on production—*the GDP effect*—plus the *terms-of-trade effect* on the consumer's purchasing power. The size of the terms-of-trade effect is simply the percentage change in oil prices scaled by the share of oil in total income. Under the optimistic scenario, the cumulative terms-of-trade effect is substantial, reaching nearly 2.5 percent over 2026-2030. On the other hand, the depreciation of the terms of trade in the pessimistic scenario leads to a 5 percent loss of income. Similar to the GDP effect, the terms-of-trade effect weakens over time as the oil sector shrinks as a share of GDP. As a result, in 2050, GDI per capita under the optimistic scenario would reach US$990, only about 5 percentage points higher than baseline (US$968), and 10 percentage points higher than the pessimistic scenario (US$930) (see Figure 53).

74 Very similar results are obtained by using the SDGSIM model

Figure 52. Gross domestic income incremental growth, Percentage points (Incremental = scenario - baseline)

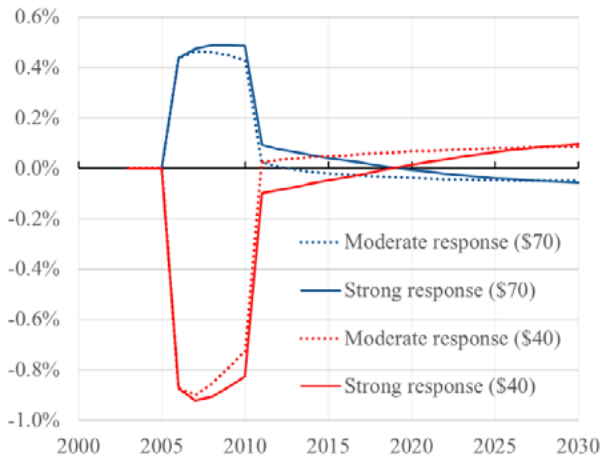


Figure 53. Gross domestic income per capita, Real 2010 U.S. Dollars/barrel

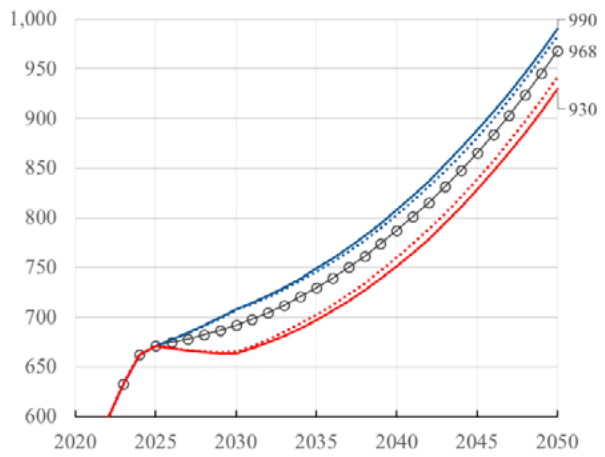


Figure 54. Government oil revenue, Percent of GDP

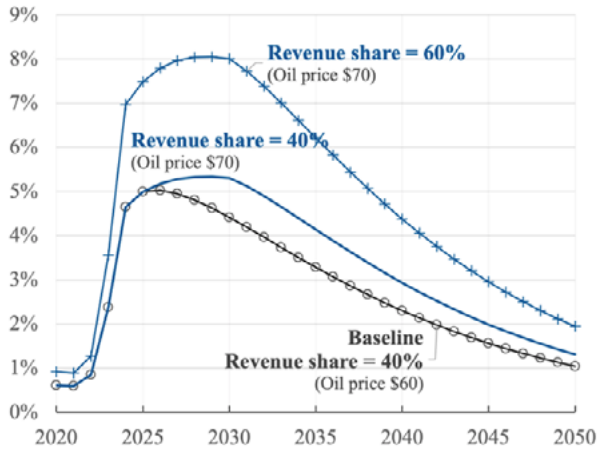
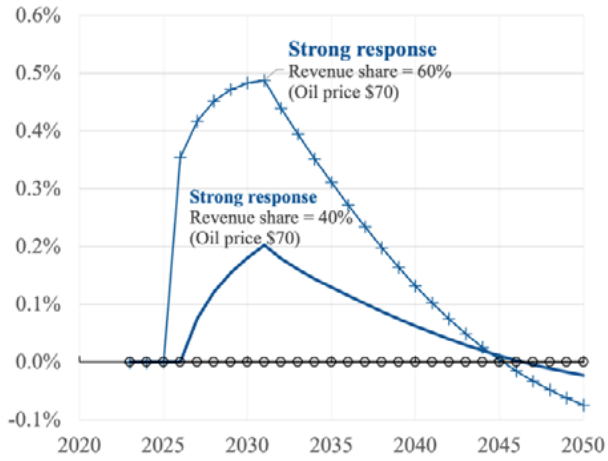


Figure 55. Incremental GDP growth, Percentage points (Incremental = scenario - baseline)



2.2.4. Robustness to high fiscal oil revenues

A higher government share of the oil income would strengthen the impact of oil prices on growth. If compared to regional peers, the government of Niger captures only a moderate share of the income generated in the oil sector (see Figure 46). As a robustness test, the LTGM-NR simulates the optimistic price scenario again but this time, assuming that fiscal reforms raised the government share in the oil sector to 60 percent (versus a default of 40 percent).[75] The simulation shows that the higher share would lead to a substantially larger windfall and incremental growth. By 2030, fiscal oil revenues would reach 8 percent of GDP, versus 4.5 percent in the baseline (see Figure 54). Under a strong procyclical rule, all windfalls would be invested, generating an extra 0.5 percentage points of growth. This extra growth would be significant given that Niger's baseline GDP per capita growth ranges between 0.5 and 1 percent until the late 2030s (see Figure 55). However, the boost to growth is only transitory, declining smoothly after 2030 and hitting zero by 2045.

2.3. Mechanisms outside the LTGM-NR framework: short-term spillovers, Dutch disease, and the pre-resource curse

The LTGM-NR is a simple extended neoclassical growth model which does not account for several channels through which oil prices can affect Niger's economic growth. This sub-section provides a brief discussion of three mechanisms emphasized in the literature that are potentially quantitatively important for the Nigerien context: spillovers from price shocks to the local economy, Dutch disease and the pre-resource curse.

The economic literature suggests that oil price shocks can have substantial short-term spillovers to the local economy in large oil-exporting countries.[76] The rationale is well known and involves the household's rational response to changing economic environment. For example, when oil prices rise, households revise upwards their expected future income (as high oil prices increase purchasing power). Anticipating tomorrow's windfall, households increase today's consumption, which partially falls on local goods and services. To meet the higher demand, local firms may hire additional workers and increase the hours of existing employees. In turn, the owners and workers of these firms spend a portion of their additional incomes and further stimulate demand in the local economy. As this process continues, additional income accrues to segments of the population that may differ from the original beneficiaries of the oil price shock.

Although there is an active debate on the size of the spillovers, Niger has several characteristics that implies a strong effect. First, the size of the spillover depends on the fraction of the extra income spent on local goods, which tends to be high in Niger. This is due to (i) a large share of poor individuals consuming hand-to-mouth, (ii) given that oil price shocks are typically highly persistent, even non-financially constrained households tend to spend a large fraction of their additional income; (iii) as a relatively closed economy to trade, when household spend their extra income, they will do so mostly on local goods and services; (iv) the peg to the Euro will prevent the nominal exchange rate from appreciate, driving the additional local demand away from local goods. Second, the size of the spillover also depends on the ability of firms to hire additional workers without incurring substantial wage inflation. This is likely not the case for Niger, as the country suffers from high unemployment rates and structural slack in the labor markets.

75 Note that to reach a 60 percent share, the government of Niger would need to capture a large share of oil rents plus a share of the returns to capital in the sector. This is because the LTGM-NR assumes that oil rents in Niger account only for 50 percent of oil income

76 See, for example, Kumhof and Laxton (2013), Pieschacon (2012), and Mendes and Pennings (2021)

Another important branch of the literature focuses on the so-called "Dutch disease" (or resource curse), which refers to the observed negative relationship between natural resources and growth. This literature emphasizes some theoretical channels through which natural resources may slow down economic growth. The main concern is that commodity price shocks can trigger a reallocation of resources in the economy, with capital and labor moving away from the non-resource sectors. Over time, this movement can slow down aggregate productivity as the process of absorbing and creating new technologies tends to be more intense in the non-resource sector. This reallocation can be particularly strong when commodity prices and the real exchange rate move in the same direction (Sachs and Warne 2001, Alexeev and Conrad 2009). However, given the widespread low productivity across the economy, the Dutch disease channel may be of second order of magnitude to Niger.

However, more recent literature has extended the concept of resource curse to "pre-resource curse", which can represent a more considerable risk for Niger. The pre-source curse is a phenomenon of countries with weak institutions where the discoveries of natural resources lead to fiscal mismanagement and become a drag on growth even before the production of the natural resource begins (Cust and Mihalyi 2017). Ghana is a notable example of pre-resource curse in Sub-Saharan Africa. The discovery of Ghana's Jubilee oil fields in 2007 changed the orientation of economic policy from fiscal and monetary discipline towards overspending and monetary accommodation. The over-optimistic expectation that the oil sector would boost growth and solve eventual imbalances led the country to increase external financing to levels far above the additional savings generated through the new oil activity (Bawumia and Halland 2017). As a result, domestic and external debt has increased dramatically since 2007 and is now assessed as unsustainable. The pre-resource curse is particularly present in Africa, with several other countries being affected by it, such as Nigeria and South Africa. As fiscal and institutional risks associated with large resource windfalls seem to represent a significant danger to Niger, we discuss it in more detail in subsection 4.

3. THE IMPACT OF THE EXTRACTIVE SECTOR ON JOBS (LOCAL CONTENT)

3.1. Local content in the Nigerien extractive industry

As each extractive industry in Niger is identified with a specific multinational, it is unsurprising that Nigerien society may have developed distinct perspectives on the companies/industries. Part of these perspectives may be attributed to their in-country history, part their local content approaches and part perhaps to cultural differences.

The uranium and gold industries are viewed as being positive participants in the Local content space. They have long histories in country, employ a high fraction of local staff and appear to have 'integrated' into the society as corporate citizens. Additionally, as French / Canadian concerns, they have no language barrier in Niger, which may have made local content issues easier to manage.

Conversely, it appears that their high operational standards may provide natural barriers to entry. For example, Orano (anecdotally) imports food from outside Niger as local produce does not meet their required standards, lab testing for minerals is conducted internationally due to lack of certification of Nigerien labs, etc.

Public opinion on CNPC and its participation in the petroleum industry is somewhat more complex. There is concern, though not yet resentment, on the part of Nigerien society that CNPC prefers the services of Chinese companies and subcontractors for 'everything'. However,

Table 9. Current level of extractives operational activity and relative local content activity

	Oil^	Gold* (formal sector)	Uranium*
Expenses on primary materials	–	US$ 2.5 million	US$ 34.6 million
Of which, fraction expended in Niger	–	17%	77%
Expenses on goods and services	–	US$ 22.2 million	US$ 98 million
Of which, fraction expended in Niger	–	65%	55%
Employment	749	299	1,165
Of which Nigerien staff	462	295	1,157
Management staff	33		7
Of which, Nigeriens	16	All Nigerien	6

***Note:** Gold and Uranium figures are drawn from 2014 USAID data, which we have been advised are still current; these do not, however, factor in the potential impact of mine closures.
^ ***Note:** Oil figures are drawn from 2014 to highlight the breakdown of staff. In 2020, the entirety of oil industry employment (CNPC and direct contractors) was estimated to be 2,396 staff. Breakdowns by staff nationality as well as breakdowns of expenses were not readily available.

this may not be the full picture, as CNPC was prepared to set up a refinery in Niger which no one else was willing to undertake, and according to anecdotal reports, purchases food from local markets.

Other factors are also at play with regard to public perception of CNPC and the petroleum industry. CNPC (a) has a much more recent history in Niger, (b) is in an infrastructure build-out phase, thus necessarily requiring more capital goods, (c) is not subject to various transparency pressures, as a Chinese State-Owned Enterprise (SOE), and (d), faces a potentially significant language barrier. Within this context, CNPC probably feels it is doing as much, or perhaps more even than what is appropriate in the local content space.

Finally, while there are various artisanal mines, artisanal mining is not a likely starting point for good local content policy.

As can be seen on Table 9, uranium and gold industries in Niger exhibit a high level of 'localization' in their operations. The petroleum industry is somewhat lower, and the data is not as clear. However, it would appear that the total employment for all industries is high relative to what one might expect internationally.

Note that vendors incorporated in Niger can legally be foreign-owned. For instance, of the main suppliers to the uranium industry, apparently 78 percent are primarily controlled by French concerns, 18 percent by Belgian concerns, and 4 percent by Nigerien principals. This is presumably reflective of the reality of Niger's capital scarcity. Hence the observation of 'multinational companies supplying to the industry' in Niger is to be expected, and may in fact be a positive, i.e., by making It possible to attract foreign capital into the industry in Niger. Similar observations can be made at the sub-contractor level, where the majority of the subcontractors are foreign-owned, sometimes by concerns from other African states such as Ghana, Morocco, and Togo.

3.2. Existing local content policy in Niger (Codes)

Local content policy in Niger, as specific to extractives, is encoded in: a) The Petroleum Code, being Law 2017-63 (Provisions for Petroleum Operations) and Decree 2018-659/PRN/MPe (which specifies the modalities for application of the above Law 2017-623, established in 2017 and 2018 respectively; b) The Mining Code Ordinance 93-16, established in 1993. The effects of these codes on local content, in their respective industries, are discussed below.

3.2.1. The Petroleum Code

***The Petroleum Code* taken collectively, is well intentioned, specifying that Nigerien enterprises must have preference in contracting of all types, subject to equivalent quality and delivery terms, *provided that* the Nigerien firm is priced no higher than 10% above the (foreign) competition.** Although the law does not specifically define what constitutes a 'Nigerien firm', its spirit is clear.

Additionally, Nigerien nationals are to have preferential employment, both at the principal and sub-contractor level. To this end, the petroleum principal is to establish and finance programs of training for Nigeriens at all levels of qualification/staffing.

By law, the Hydrocarbon Ministry is to make available a list of Nigerien enterprises capable of operating in relevant petroleum industry sub-segments. This list is to be updated regularly.

As part of the application process for a petroleum project, the principal would also have to provide a Petroleum Program for Community Development (PPDC) and a Petroleum Program for Regional Development (PPDR). The specifics of these are not encoded in national law, but would have been part of the negotiation process, and would presumably be more granular in regard to what a principal commits to undertake. These are not strictly local content, rather the related topic of local beneficiation, so that the communities on whose land the petroleum resides acquire some benefit from the development.

The implementation of the PPDC/PPDR can legally be encoded in municipal regulation. The funding quantum of such beneficiation is defined by law and would currently be US$ 500,000 per year to be 'shared equitably' among the communities and regions involved. This may increase to US$ 1.5 million per year should petroleum production exceed 50,000 bbl/day.

3.2.2. The Mining Code

***The Mining Code,* having been developed much earlier (1993) is more general in nature, specifying preference to be given to (a) Nigerien companies, (b) Nigerien employees, (c) Training and Technology Transfer, all in general terms.**

In practice, local content development is significantly higher in uranium and gold mining than it is in petroleum, perhaps partly due to the much longer experience of uranium and gold miners in Niger. This will be discussed further below.

3.2.3. General observations on the Codes

In general, the combined body of law represented by the *Petroleum Code* and the *Mining Code* can be viewed as reflecting a practical approach to local content, given Niger's level of economic development and thus capacity to monitor local content implementation.

It should be noted that the Mining and Petroleum Codes in Niger do *not* specify a fraction of ownership of 'Nigerien' enterprise required to be owned by/reserved for Nigerien nationals. Rather, enterprises operating in this space must be legally established under Nigerien law.

In theory, this may retard the development of local content, by reducing opportunities for local business participation. In practice, however, the current law may reflect a pragmatic accommodation of business reality. Given that Niger is not likely to be a country with excess financial capital in the near-to-medium term, setting a requirement for Nigerien ownership of a given enterprise or sector may risk retarding the development of the sector in question (by reducing available financial capital). Conversely, if companies incorporated in Niger are accepted as 'Nigerien', whatever their sources of capital, this will, all things being equal, increase the financial capital available in-country. This increased financial capital should then allow all domestic market participants (especially potential employees) to acquire valuable incomes, skills and, in general, capabilities development. The challenge may therefore be to balance a practical approach to local content with the need to ensure that a foreign funded 'Nigerien company' is incentivized to act as a good corporate citizen to the maximum extent possible.

As Niger develops, and technical and commercial competencies are deepened, there may be opportunities to increase the level of granularity of the Codes with regards to local content. If so, these should be designed with a specific eye to how the broader business environment develops over time. This 'broader business environment', would include fiscal/royalty regimes, quality of resources, labor productivity, depth of infrastructure and security of tenure, among factors. Pragmatic design of local content regulation, taking into account the broader business environment, can then be used to incentivize investor behavior with regards to both local content and good corporate citizenship, over time.

3.3. Degree of complexity of the Nigerien economy and implications for local content

Niger can be viewed as a 'low complexity' economy. It has a relatively low income of GDP per capita of US$ 553 in 2019, as well as low levels of formal employment and literacy (35.5 percent). As at 2014, total formal employment was estimated at around 170,000 individuals, of whom 60,000 were in public service, with the rest in the private sector and parastatals. At the time, the working age population was estimated at 7.4 million.

Within this context, extractives, while being a small fraction of total Nigerien employment, is a much larger fraction of formal employment. In fact, the extractives industry as a whole – including employment beyond uranium, gold and oil – is estimated to be the second-largest private sector employer in Niger (the first being social services, which we assume to be primarily donor-funded).

This leads to important considerations in framing local content in the extractives industry in Niger. Firstly, the industry is economically far more important to Niger than it is to a potential investor.

Secondly, the country as a whole is short of financial capital to fund new enterprises in sub-contracting or other spaces. In the cases of uranium, gold and oil, there are monopoly foreign operators in the country, each operating a single site. This, combined with histories of extensive project development times, plus logistics issues arising from Niger's landlocked position, suggest that Niger is a price taker for capital, whereas foreign investors have to consider whether or not to allocate capital to Niger relative to other potential investments.

Furthermore, skilled human capital is in relatively short supply, which means that multinationals seeking to employ Nigeriens must factor in the cost and time required for training and development. The uranium, gold and oil industries in Niger appear already fully staffed, if not perhaps fairly overstaffed by international standards, given their level of operations. Hence the potential for increasing staffing will largely depend on the ability to expand operations, i.e., the attractiveness of Niger to new capital in these industries.

Within this context, the planned expansion of the petroleum industry in Niger (based on new fields and export pipelines), if successful, would be an important avenue for additional local content spend in Niger. Conversely, the share of total petroleum activity constituted by local content should, in principle, be independent of the level of activity, but should rather be related to the overall level of Nigerien economic vibrancy and sophistication.

Industries in Niger may not be using 'state of the art' technology; however, such technology may be fit for purpose. Indeed, 'dated technology' may be an important element in allowing Nigerien employees and sub-contractors to get onto the 'growth escalator'. Higher technology would not necessarily be the best outcome for Niger at this stage, since higher technology operations are by their nature less labor intensive (less employment) and deflationary (lower revenues for the broader economy). Conversely, they tend to increase returns to capital, which is not supplied from Niger. Nevertheless, raising standards (for engineering, operations, safety etc.) may be a very important element in positioning Niger on the 'growth escalator'.

Niger therefore faces a multi-layered challenge of a) maintaining 'entry level' positions for Nigerien subcontractors/individuals, so as to grow the relative size of the formal economy, b) expanding the complexity and sophistication of the formal economy over time, and c) attracting foreign capital to achieve both these goals. It is important to note that expanding employability and skills of the surrounding population is unlikely to increase overall employment and activity in industry unless additional capital comes in and new projects flourish in Niger. Hence, a sound local content strategy would focus on (a) increasing the capabilities of the existing pool of Nigerien workers and subcontractors while (b) creating a sufficient foundation so that this pool can scale up if new projects start up while (c) attracting fresh capital (and hence technology, skills etc.) to the industries.

Based on the above, a good objective for Niger would most likely be a local content policy that uses fit for purpose technology, welcomes foreign capital at most levels, targets increasing Nigerien employment, and focuses on training and development at all levels. Additionally, the aforementioned high staffing levels of the extractive industry and the general lack of domestic Nigerien financial capital, suggest that the opportunity is not to increase the volume of activity by Nigerien companies/individuals in the industry value chain, but rather to increase their value-add.

The 'increase employment' element is an important win-win. It is in the commercial interest of international companies to increase local employment over time if (a) they believe they are going to be resident in Niger for the long term and (b) such employment is value-adding to the enterprise.

Lastly, early-stage local content policies can create path-dependency for future policies. The initial policy framework should therefore allow and encourage competition *between Nigerien companies*, as a matter of principle, even while realizing that such competition is unlikely to materialize in the short-to-medium term since the industries in question are small and likely to be concentrated.

4. THE IMPACT OF THE EXTRACTIVE SECTOR ON INSTITUTIONS AND FRAGILITY

The extractive sector presents a risk to Niger's institutions through different channels: it may erode the fiscal contract between citizens and the government, jeopardize fiscal stability by exposing the country to multiple commodity price shocks, and threaten political stability by exacerbating existing social divisions and grievances.

4.1. Fiscal risks

1. **1The extractive sector accounts for 6.9 percent of GDP and 23 percent of government revenue, making Niger is especially vulnerability to commodity price shocks (World Bank, 2020; EITI, 2021).** The recent plummeting of uranium prices and the contraction in uranium output due to oil depletion and high operating costs, contributed to government revenue contracting by 2 percent of GDP between 2014-2018 (IMF, 2019).

2. **Increased oil production may offset the gap left by declining uranium but further amplifies the fiscal risk posed by commodity price volatility.** There are high hopes that oil will serve as a catalyst for development, as reflected in the new petroleum policy adopted by the government in 2019. The policy projects that the oil sector's contribution to GDP will increase from 4 percent in 2017 to 25 percent by 2025, employing between 8-12 percent of the workforce (up from 5-8 percent in 2012), and account for 45 percent of state revenue (up from 19 percent in 2017) (Berenger, 2019).

3. **Increased exposure to volatile global commodity markets would further threaten Niger's already precarious fiscal position.** Increased social and healthcare spending due to the Covid-19 pandemic, and rising security expenditure due to an uptick in terrorist activity, have added additional strains to the government's fiscal resources. These fiscal pressures are compounded by the needs of a growing population: Niger's population growth rate of 3.8 percent is the second highest in the world (World Bank, 2019b). Consequently, public spending in recent years has increasingly been financed by debt. Between 2012 and 2017, public spending increased from 22.5-26.8 percent of GDP, with public debt rising from 26.1-49.7 percent of GDP. .

Box 2. Equatorial Guinea - mismanaged oil windfall

Equatorial Guinea's economic growth has largely failed to translate into equitable development. Equatorial Guinea discovered large oil reserves in the 1990s and has since then become Africa's third largest oil producer, after Nigeria and Angola. As a result of large resource windfalls and investments in the hydrocarbon industry, it quickly became one of the fastest growing economies in Africa. Although the country's GDP per capita at the height of its growth was on par with that of South Korea, its Human Development Index (HDI) placed it closer to Republic of Congo, making EQG the country with the largest difference between income per capita and HDI (Diamond & Mosbacher, 2013; UNDP, 2020; UN, 2015). The paradox has persisted: according to the most recently available data, the country performs worse than the Sub-Saharan African average on several development measures, including life expectancy, primary school enrolment and infant mortality, while still outstripping it in terms of income per capita (World Bank, 2019).

EQG is known for its authoritarian government, weak institutions, high corruption and clientelism. The country is infamous for its corrupt, authoritarian leadership which maintains an iron grip on virtually all aspects of public life through a combination of repression and patronage (McSherry, 2006; Wenar, 2008). It is ranked in the bottom five of the 2020 Transparency International Corruption Index, the 2019 Ibrahim Index of Governance and the 2019 Worldwide Governance of Indicators (where it ranks second to last above South Sudan in control of corruption specifically). Resource rents granted the state fiscal autonomy, thus insulating it from public accountability and democratic pressures from below, as is generally the case in a state reliant on tax revenue (Ross, 1999, 2001; Auty, 2001).

EQG was heavily impacted by the drop in commodity price, forcing it to seek donor assistance. Between 2014 and 2016, the Central African Economic and Monetary Community (CEMAC) faced a macroeconomic crisis triggered by a sharp drop in oil prices combined with increasing insecurity. Equatorial Guinea, heavily reliant on oil, was especially hit hard (World Bank, 2020, AfDB, 2018; IMF, 2017). Between 2013 and 2017, GDP contracted by 57 percent and public revenue by 45 percent (AfDB, 2018). As fiscal and external imbalances deepened, CEMAC countries resorted to their deposits at the regional central bank, Bank of the Central African States (BEAC). Foreign exchange reserves diminished, and domestic government arrears accumulated. As the liquidity crisis continued, there were fears that the CFA franc would have to be devalued. With dwindling fiscal resources, EQG entered into a Staff Monitoring Program (SMP) with the IMF in January 2018. Finally, in December 2019, the IMF approved a three-year arrangement for an Extended Fund Facility (EFF) of about $282.8 million (IMF, 2019a).

IMF support is conditional on improving extractive sector transparency, strengthening anti-corruption policies and diversifying the economy. Among other conditions, EFF stipulates that Equatorial Guinea increase transparency in the hydrocarbon sector. This entails joining the EITI, making data on contracts, production, and revenue public, as well as publishing the audit reports of the state-owned enterprises for oil and gas, GEPetrol and SONAGAS respectively (IMF, 2019). Yet, since 2010, EQG is still not yet compliant. These sector-specific efforts would be complemented by broader reforms centered on strengthening anticorruption frameworks, diversifying the economy, increasing social protection and improving public financial management. A separate critical problem of Equatorial Guinea is the paucity of reliable statistical data that further exacerbates the lack of transparency. To counter this, the World Bank is engaged in providing technical assistance to a recently formed institute of national statistics (World Bank, 2020).

It is yet too early to assess the effectiveness of these loan conditionalities and their impact on institutions and pro-poor development policy. As the country can no longer comfortably rely on its hydrocarbon income, it is possible that this crisis heralds the start of a new era in Equatorial Guinea's political culture. However, whether this will be sufficient incentive for the political elite to commit to true reform and better manage its natural resources, or whether it will simply opt for superficial changes to merely comply with loan conditionalities, remains to be seen (EIU, 2019).

4.2. Institutional risks

The literature on natural resources and institutional development indicates that governments that derive their revenue from natural resource rents have diminished need for taxes from their citizenry. With low taxes, the public is itself less motivated to demand representation and accountability from the government. Thus, income from natural resources inhibit downward democratic pressures by weakening the taxation-representation nexus, the mutually beneficial relationship that forms the basis of democracy. Windfall revenues may also enable the financing of extensive patronage systems that stifle democratic pressures and reduce dissent. Current or would-be beneficiaries of these systems develop a vested interest in maintaining the status quo, further impeding social pressure for democracy.

Corruption and lack of transparency is rife in the Nigerien extractives sector. Mining agreements including exploration and exploitation licenses are rarely available to the public, despite such disclosure being a constitutional requirement (EITI, 2021). There is also a lack of information on beneficial ownership disclosures, and on revenue flows among the myriad state-owned enterprises in the sector (EITI, 2017). Beyond the resource sector, the country has made a mixed record in terms of governance indicators: while rule of law and control of corruption have been increasing since 2014, voice and accountability and governance effectiveness have been in a downward trend. Except for political stability and absence of violence, Niger also performs relatively well compared to both high resource countries and fragile and conflict-affected countries in Sub-Saharan Africa. However, it trails the WAEMU average in all indicators but one – rule of law (World Bank, 2019a).

Box 3. Nigeria – oil and corruption

The Nigerian oil sector is composed of multiple poorly coordinated agencies, with functions that frequently overlap or are not clearly delineated (OECD/ AfDB, 2014; IMF, 2019). The Nigerian National Petroleum Corporation (NNPC), a vertically-integrated state-owned enterprise (SOE), is the representative of the government in all petroleum activities, ranging from exploration, production, marketing of petroleum products, refining and provision of engineering and data support services. The NNPC engages in commercial and non-commercial roles that are not clearly defined: it collects revenue, participates in regulation and acts a commercial agent that buys and sells crude oil and refined petroleum products.

This intertwining of commercial and non-commercial functions that are ill-defined in one entity is one of the principal flaws of the NNPC as it creates significant conflicts of interest (IMF, 2019b; Toledano et al, 2020; OECD/AfDB, 2004). A joint report by Revenue Watch Institute and Transparency International found that NNPC has the worst record on transparency of the 44 national and global energy companies it examined, especially for both organizational disclosure and anti-corruption reporting. (Transparency International/ Revenue Watch Institute, 2011). Further evidence of its longstanding governance challenges lies in NNPC facing recurrent allegations of corruption to the tune of billions of dollars. This includes a 2016 case in which the NNPC was alleged to have failed to pay the government $16 billion in revenue (BBC, 2016). A similar case involving the disappearance of$20 billion of oil revenue occurred in 2014 (BBC, 2014).

However, new regulatory reforms underway point to the willingness to turn a new page in Nigeria's oil story. The comprehensive Petroleum Industry Bill (PIB), currently being debated, represents the government's attempt to overhaul the legal, regulatory and institutional framework governing the oil and gas industry.

Public sector capacity to oversee the extractives sector is limited, owing to poor governance, low human capital and scarce technical and financial resources. Public resources are heavily concentrated in Niamey which adversely impacts service delivery in the rest of the country, and adds to citizens' grievances regarding resource management (World Bank, 2018, 2020). Although the government has adopted decentralization and extractive sector reforms to reduce technical and human capital constraints, their implementation has been slow. Poor financial management, resulting in low budget execution rates (estimated at 6-41 percent for the Ministry of Energy and Oil and 27-82 percent for the Ministry of Mines and Industry between 2013-2017) and over-allocation of resources to Niamey (e.g., over 95 percent of the Ministry of Mines spending in 2017) affect the performance of the ministries involved in the extractives sector. Moreover, public expenditure on mining and petroleum is low – less than 1 percent of the government's spending between 2013-2017 – despite extractive revenues accounting for over 20 percent of government revenue (World Bank, 2020). Niger performs poorly in terms of budget transparency, ranking 101 out of 118 countries profiled in the 2019 Open Budget Index. Its index is also lower than the average of both high resource countries and fragile and conflict-affected countries in Sub-Saharan Africa as well as WAEMU (Open Budget Survey, 2019).

Public administration deficiencies also limit environmental governance. Uranium mining has caused considerable radioactive pollution accompanied by reports of adverse health effects, the contamination of soil and water bodies as well as additional stress on scarce water resources, fueling tensions between local communities and large mining companies (Larsen & Mamosso, 2013). The closure of the Cominak mine has led to lingering concerns over the adequacy of mine remediation plans offered by mining companies, especially in terms of long-term health monitoring of mine workers. Oil rights granted to CNPC threaten the Termit and Tin Toumma nature reserves which extend over Agadez, Diffa and Zinder, and are home to several endangered wildlife species (France24, 2019). Low state presence and corruption at ASM sites also contributes to environmental degradation, with bribes paid to bypass regulations restricting the use of explosives and mercury for gold extraction, as well as mining during the rainy season thereby increasing the risks of drowning and landslides (Hilson et al, 2016). Niger has made considerable progress in preventing the use of child labor in ASM, but the threat of regressing remains, and may be more pronounced in the wake of the recent gold rush (ILO, 2007).

Further, while there is a revenue-sharing framework which requires 15 percent of mining revenue to be retroceded to the communities where mining operations take place, in practice this seldom occurs. Taxes are duly paid to the national government, but the latter rarely devolves the income to local governments, in part due to the limited capacity of local governments. Retrocession payments fell into arrears between 2012 and 2016. The government has since issued a clearance plan for 2018-2022 to cover these arrears (World Bank, 2020). See Appendix D.1 for a broader discussion of the impact of natural resources on institutions.

4.3. Fragility risks

The extractive sector plays a large role in shaping conflict dynamics in the country. Agadez, Diffa, Tillaberi and Zinder, the main extractive regions that contribute to at least a quarter of government revenues, are also among the most fragile. These regions have highly porous vulnerable borders e.g., Tillaberi with Mali and Burkina Faso, Diffa with Chad and Nigeria, Zinder with Nigeria and Agadez with Libya. Due to the severity of these security challenges, the regions of Diffa, Tahoua and Tillaberi are currently under a state of emergency.

Despite its benefits to the local economy, the ASM gold sector carries significant fragility risks. Gold is a 'lootable' point-source high value commodity and in the context of Niger's weak state presence, the risk of capture by criminal groups is especially high. Indeed, such capture has already

occurred: in spring 2014, new ASM gold sites were seized by armed Chadian groups believed to be linked to rebel groups from Libya. They controlled these sites until 2016, extending their illegal trade into Libyan territory. In 2017, Nigerian authorities closed the Djado ASM site in order to clamp down on the growing security threats from these and myriad armed groups, including terrorist groups, traffickers, bandits and rebel groups (International Crisis Group (ICG), 2019). The risk of appropriation by terrorist groups is also increased by ASM sites being situated in areas with elevated terrorist group activity. For instance, Tera in the gold abundant Liptako region is a major area of operation for Malian terrorist groups. Such conflict spillovers from neighboring fragile states, including Mali, Nigeria and Libya, highlight the transnational character of Niger's security threats (Pellerin, 2017; Grégoire & Gagnol,2017).

Decades of rebellions by Tuareg separatists contribute to the precarious security situation in the north of the country, where uranium is mined. The reasons for this protracted conflict are complex but revolve around the marginalization and economic exclusion of the Tuareg. Although the region is home to the uranium mines that long formed the economic lifeline of the country, it remains underdeveloped. local communities thus feel excluded from the benefits of the extractives sector while being left to bear the burden of mining-induced environmental damage (Keenan,2008; Baudais et al, 2021). These interlinked issues of marginalization and inequitable revenue sharing, particularly of uranium, have given rise to militant activity, such as that of the Nigerien Movement for Justice (Mouvement des Nigériens pour la Justice – MNJ) (Emerson, 2011).

The risks intrinsic to oil, a high-rent commodity that is prone to capture and is associated with conflict outbreaks, are exacerbated by the activity of terrorist groups in oil-producing regions such as Zinder and Diffa. The high rents at stake may induce rogue actors, terrorists included, to begin or intensify insurgent activity against the state. Oil installations could therefore become potential new terrorist targets. See Appendix D.2. for a discussion on the link between conflict and natural resources.

5. CONCLUSIONS

Although Niger has significant resource endowments, growth in the extractive sector is impeded by several structural factors, notably, the scarcity of financial capital and domestic skilled human capital. **Promoting sound local content policies is a pathway to ensuring that the gains from the extractive sector are shared locally and used as a vehicle to increase human capital, all while remaining attractive to foreign capital.**

Niger's extractive sector has significant development potential. However, it also comes with significant risks that have the potential to exacerbate existing sociopolitical and environmental challenges. This highlights the importance of strengthening governance systems, both within and outside of the natural resource sector, to evade the resource curse.

Finally, this chapter also applies the LTGM-NR to assess the impact of oil prices on Niger's economic growth over the next 30 years. In the LTGM-NR, oil price shocks generate windfall fiscal oil revenues that can be invested in physical capital to boost economic growth. However, the windfalls generated under the analyzed price scenarios are not large or persistent enough to yield a substantial boost to investment and growth in the long term, even under procyclical fiscal rules. Moreover, even a permanent increase in oil prices would not be able to finance a higher level of public investment in the long term. This is because Niger's oil sector is expected to contract sharply over time due to depleting oil reserves. As a result, oil price changes have a small effect on medium-term growth and almost no effect in the long term.

Options for better management of the extractive sector in Niger

Highly critical measures to be put in place by the GoN	Timeline for implementation	Fiscal implications
Reduce fiscal vulnerability		
Develop revenue management legislation e.g., establishing a fiscal stabilization fund	Medium term	Medium
Strengthen legislation enforcing fiscal discipline around usage of windfall resource rents	Medium term	Low
Consider implementing direct cash transfers to share revenue windfall with the population	Long term	Medium
Improve domestic revenue mobilization to diversify sources of government revenue	Medium term	Medium
Invest in ASM formalization		
Decentralize essential processes for ASM formalization e.g., registration and licensing	Short term	Low
Adopt a graduated approach (e.g., differentiated licenses) to meet the needs of different miners at different income levels and reduce barriers to formalization	Short term	Low
Provide incentives for formalization e.g., access to processing centers and technical knowledge conditional on being formally licensed	Short term	Medium
Strengthen governance systems		
Implement digitized systems for tax and customs to reduce leakage of revenue through illicit flows of commodities like ASM gold	Medium term	Medium
Enforce environmental standards through partnerships with civil society, EITI and local communities	Medium term	Medium
Implement revenue-sharing framework, clear arrears of pending payments and ensuring funds are spent towards local development projects	Short term	Medium
Promote local content development		
Create a specific entity to focus on Local Content needs and opportunities	Short term	Low
Develop training and vocational skills programs to increase technical knowledge of the population	Medium term	Medium
Strengthen the Niamey Data Center by mandating sharing of geological data and making it available to the GoN	Short term	Low
Improve standards of local laboratories and consider obtaining international accreditation	Long term	High

Notes: short-term (1 year); medium-term (2-3 years); long term is +3 years; fiscal implications are estimated as low: affordable within current spending structure; medium: requires budget reallocation; high: need further reform, funding sources and domestic revenue mobilization.

CHAPTER 5

Disaster and Climate-Related Risks in Niger

As a landlocked country with a mostly semi-arid climate, Niger faces multiple climate threats, most prominently recurrent droughts. Several factors, including dependence on rain-fed agriculture, rapid population growth, political instability, pervasive poverty, and persistent food insecurity further compound the country's vulnerability to these climate threats. Given that these challenges are only expected to be amplified in the face of climate change, a comprehensive DRM framework is crucial for Niger. This chapter discusses the risk profile of Niger, with It then analyses existing institutional and policy frameworks to address climate risks and options for sustainable disaster risk financing. Besides short and medium-term social protection measures to support the population in coping with adverse natural events, investments in long-term solutions focused on integrated urban land-use policies and plans, resilient infrastructure, early warning systems, and risk reduction strategies are critical.

1. HISTORICAL DISASTER AND CLIMATE-RELATED RISK CONTEXT IN NIGER

A landlocked western African country, Niger is mostly exposed to hydrometeorological disasters with flood and drought events being recurrent. 35 percent of the population (northern area) lives in a hot arid desertic climate, with sunny and dry conditions all year-round. The other 65 percent of the population (southern area including Niamey), lives in a hot semi-arid climate, with hot summers and warm to cool winters, and some to minimal precipitation. Mean annual rainfall varies geographically, but is generally lower in the north (0-150 mm) than in the south (500–600 mm) and is limited to the summer months of June–September.

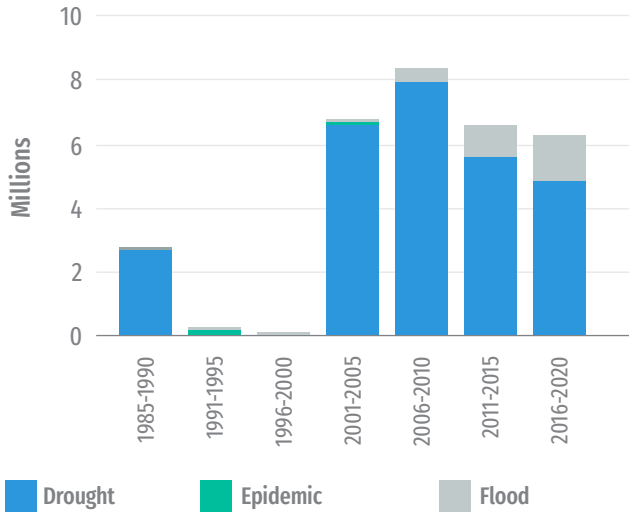
Between 1986 and 2020, 56 events were reported in Niger. Most of these events were droughts, floods, and epidemics, that caused 10,384 deaths and affected 28.2 million people. While droughts account for most—89 percent—of the population affected by disasters (Figure 56), epidemics are responsible for the majority—94 percent—of deaths in the country (Figure 57). On the other hand, despite affecting a smaller share of

the population and being less lethal, floods have been a relevant threat to Niger in recent years with large floods reported in 2017, 2018, and 2020.

Renewable and extractive resources are highly important for livelihood development in Niger; however, conflict is on the rise around these sectors. Renewable resources are under pressure from population growth, insecurity, migration, climate change, and poor land and natural resource management, leading to land degradation, reduced agricultural productivity, and food insecurity.[77]

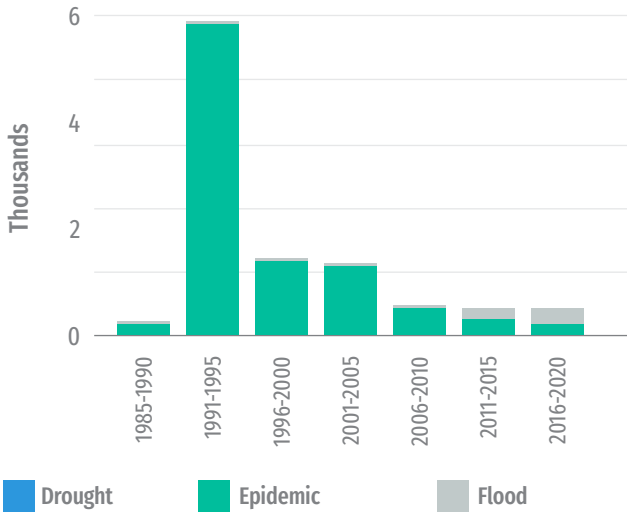
Changing transhumance dynamics due to climate change, increased population and cattle pressures are causing growing conflicts between farmers and herders over natural resources.[78] Crop farmers are moving into livestock raising which further reduces grazing land available for cattle and increases pressures on land.[79] Furthermore, border closures in regions with spillover of conflicts has limited pastoral travel dynamics and pushed pastoralists to rethink their mobility and grazing area, at the risk of fueling new local land conflicts.[80]

Figure 56. Total population affected by type of disaster



Source: Authors with data from EM-DAT (CRED, 2021).

Figure 57. Total deaths by type of disaster



Source: Authors with data from EM-DAT (CRED, 2021).

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80 Resilac, Etude régionale de recherce Bassin du lac Tchad: Soutenir la cohésion sociale par l'appui aux me1canismes endogènes de prévention, médiation et resolution de conflits?, page 19 , https://reliefweb.int/sites/reliefweb.int/files/resources/Rapport_RESILAC_CohesionSociale_Bassin-du-lac-Tchad.pdf

2. NIGER COUNTRY RISK PROFILE

2.1. Drought risk

As the country largely relies on agriculture, droughts have a significant economic impact in Niger. While data on actual losses due to historical events is limited, indicative losses have been estimated by the World Bank (2013) to understand the frequency and magnitude of adverse events on the agricultural sector.[81] Measured in terms of gross agricultural value, crop production was significantly reduced seven times by adverse events between 1991 and 2010 (Table 10). In some of these years, Niger experienced a 10 to 20 percent fall from underlying production trends and caused losses of more than US$ 100 million. Drought was the main cause of larger shocks, sometimes in combination with other events.[82]

A severe, continuous period of hardship took place from 1995–1997 following a combination of drought and political uncertainty. The cumulative impact of multiple successive shocks such as these can be devastating for an economy like Niger's where agriculture represents 40 percent of GDP (World Bank, 2017). Besides the impact on agricultural production, adverse events—and particularly droughts—can affect foreign exchange earnings, reduce GDP growth rate and per capita income, result in a loss of government revenue, and require substantial financial resources for emergency response and recovery. Figure 58 demonstrates the volatility of national GDP growth rate and GDP per capita growth rate in Niger over a period of 26 years (1984 – 2010). A strong correlation between a drop in GDP growth rates and the occurrence of adverse events can be observed. GDP growth rate was negative in 8 out of the 26 years analyzed; for 6 of these years, the drops can be partly explained by drought events (World Bank, 2013).

Table 10. Indicative losses of adverse events for crop production (1991 – 2010)

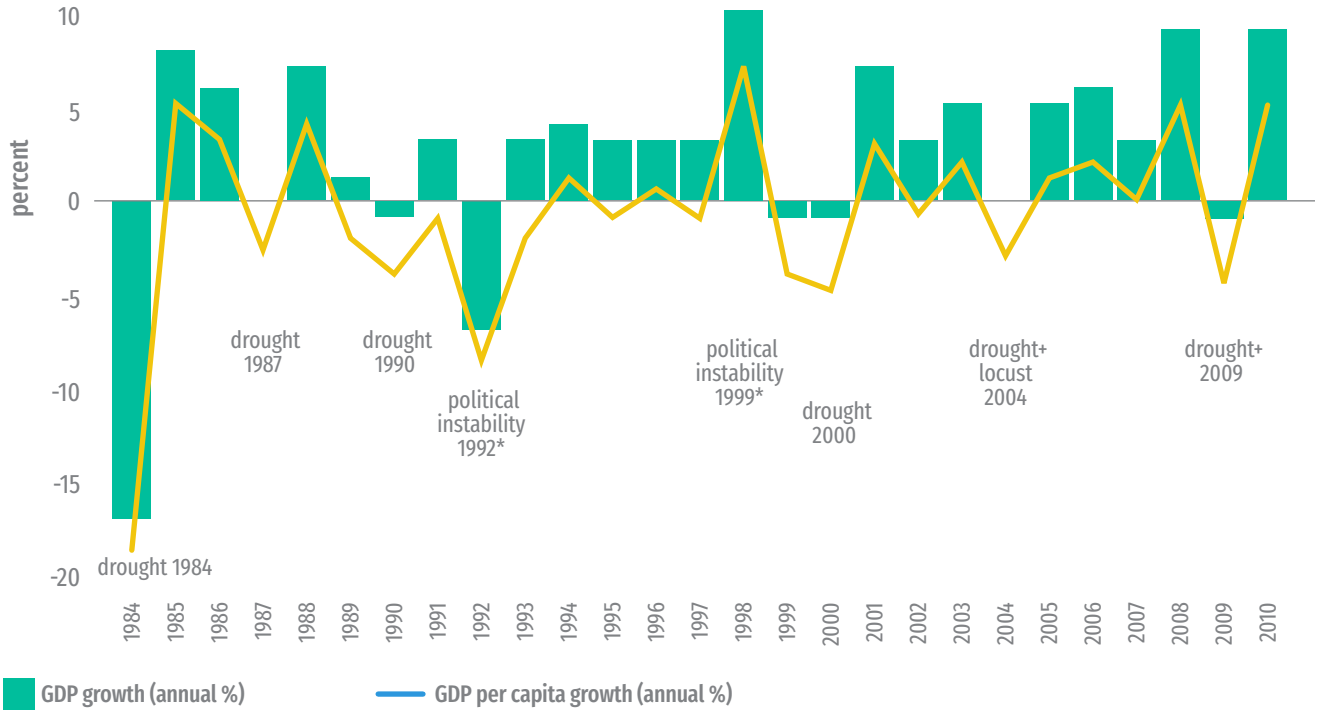
Year	Percent deviation of production from trend	Indicative loss value (2010 million US$)	Loss as percentage of agricultural GDP	Context
1995	-23.2%	-122.1	-24.1%	Drought, localized locust attacks, political uncertainty
1996	-13.6%	-35.0	-6.2%	Political uncertainty
1997	-23.1%	-135.8	-23.7%	Drought
2000	-9.1%	-10.8	-1.4%	Drought
2004	-17.2%	-125.3	-11.6%	Drought, locusts
2005	-7.0%	-4.2	-0.3%	Low rainfall
2009	-10.4%	-55.6	-3.1%	Drought, floods

Note: Losses are calculated as the value of actual minus trend production, less the threshold for normal losses from trend.
Source: Reproduced from World Bank (2013), based on data from FAOSTAT.

81 Indicative losses for each event were calculated by estimating the difference between the actual and historical trend values of each relevant crop using real producer prices. The proportion of this total loss value below a threshold (0.33 standard deviations below the production trend) was deemed to represent the loss attributable to the adverse event. This measure reflects the combined impact of interannual changes in both production and price. Production risks were analyzed only for crops as the available livestock data was considered inadequate.

82 An analysis conducted by AGRHYMET (a specialized agency of the Permanent Inter-State Committee against Drought in the Sahel (CILSS), of which Niger is a member), reveals that long dry spells (number of consecutive days without rainfall) and late onset of rains are the two biggest factors responsible for yield losses and crop failure in Niger.

Figure 58. Annual GDP growth and GDP per capita



Note: * 1992 political instability (transitional government November 1991 – April 1993) and 1999 political instability.
Source: World Bank (2013), based on the World Development Indicators Database.

Niger is severely exposed to agricultural production shocks. An upcoming World Bank report models food crop production and production losses for the most important food crops in West Africa as well as the costs to respond to these risks (World Bank, 2021d). The report finds that food crop production losses in Burkina Faso, Chad, Mali, Niger, Sierra Leone, and Togo could amount on average to more than US$ 700 million per year and increase to more than US$ 1 billion every 5 years. Main drivers of those losses are weather-related risks, especially droughts and flooding, and agricultural pests and diseases. Insect infestations including locust swarms are increasing. Climate change is expected to intensify these hazards. Looking at the five main food crops (maize, millet, rice, sorghum, and cow peas), the Loss at Risk (LaR) analysis indicates that Niger may face food production losses equivalent to 24.2 percent of the exposure once every 10 years and even 41.9 percent of the exposure (or US$ 1.32 billion) once every 100 years (see Table 11). In addition to the modelled economic losses, the report models food-security humanitarian costs. In Niger, these amount to US$ 304 million for 1-in-5-year events and US$ 391 million for 1-in-10-year events.

Table 11. Expected LaR values in Niger

Return (years)	AAL	10	25	50	100	150	200	250	500
LaR (% Exposure)	8.98%	24.2%	32.0%	37.1%	41.9%	44.2%	45.9%	46.9%	50.6%
LaR (US$ million)	284	765	1,012	1,175	1,325	1,399	1,452	1,482	1,599

Source: World Bank (2021d).

Drought risk is assessed as particularly high in Niger. The Global Facility for Disaster Reduction and Recovery (GFDRR) estimated the agricultural income loss caused by agricultural drought.[83] The results indicate that, on average, Niger suffers from yearly agricultural income loss of US$ 15 million. Losses of at least US$ 60 million could be expected once in a decade, on average; while losses greater than US$ 150 million would occur once every 50 years, on average. Maradi, Tahoua and Zinder are the regions with the higher risk of crop loss. Considering the historical indicative losses estimated by World Bank (2013 and 2021d), GFDRR estimates seem rather conservative.

These production shocks could lead to a severe increase in food insecurity in Niger. Translating losses in agricultural production following shocks into reduced food consumption by households, the analysis finds that numbers of people who get thrown into food insecurity is especially high in Niger, as undernourishment and exposure to food production shocks are particularly high: even low-severity shocks can lead to a significant number of undernourished people, and severe shocks can lead to undernourishment of almost the entire Nigerien population.

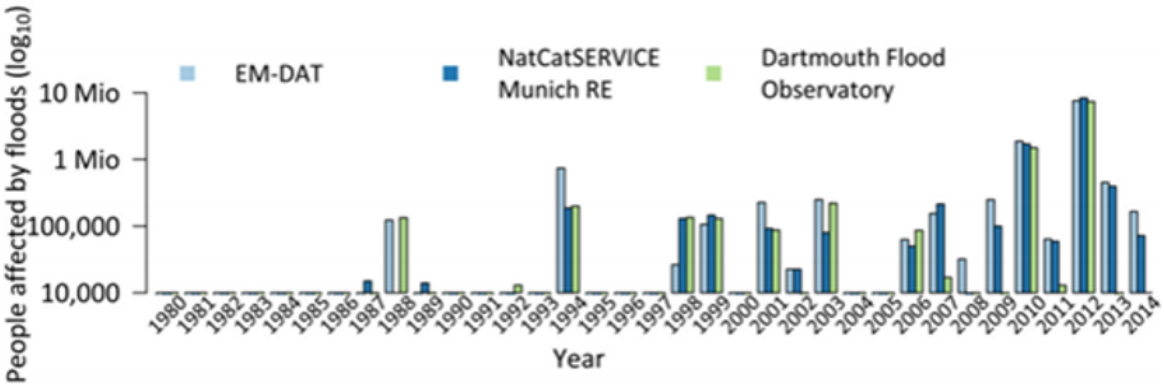
2.2. Flood risk

Flooding is mainly a threat in the River Niger basin, affecting on average well over 100,000 people a year. Figure 59 illustrates that the number of people affected by catastrophic floods in the Niger River Basin has significantly increased in recent years. This is due to several reasons, including an increase in heavy precipitation, increasing river discharges due to adverse land-use change and crusting of soils that have led to an increase in surface runoff as the overall climate in the region continues to become drier. Particularly, in Niger it is estimated that about 92,000 houses have been destroyed and 41,000 houses have been damaged due to flooding since 1986 (UNISDR, n.d.).

Annual Average Losses (AAL) from riverine floods are estimated between US$ 20 million and US$ 70 million in Niger. Floods have a recurrent negative impact on the population and the economy, predominantly in the southwestern part of Niger. The 2017 Global Assessment Report (GAR) on Disaster Risk Reduction (DRR) estimates the AAL to capital stock from riverine flood risk in Niger at US$ 21.4 million, or about 0.2 percent of the 2017 GDP. Because there is considerable uncertainty on risk estimates when limited data is available for calibration—as is the case of Niger—, it is a good practice to contrast the

83 Agricultural income loss refers to the value of crops lost due to agricultural drought, based on long-term crop prices and estimated yield loss. Agricultural drought is assessed by estimating the potential for lack of rainfall and its impact on rainfed crops.

Figure 59. People affected by catastrophic floods in the Niger River Basin from 1980 to 2014 from 3 different data sources



Note: Scale of the y-axis is logarithmic.
Source: Aich et al. (2016).

results of different studies. The 2019 GFDRR Niger Disaster Risk Profile for instance estimates riverine flood risk to be significantly larger than GAR's estimates. GFDRR suggests that the AAL of the housing sector alone from riverine floods amount up to US$ 70 million (0.6 percent of GDP), and that riverine floods causing losses of more than US$ 300 million are expected to occur relatively frequently, on average once every 10 years. Historical information from recent large floods (2012, 2020) suggest that the level of riverine flood risk is between the results of both studies. In that sense, GAR's estimates could be considered as a lower bound for flood risk, and GFDRR's estimates an upper bound. It is worth noting that these estimates are based on current conditions—with climate change and increased population, these numbers will likely increase substantially in coming years. For example, the Damage and Loss Assessment (DALA) made by Niger's Government following the 2020 floods estimates total damages and losses at US$ 261.7 million (US$ 153.7 million in direct damages and US$ 108 million in indirect losses).[84]

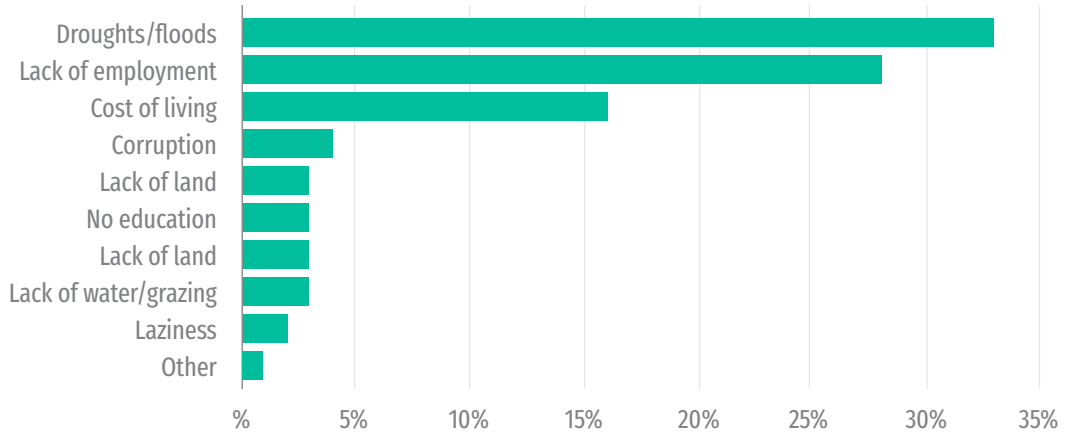
3. IMPACT OF DISASTERS ON POVERTY AND FOOD SECURITY

3.1. Relationship between disasters and poverty

In Niger, the poor suffer disproportionally from adverse natural events, which are considered as the main driver of poverty. Insights on the impact of adverse natural events on poverty levels and the wellbeing of Nigeriens can be drawn from an analysis of the 2011 and 2014 *Living Standards Measurement Study — Integrated Surveys on Agriculture* (LSMS-ISA).[85] Based on these surveys, the World Bank (2017) shows that households who consider themselves poor report droughts and floods as the main causes of widespread poverty (33 percent, Figure 60), followed by the lack of employment (28 percent) and the high cost of living (16 percent). The high dependency of the population on agriculture implies that disaster events can limit poverty reduction efforts and push the vulnerable back into poverty.

84 Rapid damage assessment losses and needs - post-flood recovery strategy 2020 in Niger, February 2021.
85 These are standard household surveys that include modules on the shocks experienced, negative consequences of the shocks (loss of assets, income, food production, and food stocks), as well as the coping mechanisms that households adopt in the wake of an income shock.

Figure 60. Principal causes of poverty (percentage of households, 2011)



Source: Reproduced from World Bank (2017). Computations based on LSMS-ISA data.

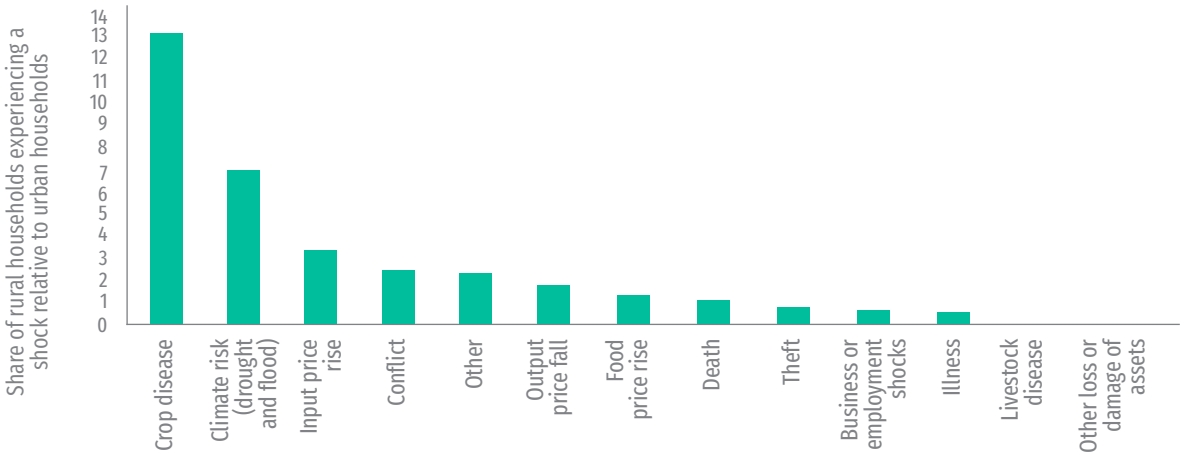
In Niger, most of the households surveyed reported sudden losses in income and assets—78 percent of the households reported experiencing a drop in income as the result of a shock, while 57 percent of households reported asset losses (World Bank, 2018a). Price shocks are the most recurrent followed by weather shocks, with the former occurring 1.3 times more frequently than the latter. Besides being often affected by price shocks, urban Nigeriens already pay an 11 percent premium on food prices compared to countries at similar income levels, with the bottom 20 percent of the income distribution spending up to 59 percent of their income on food (Nakamura et al., 2016). In general, shocks —particularly those related to drought and flood risks— are also more frequently reported by rural households, highlighting their higher exposure and vulnerability to adverse natural events (Figure 61).

3.2. Food insecurity in Niger

In a country where farming and animal breeding are the main livelihood means for more than 80 percent of the population, and agriculture contributes to 40 percent of the GDP, climate-related shocks have a large potential for adversely impacting poverty and food security. As most cultivated land is not irrigated, most farmers depend on rainfall. Agriculture is thus highly vulnerable to external shocks, particularly to droughts common in the Sahel, but also to floods mainly in the southwestern part of Niger. The Nigerien population is highly exposed to droughts and floods and has suffered from recurrent food insecurity episodes in recent years with several million people requiring food assistance.[86] The Cadre Harmonisé and the Food Security Cluster estimated in March 2021 that 2.343 million people (-or ca. 9 percent of the entire population) -were to be food insecure over the lean season (June–August 2021), of which 1.3 million persons are being prioritized (WFP, 2021), with 218,000 in emergency need.

86 Besides food insecurity, malnutrition and stunting are serious issues in Niger. It is estimated that 15 percent of children under five years old suffer from acute malnutrition and 48 percent of children suffer from stunting (UNICEF, n.d.).

Figure 61. Shocks are more frequent in rural areas



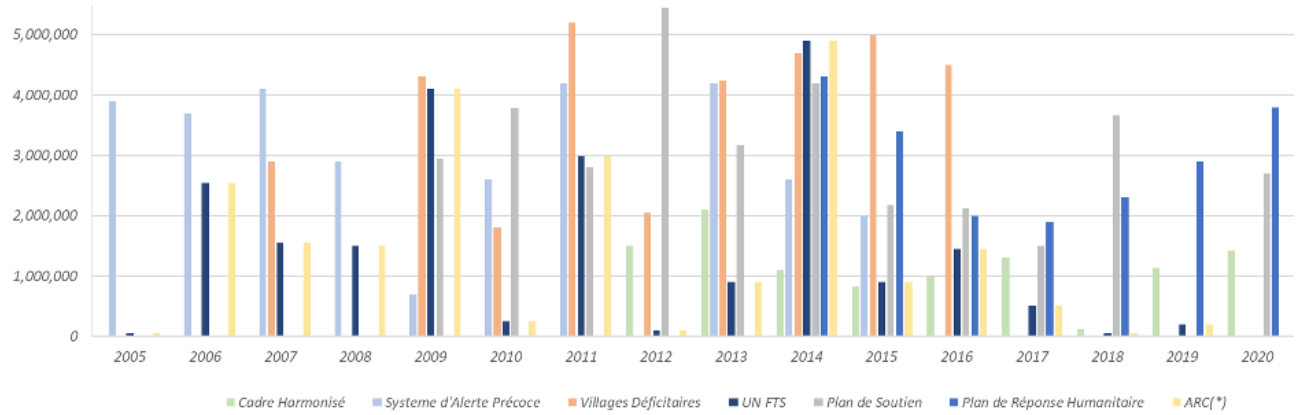
Note: The graph depicts the ratio of the percentage of rural households that have experienced shocks to the percentage of urban households that have experienced shocks. Blue bars denote that the ratio is significantly higher than 1; green bars denote that the ratio is significantly lower than 1; orange bars denote no significant difference between rural and urban areas. This analysis does not capture the impact of these shocks, so it does not provide information on whether shocks experienced by rural households have a larger or smaller effect on welfare than shocks experienced by urban households.
Source: Reproduced from World Bank (2017). Computations based on LSMS-ISA data.

The number of people affected by food insecurity is high, but highly diverges across sources. Depending on the source and the methodology employed, the numbers can significantly diverge. Building on the analysis of seven different sources, Figure 62 illustrates how (i) different datasets show different estimations of food insecure people in Niger; and (ii) that the number of people affected by food insecurity is persistently high, not just during times of adverse natural events and conflict, but throughout.

As in other Sahelian countries, in Niger the drivers of chronic and transitory food insecurity are diverse. On the one hand, climate variability leads to recurring production shocks that push many agropastoral households into short-term food insecurity during drought years. This compounds with the deterioration of security conditions across the country which also affects local productive activities. On the other hand, structural factors leading to permanent food insecurity include an economy dominated by agropastoral activities exposed to climate-related hazards, basic production techniques that have not evolved quickly enough, and rapid population growth resulting in new farming in marginal lands unsuitable for rain-fed agriculture. Access to land is also a problem and cultivated areas have been experiencing continuous fragmentation. Low level of education, lack of health and road infrastructure, poor access to drinking water, and cultural factors are also often cited as factors limiting agricultural development (WFP, 2010).

While adverse natural events can diminish food security levels, chronic food insecurity issues are also prominent. The prevalence and magnitude of chronic food insecurity were estimated in 2019 in 24 areas that included 13 different livelihood zones of Niger. The population was classified in four different categories based on the Integrated Food Security Phase Classification (IPC) Framework, considering

Figure 62. Number of food insecure people and humanitarian response in Niger according to multiple sources



Source: Authors based on data from: Cadre Harmonise, Système d'Alerte Précoce (SAP), Villages Déficitaires, UN OCHA Financial Tracking System (FTS), Plans de Soutien, Plan de Réponse Humanitaire, and ARC.

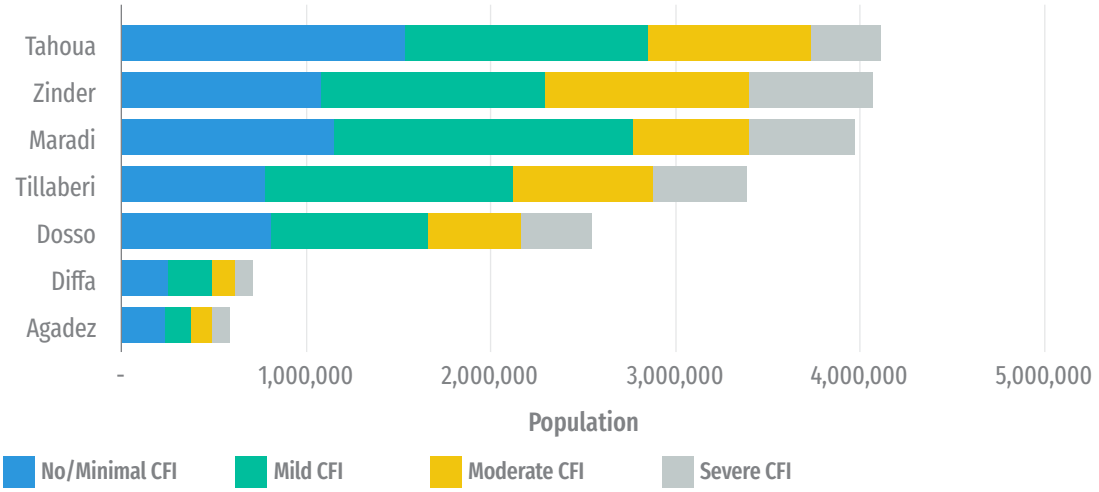
three areas of food security: the quality of food consumed, the quantity of food consumed and chronic malnutrition (IPC, 2019).[87] At the national level, one out of three Nigeriens were assessed to be in moderate or severe chronic food insecurity, with recurrent seasonal food deficiencies two to four months per year, and an undiversified diet. An analysis at the regional level shows that chronic food insecurity is widespread in Nigerien territory (Figure 63 USAID, 2019). The high degree of chronic food insecurity, high vulnerability of the population, and low resilience capacity to shocks implies that climate-related hazard as droughts or floods can seriously strain food security of Nigeriens.

4. MACRO-ECONOMIC IMPACT OF DISASTERS

Droughts and floods are the most prominent natural events affecting Niger's households and the economy. Though data is still scarce, recent studies and assessments suggest a limited yet significant growth impact from floods and droughts, with different dynamics depending on disaster characteristics. While floods are fast-onset events usually limited in time and location and foremost produce losses and damage to assets, droughts as slow-onset events can last over long periods of time and impact the wider economy through various channels.

87 Chronic Food Insecurity (CFI) is defined as "food insecurity that persists over time, especially for structural reasons". This means that food insecurity exists even during periods other than exceptional periods (i.e., periods when no atypical events occur). Four categories of CFI are distinguished in the IPC framework: (i) No/Minimal CFI: Households are continuously able to access and consume a diet of acceptable quantity and quality for an active and healthy life. Household livelihoods are sustainable and resilient to shocks. (ii) Mild CFI: Households can access a diet of adequate quantity but not always adequate quality. Household livelihoods are borderline sustainable, although resilience to shocks is limited. (iii) Moderate CFI: Households have ongoing mild deficits in food quantity and/or seasonal food quantity deficits for 2 to 4 months of the year, and consistently do not consume a diet of adequate quality. Household livelihoods are marginally sustainable, and their resilience to shocks is very limited. Households are likely to have moderately stunted children; and (iv) Severe CFI: Households have seasonal deficits in quantity of food for more than 4 months of the year and consistently do not consume a diet of adequate quality. Household livelihoods are very marginal and are not resilient. Households are likely to have severely stunted children (IPC, 2019).

Figure 63. Classification of regional population by Chronic Food Insecurity (CFI) level



Source: Authors based on USAID (2019).

4.1. Macro-economic impact of droughts

Drought is a complex phenomenon with multiple channels of impact. A wide variety of definitions exist, but drought is generally categorized as either meteorological, hydrological, agricultural, or socio-economic. While the first two categories focus exclusively on physical characteristics, the fourth looks at supply and demand mismatches. The impacts of meteorological rainfall generally become apparent after a long period of lower-than-normal precipitation and its impacts on natural and socio-economic systems depends on a wide range of additional factors, such as local temperature and other climate conditions, land-use prevalence or irrigation and agricultural practices. Its economic impacts generally first materialize through damages to agricultural production, livestock, and water-related physical capital (e.g., hydropower generation plants or irrigation infrastructure) which lowers average productivity and prompts a fall of output. Over time, this tends to reduce human capital accumulation through reduced employment opportunities in rural areas, adverse coping mechanisms (e.g., malnutrition, schooling disruption) or even death, further impacting long-term growth.[88] Drought-related shocks can compound existing shocks, generate a complex set of interactions and trigger feedback loops with instability, violence or transnational conflicts, further worsening their economic impacts.

A recent World Bank study (Van der Borght, 2021) assessed the impact of droughts on growth in G5 Sahel countries. The study uses drought indices to examine the statistical effect on the growth rate of real GDP as well as on the level of GDP.[89] The growth impact of drought has

88 Although in the short run, this negative impact can be offset to some degree by aid influxes or counter-cyclical fiscal policies, these require appropriate institutions, adequate fiscal space and financing conditions as well as capacity to absorb expansive shocks to ensure a catching-up process.

89 The complexity inherent to an objective quantification of drought events led to the development of two drought indexes based on meteorological and hydrological information derived from remote sensing sources: A first measure of drought was built through the occurrence of long-lasting and significant rain deficit episodes—a rain-based index. A second measure of droughts was developed through the incorporation of temperature and evapotranspiration as factors influencing the severity of droughts—a Standard Precipitation and Evapotranspiration Index (SPEI-based index). The results reported correspond to the estimates obtained with the SPEI-based index, which provided results with higher statistical significance.

been estimated at the G5 Sahel regional level through two complementary models:

$$\Delta \ln Y_{i,t} = \alpha \ln Y_{i,t-1} + \beta_1 D_{i,t} + \theta X_{i,t-1} + \omega_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

$$\ln GDP_{i,t} = \sum_{j=0}^{6} \beta_j \cdot (D_{i,t-j}) + \omega_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

where $\Delta \ln Y_{i,t} = \ln Y_{i,t} - \ln Y_{i,t-1}$ is the growth rate of real GDP per capita; $\ln Y_{i,t-1}$ is the lagged log of GDP per capita; $D_{i,t}$ is the drought index; $X_{i,t-1}$ is a vector of control variables in lagged form that includes structural factors; ω_i are country-specific fixed effects; δ_t are fixed effects; and $\ln GDP_{i,t}$ is the level of GDP (in US$ 2010 constant).

For Niger, the study estimates that during the period of 1981-2018, the mean drought event has lowered the GDP per capita growth rate by -1.49 percentage points (p.p.) whereas severe droughts[90] triggered a GDP per capita growth cut of -2.75 p.p. With an average GDP per capita growth rate of 0.63 percent for the same period, this implies substantial losses as the mean drought event has the potential to undo approximately 2 years of average GDP per capita gains. Concerning GDP levels, a mean drought event is expected to reduce GDP by -4.46 percent and a severe drought may lead to a GDP reduction of -8.20 percent (Table 12). Again, with an average GDP growth rate of 3.01 percent per year during the period 1981-2018, these impacts imply a heavy toll on Niger's growth trajectory.

From a probabilistic standpoint, the model predicts that, on average, Niger experiences a drought year that lowers GDP per capita by -1.5 percent at least once every 2.2 years (1/0.45).[91] Figure 64 shows the growth effect of drought at different levels of the drought index percentiles depicting drought severity.[92] It highlights that for the 50 percent of smaller drought values, the expected growth reduction is below -1.5 percent whereas the 5 percent of most extreme droughts effect substantial GDP per capita loss of at least -3.6 percent.[93] It is important to bear in mind that the estimated losses are not to be interpreted as capital stock losses or damages but rather as output flow losses.

The study tested two types of indices, one rain-based and one that also accounts for evapotranspiration (SPEI-based). Results with a higher statistical significance were obtained using the SPEI-based index, suggesting that evapotranspiration plays a relevant role in explaining the impact of drought events in the Sahel. Looking ahead, mean temperature is expected to increase 1.5 times more rapidly over the Sahel region than the global mean. Through increased evapotranspiration and rising water needs of crops, climate change is thus likely to further exacerbate drought intensity in Niger, even in the absence of change to rainfall patterns. This calls for quick action aimed at increasing resilience to disasters to ensure climate change adaptation.

90 Severe droughts are defined by a drought index that is one standard deviation above the mean of the sample.

91 GDP per capita losses of -1.5 percent are reached at the 55th percentile of the drought index, which implies that a GDP per capita reduction of 1.5 percent has an annual probability of 45 percent to be exceeded (1 - 0.55). This probability of exceedance was estimated by computing the loss in terms of GDP per capita reduction (in percentage) as a function of different realizations of the drought-index. Estimates are based on the marginal impact of droughts.

92 The index reflects a situation where water deficits represent significant and long-lasting deviations from long-term averages, accounting for spatiotemporal heterogeneity of water balance patterns. Extreme values were detected using traditional Z-scores. Further details can be found in Van der Borght (2021).

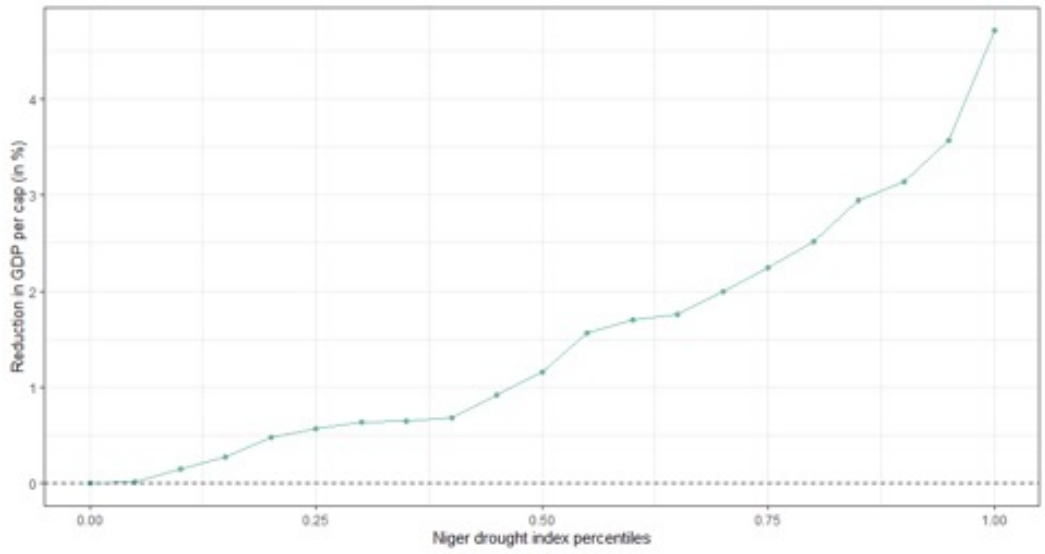
93 The non-linear relationship between drought index realizations and output losses is due to the very skewed distribution of the index values and is consistent with theoretical modelling results (Hallegatte et al., 2007).

Table 12. Growth impact of drought in Niger, 1981-2018

	Average drought year (i.e., mean index value)	Severe drought year (i.e., mean + 1 sd index)
GDP per capita growth rate reduction (p.p.)	-1.49	-2.75
GDP reduction (%)	-4.46	-8.20

Source: Reproduced from Van der Borght et al. (draft 2021).

Figure 64. Growth impact of drought as a function of drought indexes percentiles



Note: The figure plots the estimated loss in terms of GDP per capita reduction (in percentage) as a function of different realizations of the drought index.
Source: Van der Borght et al. (draft 2021).

4.2. Macro-economic impact of floods

Niger has a history of flooding with significant events in 2010, 2012, 2017 and 2020 that have rendered large amounts of damage and losses—often particularly severe in the housing sector—resulting in sizeable economic impacts (World Bank, 2020a). The most recent nationwide flood event took place in mid-2020 and led to catastrophic damages in Niamey. Starting from July and continuing intermittently until early to mid-September, heavy rainfall compounded with the silting of the Niger river led to riverine flooding and to a lesser extent, localized flashfloods. All regions of the country were hit, with the population affected totaling over half a million, a number comparable to those of the extensive flooding events in 2010 and 2012. Records indicate that about 50,000 houses and huts were fully destroyed. The most severely affected province in terms of population was Maradi with over 153,000 affected and 17,000 fully damaged houses and huts, followed by Niamey with over 96,000 affected and over 8,700 fully damaged houses and huts (World Bank, 2020a). In Niamey, all the neighborhoods bordering the Niger River, the country's main public university, the university hospital center, as well as several neighborhoods on the city's outskirts, were flooded.

An assessment of the impact of the 2020 flood event estimates the total direct damages and indirect losses at US$ 261.7 million, equivalent to 2.1 percent of the 2019 GDP. The Agriculture and Livestock (ca. US$ 125 million) and the Housing (ca. US$ 66 million) sectors were hit the hardest with ca. US$ 191 million or 73 percent of the total losses and damages.[94] However, the estimated costs of reconstruction are significantly higher than what notional figures may suggest, as many of the lost or severely damaged habitations or schools were built with very poor materials at the time of the disaster. The cost of replacement with higher construction standards to reduce the vulnerability of physical assets to future disasters—in line with the Building Back Better approach—would largely exceed the value of the existing houses. A preliminary estimation of the cost for the new houses is US$ 470 million. The same is valid for the waterways sector that has sustained damages of ca. US$ 14.6 million, but with reconstruction needs 8 times higher, equivalent to US$ 117 million. Overall, the financing need for the reconstruction amounts to ca. US$ 755 million or about 6 percent of GDP (World Bank 2020a, 2021c).

Nevertheless, the economic implications of the 2020 floods will likely be limited, as only losses related to productive sectors (e.g., agriculture, livestock, water management, industry, and commerce) are usually used to estimate the impact on GDP. Notably, losses and damages in agriculture and infrastructure exclusively accounted for ca. 1.4 percent of GDP, which is lower than for other comparable flood events. Most other sectors like manufacturing, trade, utilities, and transport have been only indirectly affected by the floods but have been severely hit by the COVID-19 pandemic. The combination of different shocks makes it hard to assess with confidence the economic repercussions, and it is particularly difficult to disentangle the idiosyncratic effects of the shocks on GDP growth (World Bank, 2021c).

94 Further affected are Fisheries and Aquaculture sector (US $23.5 million, or 9 percent of total damages and losses); and Water and Sanitation infrastructure (US$ 22 million, or 8.5 percent of total damages and losses).

5. FUTURE DRIVERS OF DISASTER RISK: CLIMATIC CONDITIONS AND URBANIZATION TRENDS

5.1. Recent climate trends and future conditions

Niger is a Sahelian country presenting in large part a hot arid desertic climate, with a small part in the south being classified as hot semi-arid (Kottek et al., 2006). Temperatures are elevated year-round, with annual averages ranging from 21.9 to 36.4°C[95], with cooler temperatures in the mountainous regions (World Bank, 2021a). Below an altitude of 500m, recorded monthly means of diurnal temperature are consistently above 30°C and nocturnal temperature above 15°C (World Data, n.d.).

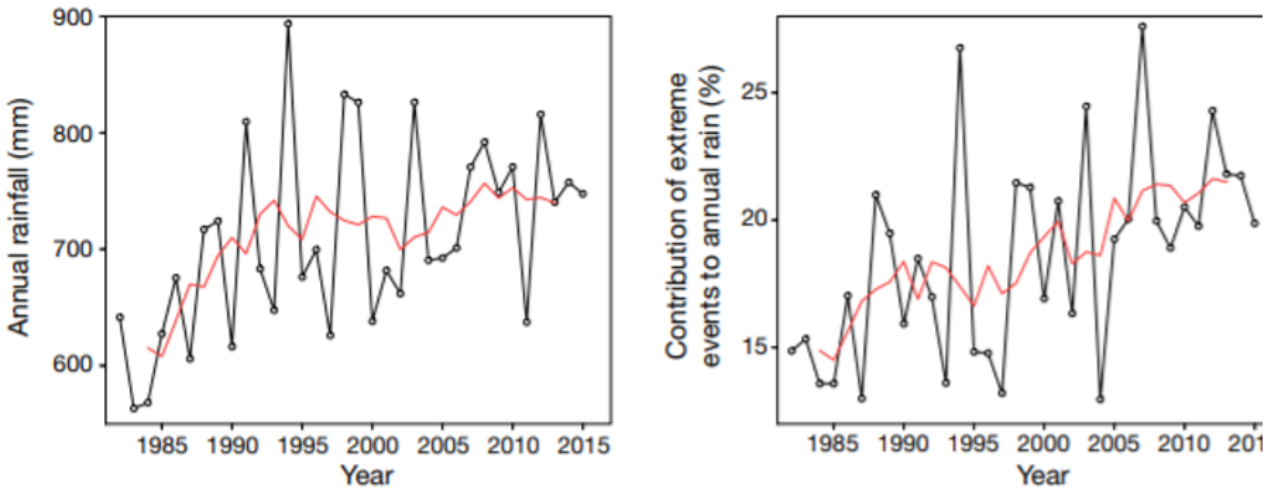
Precipitation is concentrated in the boreal summer months, with the south receiving more than the north (up to 500-600 mm per year), as Niger is located in the northernmost latitudes impacted by the West African Monsoon (WAM) jump and the Intertropical Convergence Zone (ITCZ) migration. The Sahel is characterized by high interannual and interdecadal climate variability, influenced by climate cycles related to sea-surface temperatures anomalies in the Atlantic, east Pacific, Indian Ocean, and the Mediterranean, with long-lasting drought periods alternating with wetter ones (Buontempo et al., 2010; UNDP, 2021). The long droughts of the 1970s and 1980s, were attributed to the conjunction of cooling of the North Atlantic (potentially because of sulphate aerosol emissions), the main source of moisture of the WAM, and the global increase in ocean sea surface temperatures (Giannini, 2015).

However, In the past three to four decades, summer rainfall has increased in Niger, leading to a return to yearly rainfall close to the levels of the 1960's, while temperature has risen at about 0.15°C per decade, with higher numbers of warm days, and lower numbers of cold days and nights, overall amplifying the impacts of meteorological droughts (FEWSNET, 2012). This yearly precipitation recovery has manifested in the form of extended tails of short-term (e.g., daily and multi-daily) rainfall distributions which has happened throughout the Sahel (Tschakert et al., 2010), and is generally associated with floods (Panthou, 2013; Descroix et al., 2015; Panthou et al., 2018). This has been related to both warming of the northern Atlantic Ocean (whether this is due to the Atlantic Meridional Overturning Circulation, decrease in aerosol loadings thanks to regulations, or global ocean warming), contrary to what had happened in the 1970's and 1980's, and increases in land surface temperatures (Hoerling et al., 2006; Giannini et al., 2008; Giannini et al., 2013; Taylor et al., 2017). Satellite observations also confirm that the number of extreme events as been steadily increasing (Figure 65).[96]

95 Although temperatures during the day can be significantly higher.

96 In Niger, the African Monsoon Multidisciplinary Analysis–Couplage de l'Atmosphère Tropicale et du Cycle eco-Hydrologique AMMA-CATCH (Galle et al., 2018), station network provides sub-hourly precipitation data since 1990, extremely useful to study precipitation regimes. Intensity Duration Area-Frequency curves have been developed (Panthou et al., 2015), and might be available to deepen the analysis of impacts presented above.

Figure 65. Contribution of extremes to annual precipitation since 1982 according to satellite observations



Source: Taylor et al. (2017).

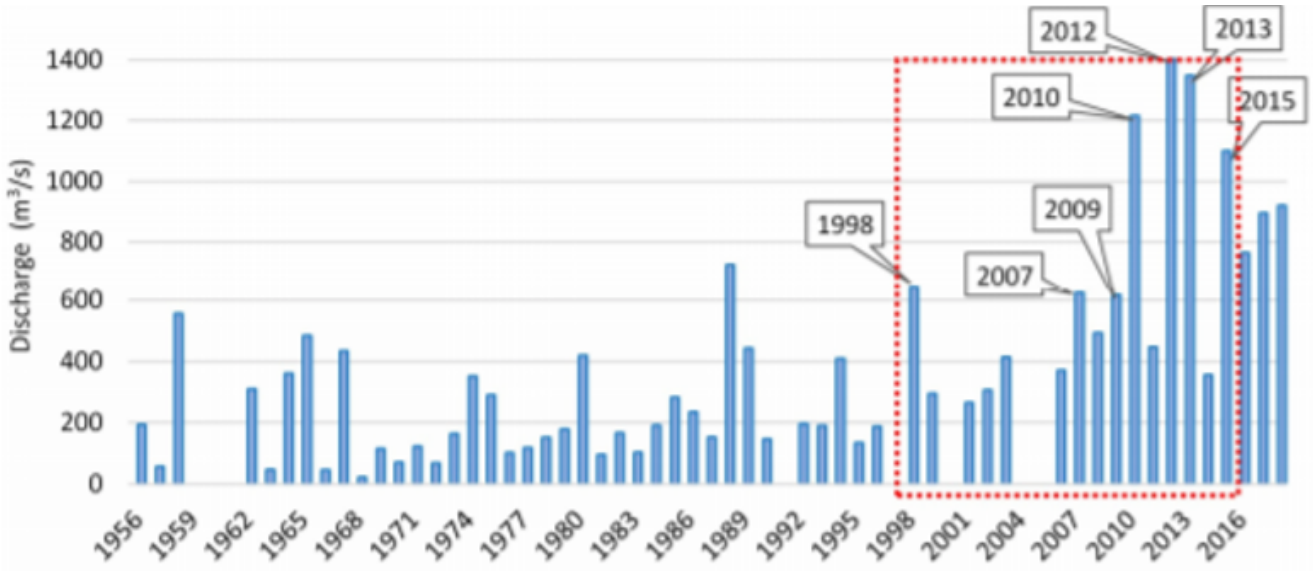
Upward trends in land surface temperatures are expected to continue, with the potential for +4°C warming by the end of the century. Given the mechanisms described earlier to explain recent trends in precipitations, there are reasons to expect increased spatial and inter-annual variability in Sahelian rainfall. However, there is still considerable uncertainty regarding the overall sign and the exact location of the changes, as multiple processes could influence rainfall variability evolution—such as a potential strengthening of the Saharan Heat Low and its impacts on the East / West difference in Sahel precipitation change and the exact location of this boundary—and none of the modalities of these phenomena and their interactions are fully understood yet.

Despite the limited capacity of climate models to represent complex regional patterns and to detect trends in extreme rainfall regimes[97], most recent research points to more extreme rainfall events in Niger. The models do not capture very well the relationship between observed Sea Surface Temperatures and the East/West precipitation change dipole, and have trouble reproducing mesoscale convective rainfall patterns (Kendon et al., 2014; O'Gorman, 2015), which are critical to capture the spatial organization of rainfall events, although changes in rainfall distribution throughout the year have already been evoked (Biasutti & Sobel, 2009; Sultan et al., 2014). However, while future consequences at the country scale remain uncertain, recent research improving the ability to model relevant mesoscale convective processes does point towards the potential for more extreme rainfall events in Niger specifically, and within the greater Sahelian region (Fitzpatrick et al., 2020).

These changes in rainfall across the region can have complex impacts on land cover, which might in turn affect rainfall patterns (Saley et al., 2019). These dynamics may lead to unintuitive consequences on surface hydrology (Descroix et al., 2018), such as the "paradox of the Sahel"

97 Panthou et al. (2014) state that "This is even more true for West Africa where recent studies (e.g., Biasutti (2013); Monerie et al. (2012)) establish that the most recent ensemble climate simulations of Coupled Model Intercomparison Project (CMIP) Phase 5 behave similar to the previous CMIP Phase 3 simulations, known for their weakness in reproducing correctly the spatial patterns and multi-decadal variability of the West African rainfall".

Figure 66. Time series of annual maximum discharge of the gauging station of Garbey Kourou



Source: Tamagnone et al. (2019) and Massazza et al. (2019).

in the 1980's, where the meteorological drying was accompanied by increased riverine flooding (see Figure 66), a trend that has now amplified with the return of rainfall (Descroix et al., 2013). At present, both extrapolating 20th century trends and using current climate projections as they exist seem like an ill-fitted approach. Coming up with a flexible decision-making project design and management frameworks that are able to incorporate new information as research progresses is therefore critical.

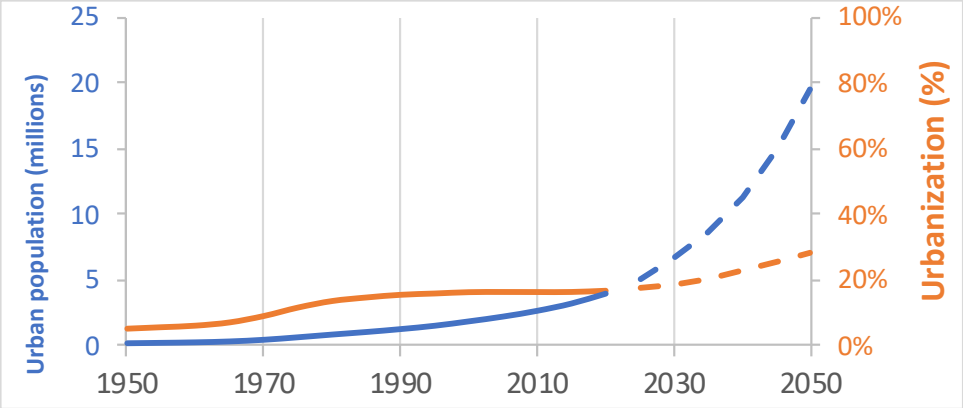
5.2. Urbanization context and projections in Niger

Projections points to a very steep increase in urbanization levels. Currently only 4 million people live in areas classified as 'urban' (estimated as close to 17 percent of total population; UN DESA, 2018). This number is expected to increase significantly by 2050 when urban population will reach 20 million—growing at an average of about half a million new urban dwellers per year (Figure 67).[98] In Niger, 33 percent of the urban growth is explained by migration (World Bank, 2021b). Climate change and adverse natural events might impact the rural-urban migration dynamics and increase urbanization. In turn, the projected demographic and urbanization trends in Niger could lead to an increase of the negative effects of flood events through higher exposure and vulnerability.

While short- and medium-term social protection measures are required to support the population in coping with adverse natural events, long-term solutions are critical. On the one hand, investments in irrigation and water management infrastructure are key to reducing the country's vulnerability to droughts and increasing the welfare of the population. On the other hand, to avoid even

98 Although due to projected demographic patterns, this will only represent 28 percent of the total population at the time. Population is and will continue to be primarily rural for the foreseeable future (World Bank, 2021b).

Figure 67. Urbanization projections in Niger



Source: Authors with data from UN DESA (2018).

more negative consequences of future floods, developing integrated urban land-use policies and plans, resilient infrastructure, and risk reduction strategies is needed. This shift requires a strong investment in local Government capacity to implement a comprehensive disaster risk management agenda and strengthen institutional arrangements for the coordination between ministries and local governments.

6. INSTITUTIONAL AND POLICY FRAMEWORK FOR DISASTER RISK MANAGEMENT

6.1. National institutions

Niger has progressively developed a disaster risk management framework. This framework has informed Niger's overarching development planning strategies, including (i) the Niger Economic and Social Development Plan 2017 - 2021 (PDES 2017-2021)[99], which intends to "strengthen the resilience of the economic and social development system"; (ii) the 2021 policy declaration of the newly elected government informed by the Third Program of Renaissance, which identifies the strengthening of Disaster Risk Management as a key priority area[100], as well as (iii) the Country Partnership Framework with the World Bank Group for the period 2018-2022 (World Bank, 2018b). Various institutions are involved in and responsible for DRM functions. However, the country does not have a DRM law, meaning that institutional mandates often overlap, and their application is often limited by human and financial resources.

6.2. Disaster risk management policies, strategies, and tools

The different national structures (described in the Appendix) interact based on various disaster risk management policies, strategies, and tools.

From the available data it can be noted that DRM-related expenditure has a limited scope and relevance with a staggering underperformance. Following an initial review of FY 2018 data, approximately 7 percent of the total

99 https://www.undp.org/content/dam/niger/docs/UNDP-NE-PDES%202017-2021.pdf
100 http://www.gouv.ne/index.php/1359-comprendre-les-axes-de-la-declaration-de-politique-generale-dpg

portfolio of governmental programmatic actions (37 lines in total) can be considered DRM-related (Appendix E). The share of these aggregated DRM-related expenditure lines over total public expenditure is close to 2 percent, which contrasts with the initially planned allocations to DRM of close to 4 percent of the budget. In terms of budget deviation, the level of underperformance in the sector is larger than the overall public expenditure: the aggregated DRM-related budget lines have an execution rate barely over 35 percent. Additional information is needed to have a more comprehensive understanding of the nature of resource underutilization. In general, the disparities in budget execution and the challenge of obtaining reliable information limit the correct measurement of the sectorial expenditure.

Niger's National Disaster Risk Reduction Strategy (SN-RRC), 2019-2030: In line with the Sendai Framework for Disaster Risk Reduction 2015-2030, the strategy is based on four areas, as follows: (i) Strategic Axis 1: Understanding disaster risks; (ii) Strategic Axis 2: Strengthening disaster risk governance to better manage disaster risks; (iii) Strategic Axis 3: Investing in DRR for resilience; and (iv) Strategic Axis 4: Strengthening disaster preparedness to respond effectively and "build back better" during the recovery, rehabilitation and reconstruction phases. The action plan linked to this strategy, which covers the period 2019-2023 aims to contribute to reducing disaster-related damages and losses by addressing the underlying factors of risk and vulnerability, strengthening the resilience of populations, and of socio-economic infrastructure.

The National Strategy for Sustainable Recovery (SNRD) aims to be a participatory, constructive, and integrative framework of actions and actors focused on supporting resilient post-disaster recovery. It is based on the existing institutional and political framework and is founded on the principle of making the most of feedback. Thus, the strategy takes into account the achievements of pre-existing institutions such as the Ministry of Humanitarian Action and Disaster Management (MAH-GC), the High Authority for the Consolidation of Peace (HACP), the Civil Protection General Directorate (DGPC), the National Mechanism for the Prevention and Management of Food and Nutritional Crises (DNPGCCA), and its branches, as well as the regional, departmental and communal committees that work in the field of disaster management in general and recovery in particular. This strategy also takes into account the guidelines resulting from the Sendai conference, in particular, the 2015-2030 Disaster Risk Reduction Action Framework and the guide for the preparation of the post-disaster recovery framework (Sendai conference version, March 2015).

The Early Warning System (EWS): The National Early Warning System[101] provides measures to alert and inform the public, in all circumstances, including threats, accidents, and adverse climate events. The warning aims to allow the public to prepare and act appropriately in a timely manner to reduce the risk of damage or loss. According to the law, the responsibility for alerting a given population, in connection with the implementation of an Organizational Plan for emergency response (ORSEC), rests with the mayors at the local level, the prefects for the departments and the Governors for the regions. As for the national level, the decision to activate the alert resides within the Prime Minister who can delegate this decision to the Minister of Interior in charge of Civil Protection, or any other Minister appointed to manage the event.[102]

Emergency Preparedness and Response Plans (Organizational Plan for emergency response - ORSEC; Municipal Safeguards Plans): The country, relying on the technical support from the DGPC, aims to develop

101 Established by Decree No. 2018-538/PRN/MISP/D/ACR dated July 27, 2018.
102 Article 5 of Decree No.2018-538/PRN/MISP/D/ACR of 27 July 2018.

emergency preparedness and response plans at the national and territorial levels. The ORSEC Plan organizes the mobilization, implementation, and coordination of the actions of any public and private person contributing to the general protection of the populations. The Municipal Safeguards Plan defines, under the authority of the mayor, the organization planned by the municipality to ensure the dissemination of warnings, sharing of information, and protection and support of the population in view of the known risks. It is complementary and aligned with the ORSEC plan.

Harmonized Framework for Food and Nutrition Security analysis (ISAN): The Harmonized Framework (HF)[103] is a unifying tool that allows for a relevant, consensual, rigorous, and transparent analysis of current and projected food and nutrition situations. It provides a classification of the severity of food and nutrition insecurity according to the international classification scale and refers to well-defined functions and protocols. The results of the HF are communicated in a clear, coherent, and effective manner to support decision-making by linking information to action. The HF provides a platform to facilitate planning for response to food and nutrition crises.

7. DISASTER RISK FINANCING IN NIGER

Adverse natural events affect millions of Nigeriens and are an important challenge for fiscal sustainability and economic development of Niger. In order to allow Niger to adequately budget for disaster response, the country needs to know its disaster-related costs. This section seeks to quantify these costs, namely food insecurity costs related to droughts and other perils as well as agricultural shocks. It then details the known available instruments for disaster response and their funding, allowing to quantify the current funding gap for disaster response in Niger.

7.1. Costs of food insecurity and, emergency response

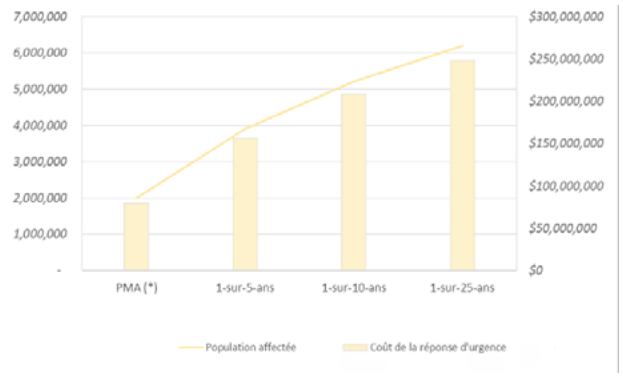
Drought-related food insecurity is a major liability for Niger. As part of this study, an actuarial analysis was developed, fitting frequently used distribution curves for drought, and applying them to historical data from the African Risk Capacity from 2005 to 2020, adjusted to 2021. Assumptions between the fitting (e.g., type of distribution, detrending) appear to not have a major impact on estimates, so the major source of uncertainty is the historical reference data for this assessment. The cost of the emergency response is modeled by estimating a cost per person of US$ 40 as Average Annual Loss (AAL), which is based on global experience, that is, not specific to the food insecurity situations faced per capita from year to year which are highly volatile.

The results show that drought-related emergency costs in Niger amount to nearly US$ 100 million per year. Figure 68 provides further details on drought-related emergency costs to respond to food insecurity, as well as people affected by drought-related food insecurity. On average, 1-in-5-year droughts cause liabilities of almost US$ 200 million. This number jumps to about US$ 250 million for 1-in-25-year events.

Overall shock-related food insecurity is an even bigger liability for Niger. Figure 69 takes into consideration a mix of Humanitarian Response Plan data and EWS estimates and considers climate causes (drought, heatwaves, and flood) as well as conflict/violence, political instability, commodity price/trade shocks and unstable markets, and forced migration. When considering this mix of causes of food insecurity, annual liabilities related to food-security costs amount to US$ 150 million on average. However, the average costs of US$ 150 million can increase significantly when disasters arise. As Figure 70 shows, Niger faces emergency response costs of over US$ 200 million every five years and of nearly US$ 300 million every 10 years on average.

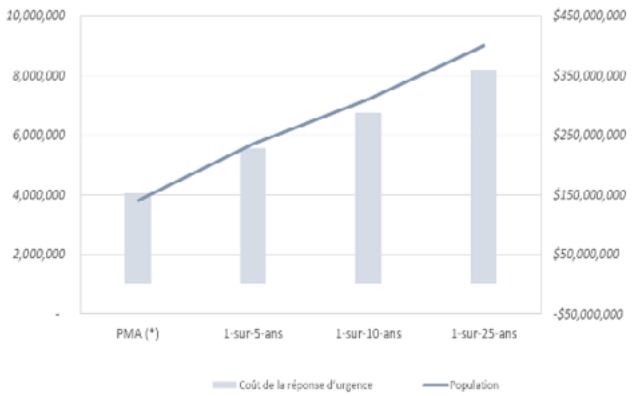
103 Harmonized Framework: Manual Version 2.0 Analysis and Identification of Areas at Risk and Food and Nutritionally Insecure Populations, CRA.

Figure 68. Drought-related food insecurity



Source: Authors based on the ARC dataset adjusted to 2021.

Figure 69. Overall costs related to food insecurity



Source: Authors based on data from the Humanitarian Response Plan and SAP datasets adjusted to 2021.

7.2. Disaster Risk Financing (DRF) in Niger

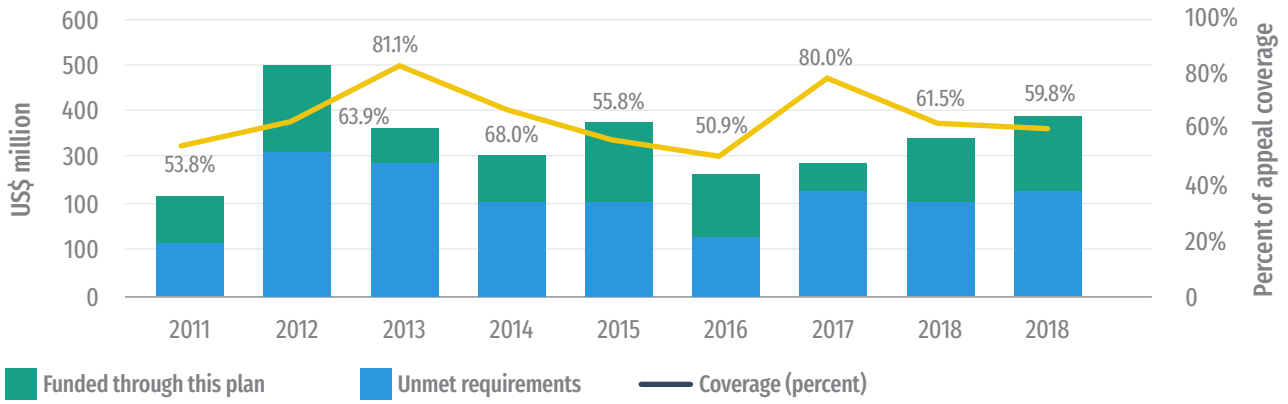
Niger is heavily dependent on ad-hoc international humanitarian aid to finance its shock-response. From 2012 to 2019, Niger received between US$ 200 and US$ 400 million per year in external international humanitarian assistance (OCHA Financial Tracking System) in total. The country is currently not sufficiently prepared to deal with shocks, and finances its humanitarian shocks mostly ex-post through external donor support as well as to a lesser degree through budget reallocations.

Relying on humanitarian assistance following disasters, Niger faces uncertainty regarding the amount of funding mobilized as well as delays in the provision of assistance. While humanitarian assistance is free from the point of view of governments, in many cases there are funding shortfalls, leading to a gap between the amount of the appeal and funding provided. With humanitarian assistance arriving on average 7 to 9 months after a disaster, this approach is slow and unreliable, leading to unnecessary loss of lives and livelihoods. Uncertainties over amounts of funding available can undermine government planning of response efforts, and lead to shortages in the assistance provided to the affected population. In the case of Niger, appeals between 2011 and 2019 were on average funded at 63.9 percent, as shown in Figure 72.

DRF can reduce the economic, fiscal, and human impact of disasters. Developing a DRF strategy could allow the Government of Niger to further quantify its risks, discuss what risks will be taken on by the Government at different levels (national/regional/local), what risks will be shared with others such as households and firms, and what risks will be shouldered by international partners. Based on core principles for effective DRF, a DRF strategy could help the Government of Niger by putting in place the right financing instruments and making available adequate financing to ensure that funds are available quickly when – and only when – they are required. In addition, the strategy would bind all stakeholders involved in disaster response to pre-agreed objective and transparent objectives, decision-processes, and implementation modalities to guarantee that resources reach the people who need them the most, when they need them most.[104] In view of developing such a strategy, the Government of Niger has appointed an inter-ministerial committee (decree 0126, "Comité Interministériel en charge de l'élaboration d'une Stratégie Nationale de Financement de Risques des Catastrophes au Niger".

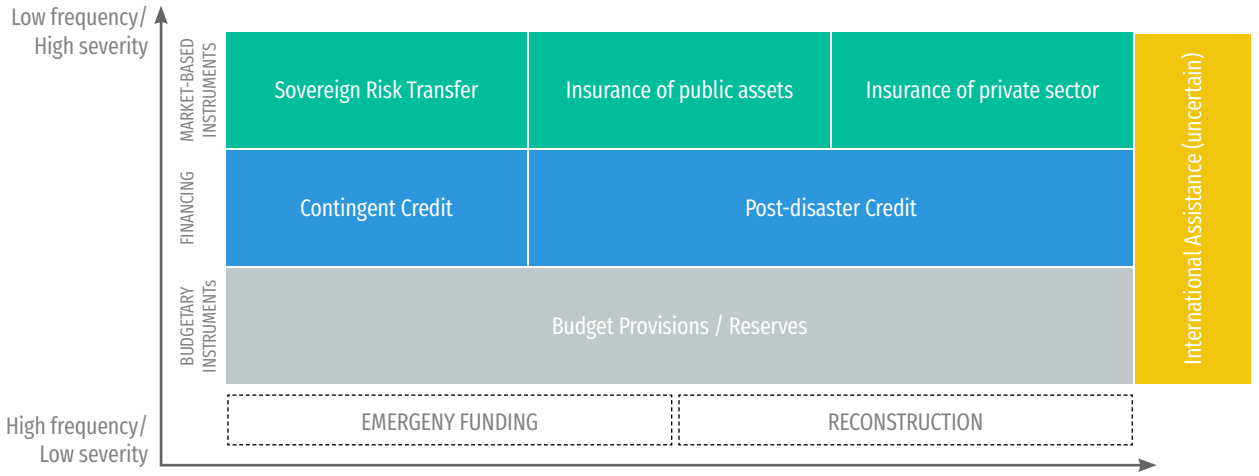
104 An Introduction to the principles of disaster risk finance can be found on the World Bank's Financial Protection Forum website: https://www.financialprotectionforum.org/

Figure 70. Niger appeal amounts and coverage 2011 – 2019



Source: Authors based on OCHA FTS.

Figure 71. Financial instruments for disaster response – a framework

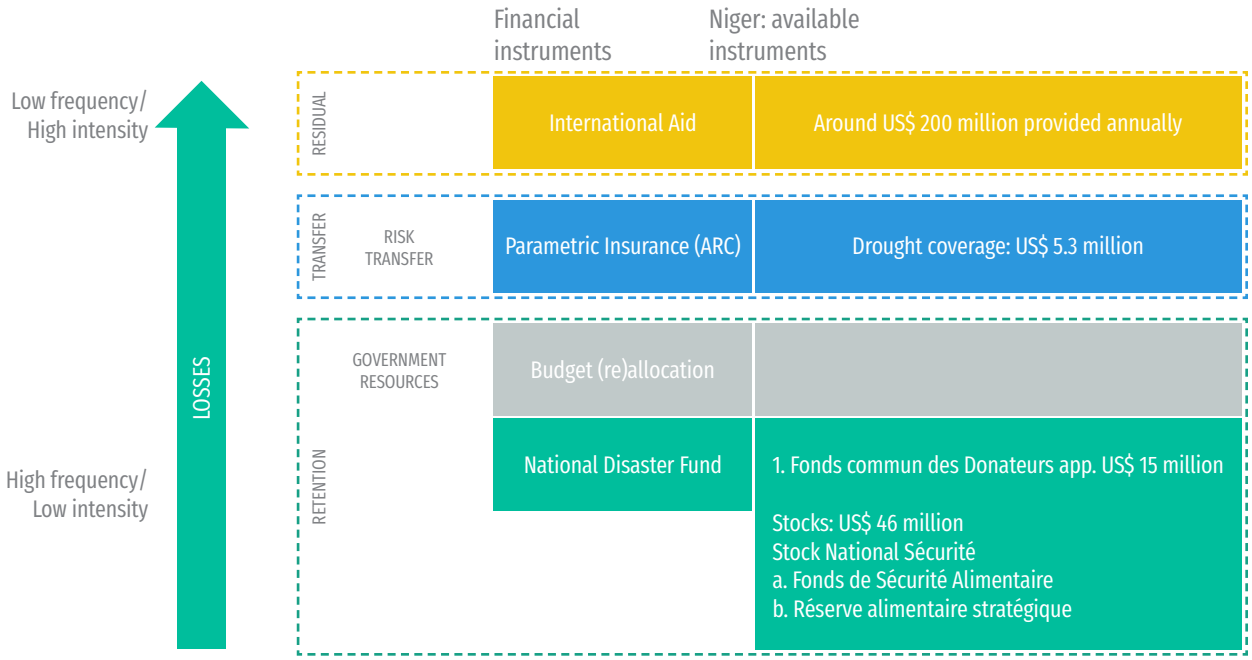


Source: Adapted from Mahul et al., 2014.

A disaster risk layering approach could support the Government of Niger financially manage its risks more efficiently. Risk layering refers to the combination of instruments to ensure cost-efficient financing for emergency response and long-term recovery. Governments can reduce the economic and fiscal impact of disasters by combining instruments which cover different identified risks. Events of different magnitude are covered by different types of instruments. The relevant literature suggests that the combination of financial instruments for disaster response is cost-effective.[105] Figure 71 provides a general overview of financial tools for disaster response for different risk layers and response phases. Frequent risks with low impacts could be reduced through either risk mitigation or budgeting/reserves, depending on the losses and the related costs. For medium-sized events, contingent financing can complement reserves if needed, and post-disaster credit can finance long-term reconstruction. For more extreme but rare shocks, risk transfer instruments can typically provide additional protection to the government

105 See for example Clarke et al, 2016.

Figure 72. Financial instruments in Niger



Source: Authors.

and private sector (business, households, farmers, etc.) most cost-effectively. Some of the mentioned tools are ex-ante instruments put in place by the government prior to the disaster, while others are ex-post instruments mobilized after a disaster (e.g., post-disaster credit).

7.3. Available DRF instruments including insurance

Niger has some disaster risk financing instruments in place. As outlined above, no single instrument is optimal for responding to all disaster events. The most cost-effective way of financing disaster response is through a range of tools to address different layers of risk, ranging from frequent small-scale events to rare catastrophic events. Figure 72 shows the availability of these tools in Niger.

1. Risk Transfer

African Risk Capacity — US$ 5.3 million coverage

Niger is a member of the African Risk Capacity (ARC) and has been intermittently purchasing ARC's drought insurance. Founded in 2014 as a specialized agency of the African Union, ARC has been offering parametric insurance for drought-related emergency relief expenditure. As a regional risk pool for African countries, ARC aims at offering insurance at a lower price compared to commercial insurance. In order to participate in ARC, countries need to sign a Memorandum of Understanding (MoU) with ARC and to develop a contingency plan and operations plans to detail the use of potential future insurance pay-outs. Niger signed its MoU in 2016 and has been purchasing drought insurance between 2014 and 2017 and since 2019. The

maximum cover is US$ 5.3 million. In 2016, the Government of Niger received a US$ 3.5 million pay-out which it used to finance cash for work and targeted food distribution activities.[106]

Several programmes are currently working towards expanding ARC coverage, and Niger is participating in some of them. Whilst traditionally targeting farmers, ARC has developed an alternative product for pastoralists which is currently being tested in Niger. (ARC 2020a). ARC is also testing a flood index insurance pilot in four countries (not in Niger), which it is hoping to officially introduce later in 2021.[107] In 2018, the African Development Bank (AfDB) launched the Africa Disaster Risk Financing Programme (ADRiFi), which co-finances ARC premium payments of recipient governments as well capacity-building measures (national institutional strengthening, policy development, risk profiling, and contingency planning). Five ADRiFi country projects have so far been approved, including a EUR 4.8 million grant to the government of Niger.

2. Risk Retention

a. Fonds Commun des Donateurs (FCD)/National Disaster Fund — US$ 14.8 million coverage.

The FCD is a central relief fund though which the Government of Niger (Dispositif, DNPGCA) finances food security interventions. Funded through annual donor contributions, donors channel and coordinate their humanitarian food relief funding. Funding is approximately US$ 14.8 million per year [as per 2008-2017 data, further data is needed from the GoN to corroborate this]. It is unclear how much of this funding can be categorized as ex-ante disaster risk financing and how much of it is ad-hoc or ex-post funding (Achirou, 2017).

b. Food Reserves — US$ 45.9 million. Niger operates two national strategic food reserves:

- The 'Stock National de Sécurité' (SNS), created at the end of the 1980s, is managed by GoN together with donors. Food stocks are disbursed after an early warning system alert and with the agreement of both the government and the donors group. The strategic food reserve (SFR) consists of a physical and a financial reserve, the Fonds de Sécurité Alimentaire (FSA) aiming to hold 60,000 tons of cereal.

- The 'Réserve Alimentaire Stratégique' (or Stock d'Intervention) was created after the food crisis in 2005 and is solely manged by GoN (Office des Produits Vivriers -OPVN). As many other SFRs in the region, stocking targets of Niger's SFRs have been missed. Between 2002 and 2010, the SNS was only stocked at 41 percent, or 62,000 tonnes. On the local level, local stocks are community stocks and managed by communities themselves.

3. External Finance

Additional external finance is in place to support disaster risk financing in Niger. (i) The World Bank Sahel Adaptive Social Safety Nets Program supports the Government of Niger in the development of an adaptive social safety nets program which can immediately protect poor and vulnerable populations in the case of natural disasters (drought thus far). US$ 8.5 million are in place to develop a shock-responsive pilot (total funding for the whole Niger Adaptive Social Protection Project 2 is US$ 210 million). In the future, financing arrangements will need to ensure sustainable financing. (ii) A Regional Food Security Reserve (RRSA) was founded in 2013, with a target size is 411,554 MT,

106 ARC (2017): Lessons Learned Summary Report: 2014/2015 ARC payouts: Senegal, Niger, Mauritania, ARC-2015-Payout-Lessons-Learned-Summary-Report.pdf (africanriskcapacity.org)

107 African Risk Capacity (2020): Updates. https://www.africanriskcapacity.org/updates/

with 140,000 MT held in a physical reserve and 271,554 MT in a financial reserve, but by the end of 2020, the physical reserve only amounted to 32,000 MT and no funds had been committed to the financial reserve. (iii) External humanitarian financing accounts for the largest amount of external finance. Niger has been receiving between US$ 200 and 400 million per year in external international humanitarian assistance, according to the OCHA Financial Tracking System.

Financing gap

The Government of Niger faces a large financing gap. Niger disposes overall resources of US$ 66.02 million for all layers of risk (National Disaster Fund, Food Reserves, Droughty Insurance ARC), and US$ 60.7 million for the lower layers of risk (1-5 years, National Disaster Fund, Food Reserves). Compared to the mere cost of drought related food insecurity (US$ 100 million per year) and overall food security (US$ 150 million per year), the funding gap amounts to about US$ 40 to US$ 90 million per year. The funding gap significantly increases when taking into consideration the modelled food production shocks. The combined humanitarian and economic funding gap is of US$ 768 million for 1-in-5-year food production shocks and US$ 1.1 billion for 1-in-10 years food production shocks.

Options for disaster risk management and financing in Niger

Decreasing human and economic impacts of disasters in Niger requires significant investments and policy as well as capacity building efforts in risk reduction and planning, risk management and response as well as risk financing. Even though DRM has been identified by the Government as a priority in its Strategic Development Plan, the DRM sector still faces the following challenges linked to institutional and resources limitations:

Critical measures to be put in place by the GoN	Timeline for implementation	Fiscal implications
Strengthening of emergency preparedness and response capacities		
Adopt a DRM law clarifying roles and responsibilities for disaster risk management at central and local levels	Medium term	Low
Strengthen capacities for emergency preparedness and response at the national and local levels, including Early Warning Systems	Medium term	Medium
Use the National Platform to improve inter-ministerial and other stakeholders' coordination	Short term	Low
Strengthen DRM at the local level, within municipal planning and management	Medium term	Low
Enhance capacity and budgetary resources for disaster risk reduction, including investments in resilience in key sectors, integrated land-use planning building code enforcement and resilient infrastructure and services	Medium term	Medium
Need for Integrated DRM-FCV approaches to better capture the nexus linkages and interoperability (in terms of impacts to communities, resilience needs and programmatic approaches)	Long term	Medium

Critical measures to be put in place by the GoN	Timeline for implementation	Fiscal implications
Increase investment in disaster risk reduction and disaster risk management activities		
Limit disaster-related liabilities by investing in ways to prevent and mitigate the effects of disasters	Medium term	Medium
Implementing existing disaster risk financing strategy and investing in pre-arranged disaster risk financing instruments	Medium term	Medium
Develop a comprehensive Disaster Risk Financing strategy		
Develop systematic approach to financing different types of shocks	Medium term	Low
Identify gaps and opportunities for improving current funding framework to increase efficiency and effectiveness	Short term	Low
Improving data collection on both disaster risk and disaster response financing	Medium term	Medium
Work on risk layering		
Identify optimal risk layering	Short term	Low

Notes: short-term (1 year); medium-term (2-3 years); long term is +3 years; fiscal implications are estimated as low: affordable within current spending structure; medium: requires budget reallocation; high: need further reform, funding sources and domestic revenue mobilization.

8. CONCLUSIONS

While a DRM institutional framework exists, supported by various policies and tools, the DRM sector still faces the several challenges linked to institutional and resources limitations. Decreasing human and economic impacts of disasters would necessitate both short-term and long-term interventions to strengthen (i) the DRM governance structure, (ii) emergency preparedness and response capacities, (iii) risk reduction investments and policies both at the national and municipal levels; and (iv) Disaster risk Financing capacity. With the increasing threat of climate-change, investments in long-term solutions focused on integrated urban land-use policies and plans, resilient infrastructure, early warning systems, risk reduction strategies and risk financing strategies and tools are critical. In the short-term, this would allow the country to manage potential shocks to public finances, avoiding costly ad-hoc budget shifts and dependence on slow and unreliable humanitarian financing; and in the long-term, ensure a more resilient development process.

CHAPTER 6

Key policy options

Timeline for implementation: short-term (1 year); medium-term (2-3 years); long term (3+ years)

Fiscal implications are estimated as low: affordable within current spending structure; medium: requires budget reallocation; high: need further reform, funding sources and domestic revenue mobilization.

1. PRIVATE SECTOR DEVELOPMENT

Options to improve productivity and export orientations in the agri-business sector

High Criticality	Timeline for implementation	Fiscal implications
Enhance the quality of the export products of Niger by providing training and technical assistance to the different value chain actors and strengthening certification processes. While the monitoring and tracing technologies such as blockchain can play a significant role in ensuring compliance with market-relevant standards (e.g., the standards of importing countries, international standards for organic produce, fair trade, etc.), it is important that such compliance is certified by relevant entities of the destination countries. Although the process to turn around the quality of agricultural products from Niger will take time, the benefits of a credible quality seal for Nigerien agricultural exports for the value chains and the country are well worth it.	Long term	Low
Development of infrastructure. As a landlocked country, access to international markets is costly, but with adequate reforms Niger could export to large neighboring markets. Lowering transport costs would require investments in roads maintenance, removal of frequent roadblocks, and increasing competition in the trucking sector, as burdensome regulations are revised and streamlined. Developing advanced sustainable logistics infrastructure to transport securely across the Sahara into Europe should go beyond completing the non-asphalted part of the A1 highway, but developing renewable energy sources along the road, to allow electric truck convoys to cross the Sahara with zero carbon footprint. This cross-Saharan routes and power generation facilities would create inclusive jobs in lagging regions, helping reduce conflict and sharing the goals of economic development brought by the trade routes.	Long term	High
Medium Criticality	**Timeline for implementation**	**Fiscal implications**
Strengthen Farmers Organizations. The measures should include on the one side direct support and capacity building, and the establishment of suitable control and oversight mechanisms that foster a transparent operation on the other. The impact of projects that have not been given sufficient time and resources to address these issues has been significantly diminished, resulting in producer unions that were not able to take over the management of their organization upon project completion.	Medium term	Low
Building linkages between PPPs, SOEs and micro, small and medium enterprises (MSMEs). The public-private partnership (PPP) law of May 2018 is expected to pave the way for more PPPs which could improve the governance of the SOEs, while having much more spillover effects on the economy. For instance, the Niamey Airport was recently fully privately financed in exchange for a 30-year concession.	Medium term	Medium

Options to facilitate better adoption of digital finance and boosting financial inclusion in Niger

High Criticality	Timeline for implementation	Fiscal implications
Making the registration/use of the technology simple and trouble-free for the consumer by improving consumer protection reforms, and adopting tiered KYC measures such as using the equivalent of birth certificates instead of a formal ID to open formal account for women and other populations presenting low risk of AML/CFT.	Short term	Low
Developing digital payments in rural areas. As 71 percent of Niger's population lives in rural areas, this will be key. The Smart Villages project is a strong catalyst in this respect, as it is partnering with mobile money operators to improve connectivity in 2,100 villages, providing access to digital payments and finance to about 1 million individuals in rural areas.	Medium term	Medium
Digitalization of Government payments. If implemented, the strategy and roadmap for the digitalization of Government payments such as scholarships, safety nets, salary of contractual workers, and payments of taxes, will allow for the inclusion of about 800,000 individuals. It will also send a strong signal and build awareness on mobile finance. For instance, the Government of Togo was able to financially include 2 million people in few months during the COVID-19 pandemic, thanks to the digitalization of public financial aid through its NOVISSI system.	Short term	Low
Partnerships between mobile money operators, Fintechs and traditional financial institutions to encourage micro-credit and savings via mobile. As regulations do not allow MNOs to directly provide credit and savings, it will be key for them to partner with banks, Fintechs, and MFIs. This will be also to the advantage of banks as they need to digitize their services to expand their outreach and remain relevant. The leading example is M-Shwari in Kenya, a partnership between Safaricom (Kenya's leading telco, with a customer market share of nearly 70 percent) and CBA (a mid-sized bank in Kenya). This partnership reached 10 million customers within 18 months of launching, in part because it managed to cross-sell to users of Safaricom's M-Pesa. Other financial institutions – such as microfinance institutions, payment service providers and post offices – which have a large presence in rural areas should not be overlooked in that process.	Medium term	Medium
Promoting women's access to digital accounts. It will be key to put in place enabling laws and policies, and spurring innovative gender inclusive products to facilitate women's adoption of digital payments. Digital payments can facilitate transactions and reduce the risk of carrying cash on market day. Local markets can also be good places for providers to build awareness of digital innovations and onboard women over time. Special reforms to facilitate women's access to mobile handsets and management of mobile agent centers will also help. The experience of SEWA ICT and Community Learning Centers in India is a valuable experience that Niger can replicate. These centers serve women micro entrepreneurs and also operate as a learning center focused on digital finance. Following this, Niger could, for instance, add digital financial skills to all its existing learning centers.	Medium term	Low

Medium Criticality	Timeline for implementation	Fiscal implications
Linking the national biometric identification system with the banking sector to facilitate onboarding of new clients. A number of initiatives are underway in Niger that would allow for the financial inclusion of millions of people. These include ongoing efforts to connect the biometric system under the West Africa Unique Identification for Regional Integration and Inclusion (WURI) program, and the e-KYC system under the Smart Villages project, along with the creation of an adequate data protection legislation.	Medium term	Low
Developing a strong and liquid network of mobile finance agents across the country to deliver mobile money including cash-out services. This could be done through partnerships between mobile money operators and over the counter service providers. AIRTEL for example partners with Money gram in 40 countries. Special incentives will also be necessary for MNOs to develop a network of agents in unprofitable low-density areas.	Long term	Low

Options to facilitate better adoption of digital finance and boosting financial inclusion in Niger

High Criticality	Timeline for implementation	Fiscal implications
Address the shortcomings of the microfinance industry and give it a fresh impulse, involving FinTech solutions and new MFI players to the extent possible. Given its orientation and experience in serving smallholder farms and rural MSMEs, the microfinance industry will continue being an important player serving smallholder farms and rural MSMEs. To strengthen this industry, it is advised to a) advance and complete the process carried out by the Regulatory Authority of the Microfinance Sector (Autorité de Régulation du Secteur de la Microfinance, ARSM) to strengthen and clean up the sector, b) invite foreign MFIs successfully serving farms and rural MSMEs in other countries to set up shop in Niger, and c) foster the establishment of linkages between MFIs on the one side and FinTech companies providing payment and other services on the other.	Medium term	Medium
Design properly the Financial Inclusion Fund that is being set up to provide medium- and long-term loans to strengthen MFIs, Fintechs and banks through a combination of equity, loans and grants for digital transformation. A technically sound governance and decision-making structure, as well as adequate pricing policies and efficient procedures will be decisive to achieve the desired impact of this fund, which can become in time a crucial instrument to mobilize part of the large amounts of public and private resources required to facilitate the digitization of the financial sector. To be able to attract further medium to long-term funding, the fund must be itself operated in a sound and transparent manner.	Long term	Medium
Promote value chain financing (VCF) arrangements including the use of warehouse receipts. In Niger, such arrangements should be promoted as part of a strategy to enhance the performance of value chains. It should involve, to the extent useful, the use of contractual farming arrangements that provide certainty to buyers and sellers. Additionally, it should involve the use of cold and normal storages to strengthen a system in which stored crops can be used as collateral.	Short term	Medium

Promote the use of blended finance. In addition to further streamlining the use of matching grants, it seems advisable to promote the use of blended finance arrangements. These could crowd in private sources of finance, be it from financial institutions or from investors, by temporarily reducing the cost of funding, and/or by absorbing part of the risk of commercially viable investments, and/or by providing incentives and capacity building to interested stakeholders. Such blended finance arrangements usually combine commercially priced funding with 'soft' funding from donors or from public entities, and are especially useful to finance the medium to large investment projects that are required to build the production, processing, logistics and information systems for the future mentioned above. In recent years, several facilities have been set up to promote blended finance for agriculture, specifically to benefit smallholder farmers, the largest being the Global Agriculture and Food Security Program, GAFSP, and the IDH Farmfit Fund. See Appendix for examples of blended finance arrangements that may be useful for similar undertakings in Niger.	Long term	Medium
Medium Criticality	**Timeline for implementation**	**Fiscal implications**
Establish a proper framework and policies to promote the digital transformation of the banking system to better serve rural and agricultural clients. Building on previous work in Niger, as well as on relevant international experiences, this effort should help in the design and implementation of a strategy to digitize the provision of financial services by leveraging the digital infrastructure that is being built. Digitalization of financial services should be combined with the development of networks of non-bank agents in rural areas. In addition, it should leverage the opportunities offered by shared digital platforms of the financial sector such as the e-KYC and credit scoring registry implemented under the Smart Villages initiative. This platform could then be linked to the national biometric ID system, similar to the Pakistan model to allow for centralization of KYC and credit scoring data on clients of banks, MFIs, and MNOs. It would also allow for the streamlining of anti-money laundering processes. Additionally, Niger should consider using these platforms to promote better production techniques by facilitating farmers' access to agricultural extension services.	Short term	Low
Further streamline the policies for the use of subsidies to finance agriculture. FISAN, the Investment Fund for Food Security and Nutrition (Fonds d'Investissement pour la Sécurité Alimentaire et Nutritionnelle), has already undertaken important steps to harmonize the use of matching grants in financing agricultural projects of smallholders, promoting the use of financing arrangements in which beneficiaries contribute 10 percent of the required amount, financial entities provide 50 percent, and the remaining 40 percent are funded by grants. These important efforts should be continued and deepened, aiming to reduce and eliminate in time the subsidies for commercially viable undertakings.	Short term	Low

2. NATURAL RESOURCE MANAGEMENT

Options for local content development

High Criticality	Timeline for implementation	Fiscal implications
Mandate an appropriate arm of government (e.g., Ministry of Industry or equivalent) to focus specifically on local content needs and opportunities. The objective should be to (a) maintain a continuous dialogue, (b) understand the needs of industry, c) build relationships, (d) attract investment and (e) act as a clearing house for information to Nigerien companies/citizens as to the standards, skills etc. required for roles. Timeline 0-1 years. Impact is initially small and grows over time. Ultimate impact can be significant.	Short term	Low
Provide incentives to multinationals operating in Niger to provide regular training workshops for instance, quarterly, on various technical/industry matters important to industry (e.g., road design, industrial safety, food hygiene etc.). This should be training by the foreign investor to Nigerien companies. The training could be done on-site and at low cost (i.e., just the time of the specific corporate staff). This should be undertaken with no expectation of contracts arising for the Nigerien parties attending the training, but rather to build competency in the wider commercial ecosystem. Timeline 1-2 years. Impact is small-to-medium, but fiscal cost is also low.	Medium term	Low
Encourage or require that foreign investors in Niger put aside a certain fraction of salary (say 2-10 percent) to be spent on training of their own employees. This will have the effect of *depressing* Nigerien salaries, and will not be targeted at non-employees. However, the objective is to build the 'next generation' of Nigerien corporate leaders, who may operate in or beyond Niger. In principle, this could include international training (e.g., at the training centers of the foreign entities be they in France, China or other countries). Timeline 1-2 years. Impact is potentially significant over time.	Medium term	Low
Medium Criticality	**Timeline for implementation**	**Fiscal implications**
For unskilled-to-moderately skilled labor, consider the possibility of setting up labor providers who would maintain a pool of labor trained to a certain level, for which they would take a fraction of labor income. The advantage of this is that a larger cohort of workers becomes 'linked' to formal employment. The disadvantage is that the labor provider would need to take a portion of salaries to fund their own costs. There may be some controversy on this, but it is a way of streamlining the market, while providing certain basic benefits (e.g., healthcare, assurance of a minimum annual income) to the laborers. Timeline 0-1 years. Impact is initially significant in terms of organizing labor. Over time the benefit of having such an entity dissipates, but hopefully by having a cohort of 'formal' labor normalizes societal expectations around formal employment.	Short term	Low
Strengthen the 'Niamey Data Centre' into a full-blown 'geology department' by mandating the sharing of all geological data from foreign companies and storing said data in appropriate databases under the control of the Nigerien government. Capabilities should be built up over time so that, eventually, it will have a deep understanding of the geological patrimony of Niger. The ultimate goal would be to position such a department as the competent regulator for upstream licensing/regulation of minerals and petroleum. Timeline 1-2 years. Impact is initially small and grows over time. Ultimate impact can be significant.	Medium term	Low

As specific to attracting foreign investment and creating opportunities for Nigerien staff to progress, strong competencies in the language of the investing company can be an advantage, particularly for investors who may not be competent in French. Consideration can be given to embedding appropriate 'language institutes' in a premier Nigerien university and/or polytechnic, with the intent of building up cohorts of individuals who are able to communicate in foreign languages. The ideal would be that the university/polytechnic produces competent technical individuals who are also competent (say to a B1/B2 level on the CEFR framework) in languages of potential investors. Such competent staff might find it significantly advantageous to their careers. Over time, this would increase the likelihood of investors deciding to act as long-term corporate citizens, while also building up the 'Local Content' component of such companies/industries. Timeline 5 years (for creating initial cohorts of language speakers). Impact can grow over time and ultimately be significant.	Long term	Low
Adopt a 'more specialized approach' as the country grows and Local Content policy becomes more specialized. This could include a licensing regime where only licensed subcontractors can operate in a certain (foreign dominated) industry, licensing only to Nigerien-incorporated subcontractors etc. However, this is unlikely to be possible now, as the market is neither mature nor 'thick' enough. allow for this. Timeline is Aspirational. Dependent on future development and policy pathways.	Aspirational	

Options for extractive sector management

High Criticality	Timeline for implementation	Fiscal implications
To reduce its vulnerability to commodity price volatility, Niger could develop revenue management legislation to create a fiscal stabilization fund. The legislation would specify a baseline revenue level that reflects average revenues at sustainable production levels or, alternatively, targeting the non-resource primary balance as fiscal anchor. The excess profits above this threshold that accumulate during boom times would be directed into a stabilization fund for use during slumps. Moreover, it is suggested that in the first years when oil revenues are used to create a fiscal buffer, by reducing the current stock of public debt, until the frameworks regulating the governance of the fund and the use of the resources for productive investments in human and physical capital are robust enough. Given the estimated limited impact of oil prices shocks, the size of the fiscal buffer can be of a limited size (equivalent of 1 or 2 years or revenues).	Medium term	High
For such funds to be successful, fiscal discipline is imperative. Strict legislation governing the use of the funds helps enforce fiscal discipline by keeping them out of the normal budgetary process that is often influenced by short-term political motivations (Brown et al, 2008). This will encourage counter-cyclical fiscal policy and expenditure smoothing. On the other hand, while saving all the cyclical revenues in good times and use them to fund spending in bad times may support countercyclical stabilization, it can be difficult in term of political economy in Niger context. To mitigate these risks, it may be prudent to use to invest all the resource revenues in financial assets; consumption out of resource wealth will thus be equivalent to the interest earned on accumulated financial wealth.	Medium term	High

Besides smoothing spending, revenue funds can also be for broader economic objectives such as funding diversification and competitiveness initiatives. One such example is Chile's Competitiveness and Innovation Fund (Fondo de Innovación para la Competitividad – FIC), funded by royalties from the country's main commodity, copper. FIC supports entrepreneurial innovation, human capital formation and promotes science and technology, particularly in mining regions (Brown et al, 2008). Stabilization funds of this nature have been useful in other resource-abundant countries like Mongolia and Chile. Both the level of effort and impact of designing and implementing a fiscal stabilization fund is high.	Medium term	High
Broaden access to ASM formalization by decentralizing essential process such as registration and license issuance to local governments. To further increase incentives for formalization, the government could make access to value-adding support services, equipment or processing centers conditional on having a license (IGF, 2018b).	Short term	Low
Medium Criticality	**Timeline for implementation**	**Fiscal implications**
To reduce the risk of rent capture, increase public scrutiny of the resource sector, and resolve longstanding grievances regarding resource revenue allocation, Niger could establish direct cash transfers funded by its natural resource rents. Direct cash transfers would also reduce household poverty, which in turn could help resolve other related challenges, such as food insecurity, the effects of climate change, and risk of radicalization due to poverty especially amongst unemployed poor youth. To prevent some of the negative outcomes seen in Mongolia's experiment with a similar resource-to-cash scheme, the payments would need to be aligned to the performance of the resource sector and independent of political influence (Devarajan, et al 2011; Moss et al, 2015). However, it is critical to note that sudden changes in the size and/ or frequency of the payments, if not well-communicated and managed, may end up aggravating grievances and potentially increase the risk of conflict. The level of effort required to design a direct cash transfer system is high and its impact would also be high.	Medium term	High
The government could also adopt progressive levels of ASM formalization to allow both miners and local governments to incrementally work towards compliance with technical, environmental, and labor requirements in the face of significant resource constraints. Providing different categories of licenses for the different needs and resources of the miners would help ensure that formalization is an achievable goal even for the poorest miners (IGF, 2018b). This type of graduated approach has proven successful in ASM formalization in Colombia (Singo, & Seguin, 2018). The level of effort required for successful ASM formalization is high, but this is exceeded by its socioeconomic and environmental benefits.	Short term	Low
To reduce the risk of rent capture, increase public scrutiny of the resource sector, and resolve longstanding grievances regarding resource revenue allocation, Niger could establish direct cash transfers funded by its natural resource rents. Direct cash transfers would also reduce household poverty, which in turn could help resolve other related challenges, such as food insecurity, the effects of climate change, and risk of radicalization due to poverty especially amongst unemployed poor youth. To prevent some of the negative outcomes seen in Mongolia's experiment with a similar resource-to-cash scheme, the payments would need to be aligned to the performance of the resource sector and independent of political influence (Devarajan, et al 2011; Moss et al, 2015). However, it is critical to note that sudden changes in the size and/ or frequency of the payments, if not well-communicated and managed, may end up aggravating grievances and potentially increase the risk of conflict. The level of effort required to design a direct cash transfer system is high and its impact would also be high.	Medium term	High

3. DISASTER RISK MANAGEMENT AND FINANCING

Options to strengthen the DRM

High Criticality	Timeline for implementation	Fiscal implications
Adopt a DRM law clarifying roles and responsibilities for disaster risk management at central and local levels. A DRM law would clarify legal and institutional mandates, coordination mechanisms, financing instruments, operational protocols, stakeholders' participation mechanisms, role of CSOs, CBOs (including Women and Youths) and the Private Sector engagement, etc.	Medium term	Low
Strengthen capacities for emergency preparedness and response at the national and local levels, including Early Warning Systems. With Niger highly vulnerable to floods and other weather and climate threats, accurate forecasting, and systems to warn vulnerable populations effectively are essential and becoming more vital as climate change effects increase.	Medium term	Medium
Use the National Platform to improve inter-ministerial and other stakeholders' coordination. The National Platform has remained inactive for a long time and overlapping responsibilities and mandates among DRM actors have negatively impacted coordination.	Short term	Low
Enhance capacity and budgetary resources for disaster risk reduction, including investments in resilience in key sectors, land-use planning and building code enforcement. In most sectors, limited budgetary resources are assigned for maintenance of infrastructure and enforcement of building standards, and limited investment is made in increasing the resilience of vulnerable assets	Medium term	Medium
Medium Criticality	**Timeline for implementation**	**Fiscal implications**
Need for Integrated DRM-FCV approaches to better capture the nexus linkages and interoperability (in terms of impacts to communities, resilience needs and programmatic approaches). The context of security fragility and natural hazards vulnerability necessitates addressing both challenges in consistent and complementary ways.	Long term	Medium
Strengthen DRM at the local level, within municipal planning and management. No funds are assigned by the national government to municipalities specifically for DRM purposes, and many municipalities do not possess urban and investment planning capacities and tools to adequately address resilience needs and land-use planning for disaster risk reduction.	Short term	Medium

Options to strengthen the DRF

High Criticality	Timeline for implementation	Fiscal implications
Increase investment in disaster risk reduction and disaster risk management activities. Financing disaster risk reduction is often more cost-effective than the financing of post-disaster search, rescue, relief, rehabilitation, reconstruction, and recovery. However, residual risk will remain and should be complemented with pre-arranged finance. Despite the fact that disaster events cannot be fully prevented, the extent of damage can be minimized by adopting disaster risk reduction measures. Alongside implementing its disaster risk financing strategy and investing in pre-arranged disaster risk financing instruments, the Government of Niger should continue to limit its disaster-related liabilities by investing in ways to prevent and mitigate the effects of disasters, an action underlined in the draft National Disaster Risk Financing (DRF) Strategy.	Long term	High
Develop a comprehensive Disaster Risk Financing strategy. As Niger faces high disaster-related contingent liabilities particularly caused by droughts and floods, there is a strong rationale to work towards a more systematic approach to finance these shocks. A comprehensive disaster risk financing strategy could detail the most suitable sources of financing and instruments to finance the different types of shocks. It also helps identify gaps and opportunities for improving the current funding framework to increase the efficiency, timeliness, coherence of different financial mechanisms and the transparency of disaster response interventions. Working on such a strategy could also open up discussions on reference data used for the elaboration of this report as well as on missing data that could help further refine the assessment of disaster risk financing in Niger, including details on available instruments and related funding.	Long term	High
Work on risk layering. Working towards a disaster risk finance strategy could further support the identification of optimal risk layering. Initial analysis shows that there is substantial room for saving costs by introducing ex-ante financing instruments that are in place before a disaster happens and guarantee that adequate financing is in place for immediate disaster relief. The process of working towards a DRF strategy could allow the Government of Niger and other development partners to collect further data towards optimal risk finance layering.	Long term	High

APPENDIX

CHAPTER 1: APPENDIX A

Productivity Definitions

This appendix reviews definitions, and different techniques and challenges of different productivity measures, and explains how they are tackled in this study, especially in chapter 1.[108]

Throughout this chapter, productivity is defined as output (GDP or sectoral value added) per input of a unit of labor (number of people engaged rather than the number of hours worked, as measure of labor input). A second measure, total factor productivity (TFP), is also featured, which measures the efficiency with which factor inputs are combined and is often used to proxy technological progress. TFP may also incorporate wider factors such as organizational and institutional characteristics. Output per worker is then a more general concept that incorporates TFP, as well as the differences in physical and human capital per worker.

Defining labor productivity as output per worker, with the number of employees used as the unit of labor input, has the advantage of wide availability across countries. Labor input is intended to capture all of those involved in the production process. Thus, total employment figures include self-employment, which accounts for a large proportion of informal employment in Emerging and Developing Market Economies (EMDEs) (World Bank, 2019). However, difficulties in measurement of the informal sector creates uncertainty and increases the potential for inconsistency across countries around the productivity level, particularly in EMDEs with high shares of informal employment (Fajnzylber, Maloney, & Montes-Rojas, 2011). The effectiveness of labor input may be influenced by the level of education, training, and health of workers. Besides, labor contribution in the context of Niger follows a per capita counting rather than a full-time equivalent definition so that it does not consider the actual number of hours worked; household survey data suggests that among the working population, the number of hours worked per week (in a person's main job) has declined, by as much as 39 percent for men and 53 percent for women between 2002 and 2018.

GDP per capita and its dynamic can be decomposed into four main channels. First, employed people become more productive in doing their jobs because of different reasons (such as learning by doing, capital deepening, better education), so that output per worker increases. Second, even if the output per worker stays constant, output can still grow if the growth in the number of people with a job is higher than the growth in the workforce, thus expanding the production basis of the economy. Third, the number of people willing to work may expand faster than the working age population (people aged between 15 and 64 years), increasing the participation rate. Finally, a demographic effect is linked to the expansion of the working age population as a share of population, the so-called demographic transition. In summary:

$$\frac{Y}{N} = \frac{Y}{E} * \frac{E}{L} * \frac{L}{WAP} * \frac{WAP}{N}$$

Where Y is output, N the population, E the labor input, L is the workforce (employees, self-employees and

108 This box partly draws from World Bank, 2020., Global Productivity. Trends, Drivers, Policies. Washington DC: World Bank.

unemployed), WAP is the working age population (people aged between 15 and 64 years old).

Productivity (Y/E) can then be analyzed through the Shapley decomposition, which allows a decomposition of its changes into: i) changes in sector-level productivity ('within' component) and ii) changes from labor re-allocation between sectors ('across' or "between" component). The latter gives us a measure of the speed of 'structural change' in the economy.

Finally, following the growth accounting methodology first introduced by (Solow, 1957), labor productivity growth can be decomposed into the contribution from different factors, using the log differences of a Cobb-Douglas production function with constant returns to scale:

$$\Delta y_t = (1-\alpha)\Delta k_t + \alpha \Delta h_t + \Delta a_t$$

Where $y_t = \log \frac{Y_t}{L_t}$ is the output per worker (labor productivity) $k_t = \log \frac{K_t}{L_t}$ is the ratio of capital equipment per person employed, $h_t = \log(H_t)$is the human capital level, and a_t is the log of the TFP, calculated as a residual of labor productivity growth after subtracting the change in capital deepening and human capital, weighted by their respective shares in the production function, $(1-\alpha)$, α. Being the residual, everything not captured by changes in labor or capital is picked up by TFP growth. This includes measurement errors and changes in utilization rates of factor inputs.

A concise way to rearrange this formula is $y_t = AX$ where *A* represents the TFP and *X* the inputs. The two factors are interconnected: there are variations of *k* and *h* generated by differences of *A* (because of the nonrival nature of technology creation and adoption), and *A* itself may be affected by capital intensity *X*. If *A* is determined by technology adoption, for instance, then it is likely that higher schooling leads to a higher level of *A*. In another case, growth in physical capital could be attributed to rising productivity, since the higher rate of return stimulates additional capital accumulation (Klenow and Rodriguez-Clare 1997).

Appendix A Box 1: Urbanization: the spatial corollary of structural change in Niger?

The following text is adapted from the World Bank's 2021 Niger Urbanization Review.

In many contexts around the world, urbanization has been the spatial corollary of positive structural transformation. More productive service and industrial sector jobs tend to cluster in urban areas, due to the productivity benefits of urban agglomeration economies; as a result, the transition of labor out of agriculture is often accompanied by the physical movement of workers (and their families) from rural to urban areas. In Niger, from 2001-2012, 4 out of 5 of all new nonfarm jobs were created in urban areas, suggesting most of Niger's positive structural change has taken place in urban areas. Niger's slow rate of structural transformation is similarly consistent with its lackluster urbanization rate, which has remained around 16 percent for twenty years.

Pressures on rural livelihoods in Niger are expected to intensify over the next decade, which may accelerate rural-to-urban migration, as rural residents seek opportunities and survival in cities as rural prospects dwindle. On the other hand, in some low-income contexts, intense rural pressures appear to have depressed rural-urban migration, by depriving rural households the liquidity to finance migration.[109]

109 Peri, G., & Sasahara, A. (2019). The impact of global warming on rural-urban migrations: Evidence from global big data. NBER Working Paper, (25728).

The World Bank's Niger Urbanization Review (2021) used a Computerized General Equilibrium (CGE) model to explore how alternative urbanization scenarios may impact structural change and welfare in Niger until 2035. The model's Business-as-Usual (BAU) scenario assumes that rural-urban migration continues according to recent trends, rising almost imperceptibly to 16.6 percent by 2035. In this scenario, agricultural growth slows due to falling farm sizes and increasing rural land pressures. Average household welfare grows at 3.3 percent per year, though inequality widens, with poor households'[110] per capita welfare growing by only 2.6 percent per year.

The model then considers a 'Faster Migration' scenario, in which rural-to-urban migration accelerates above historical rates, with the urban population share rising to 19.6 percent by 2035. Under this scenario, the economy in 2035 is about five percent larger than under Business-As-Usual, with this positive growth-effect entirely due to the elevated rural-urban migration. As expected, Faster Migration brings positive structural transformation, as workers transition to more productive urban nonagricultural sectors. New urban residents also demand more manufactured goods, resulting in more employment in Niger's industrial sectors, and urban GDP growth generates further demand for investment and construction. Despite the outflow of rural labor, agricultural GDP under Faster Migration is higher (by 0.7 percent by 2035) than under the BAU scenario: initially, the reduced rural labor supply slows agricultural GDP growth; however, urban incomes and productivity rise as urban producers benefit from the increased urban labor supply, lower wages, and lower food prices, which in turn raises urban demand for agricultural products from Niger's rural areas. Overall, these backwards linkages in demand offset the loss of rural labor.

More concerningly, under Faster Migration, Niger's urban GDP does not rise as fast as its urban population, leading to lower urban welfare by 2035 compared to the BAU scenario. This reflects an 'urbanization of poverty', in which urban areas do not generate sufficient growth to uphold today's level of urban welfare as new poor rural migrants arrive.

Governments may attempt to invest more urban areas to prevent the decline in urban welfare. An important insight from the model is that raising public urban investment at the expense of rural investment is liable to reduce both urban and rural welfare. This is because of the importance of food prices to urban welfare and productivity: lower rural investment reduces agricultural productivity, raising food prices, which are a major share of poor urban households' consumption baskets. Urban investment is necessary to stem the decline in urban welfare, but this exercise suggests urban investment should be 'self-financed' by improved taxation of urban enterprises and households, not by diverting fixed public resources from rural agriculture.

A final insight from the CGE model is that even with urban-based financing of urban investment, cities will still be unable to accommodate Faster Migration without a loss of urban welfare. Niger's rural population is growing so rapidly that even small shifts in urbanization rates flood urban centers with job seekers, most of whom are unskilled. At the same time, urban labor markets are dominated by non-tradable services, which have limited opportunities to achieve scale economies and expand production. There are deep structural constraints to urban and off-farm job creation in Niger, beyond urban financing, – including human capital, dependency ratios, and private sector bottlenecks – that must be addressed if Niger is to prepare itself for the increased urbanization expected in the coming decades, and to secure the linkage between faster urbanization and positive structural transformation.

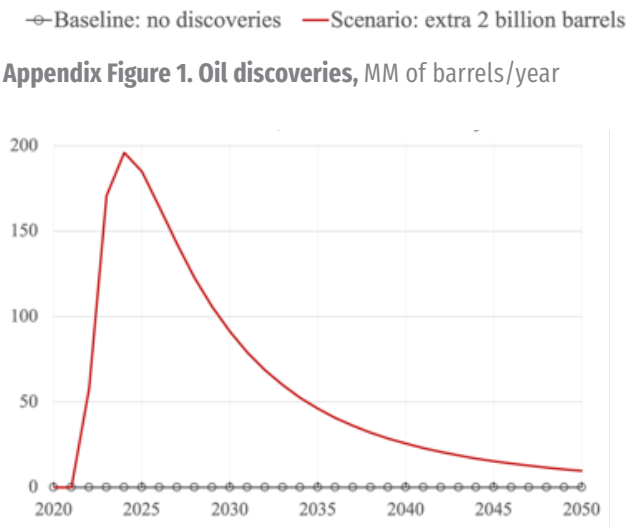
110 Defined as the bottom three income quintiles.

CHAPTER 2: APPENDIX B.1

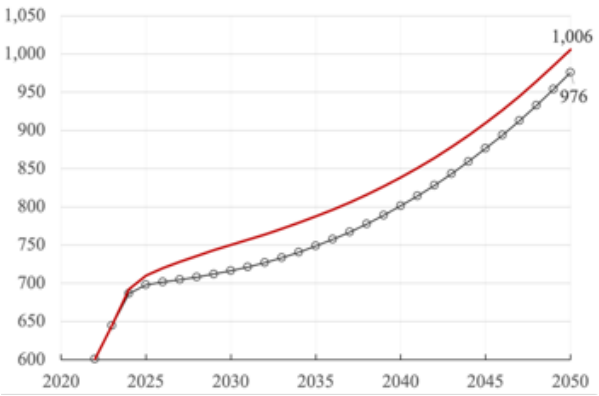
Robustness to oil discoveries

The baseline assumes that reserves of oil stand at two billion barrels in 2020, and there are no further discoveries until 2050. An optimistic simulation assuming discoveries of extra 2 billion barrels of oil from 2020 to 2050 yields a substantial boost to oil production and growth in the medium-term. However, the long-term effect on overall growth is small. The scenario considers a more optimistic simulation with discoveries of extra two billion barrels of oil from the Tenere block until 2050 (see Appendix Figure 2). Under this scenario, the block would amount to 3 billion barrels of oil until 2050, which is at the upper-end of the CNPC estimates. Under this scenario, production of oil would hit 180,000b/d (the pipeline capacity) by 2030, remaining at that level until 2040, and then slowly declining over time (see Appendix Figure 3). This extra oil production would boost GDP per capita growth by 1 percentage point in 2025. But this boost to growth would be transitory, vanishing by 2035 (see Appendix Figure 4). The long-term effect on Niger's income would be small: a GDP per capita of around US$1,000 in 2050 vs baseline 976.

Robustness to discoveries of oil

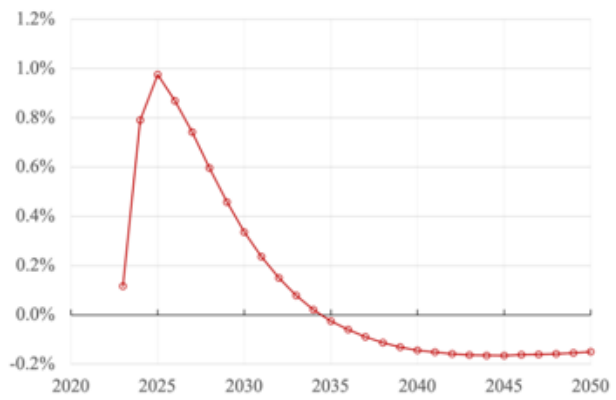


Appendix Figure 1. Oil discoveries, MM of barrels/year

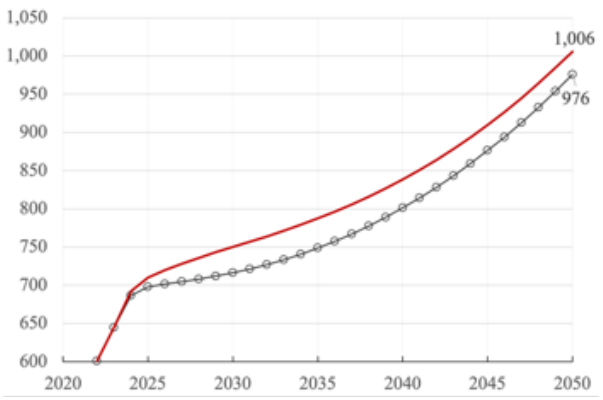


Appendix Figure 2. Production of oil, Barrels/day

Appendix Figure 3. GDP per capita growth,
Incremental annual growth rate, percentual points



Appendix Figure 4. GDP per capita,
Real 2010 U.S. Dollars



Source: World Bank's staff estimates based on the LTGM.

B2. Appendix tables

Appendix Table 1. Summary of Baseline Assumptions for Niger (LTGM-NR)
(Selected Initial Conditions, Main Parameters, and Exogenous Variables)

A. Main parameters	Value	Source
Labor share	52% of non-R GDP	PWT 10
Resource rents	45% of oil GDP	GTAP
Government share	40% of oil GDP	IMF-WCE

B. Initial conditions	Value	Source
Per capita GDP	US$563 (real 2010)	UN-WDI
Non-oil	98% of GDP	NER-SNA
Oil	2% of GDP	NER-SNA
Capital-to-GDP ratio	4	PWT 10
Non-energy	3.9	Eq. MPK
Oil	0.1	Eq. MPK
Reserves of oil	2Bn barrels	BP-Energy

C. Trajectory of exogenous variables, 2021-2050		
Price of oil	US$60/barrel	WB-CMO
Investment:		
Private	30%→15% GDP	IMF-FAD
Public	15%→10% GDP	IMF-FAD
Productivity:		
Non-oil TFP	1% growth	PWT 10
Human capital	0.5% growth	PWT 10
Demographics:	2021→2050	
Population growth	4%→3%	UN-ILO
Working-age pop.	48%→55%	UN-ILO
Participation rate	74% constant	WB-WDI

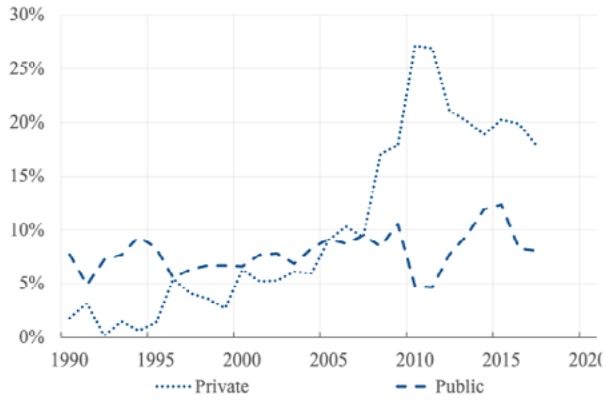
Appendix Table 2. Summary of Growth Simulations (LTGM-NR)

	Average growth rate, Percentage				Real 2010 U.S. Dollars		
	2026-50	2026-29	2030s	2040s	2020	2030	2030
I. GDP per capita							
Baseline	1.4	0.5	1.0	2.0	563	716	976
Moderate reforms (one-by-one):							
A. Non-energy TFP growth	2.6	0.9	2.2	3.5		736	1,312
B. Human capital growth	2.0	0.7	1.6	2.8		727	1.139
C. Investment	1.8	0.7	1.6	2.3		726	1,084
Reforms package (A-C)	3.7	1.4	3.4	4.8		756	1,720
Ambitious reforms (one-by-one):							
A. Non-energy TFP growth	3.8	1.4	3.4	5.0		756	1,772
B. Human capital growth	2.6	1.0	2.2	3.5		737	1,330
C. Investment	1.9	0.8	1.8	2.4		730	1,126
Reforms package (A-C)	5.9	2.1	5.5	7.4		792	2,888
II. Non-energy GDP per capita							
Baseline	1.9	0.8	1.8	2.4	552	616	943
Moderate reforms (one-by-one):							
A. Non-energy TFP growth	3.2	1.4	3.0	3.9		636	1,280
B. Human capital growth	2.6	1.1	2.5	3.2		626	1,107
C. Investment	2.3	1.0	2.4	2.8		624	1,048
Reforms package (A-C)	4.3	1.8	4.3	5.2		655	1,688
Ambitious reforms (one-by-one):							
A. Non-energy TFP growth	4.5	1.9	4.3	5.5		656	1,741
B. Human capital growth	3.2	1.4	3.1	4.0		637	1,298
C. Investment	2.5	1.1	2.6	2.9		627	1,090
Reforms package (A-C)	6.5	2.7	6.6	7.8		691	2,857
III. Oil GDP per capita							
Baseline	-4.7	-1.3	-4.9	-5.7	11	101	33
Moderate reforms (one-by-one):							
A. Non-energy TFP growth	-4.8	-1.4	-5.1	-5.8		100	32
B. Human capital growth	-4.8	-1.4	-5.0	-5.8		100	32

	Average growth rate, Percentage				Real 2010 U.S. Dollars		
	2026-50	2026-29	2030s	2040s	2020	2030	2030
C. Investment	-4.4	-1.1	-4.6	-5.5		102	35
Reforms package (A-C)	-4.7	-1.2	-4.9	-5.8		101	33
Ambitious reforms (one-by-one):							
A. Non-energy TFP growth	-5.0	1-.5	-5.3	-6.0		100	31
B. Human capital growth	-4.9	-1.4	-5.1	-5.8		100	32
C. Investment	-4.4	-1.0	-4.4	-5.5		103	36
Reforms package (A-C)	-4.9	-1.2	-5.1	-5.9		101	32

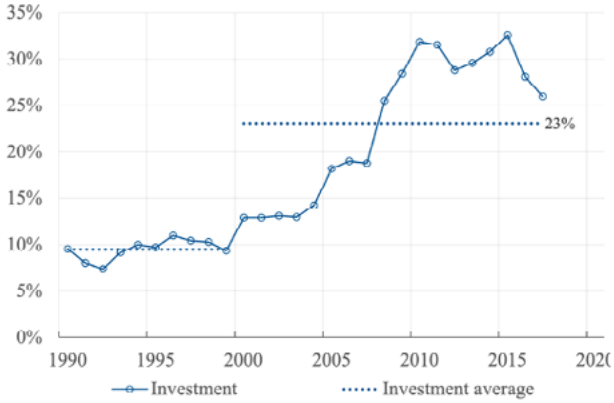
A3. Appendix figures

Appendix Figure 5. Gross domestic product,
Annual growth rate, Percentage



Source: World Bank's World Development Indicators

Appendix Figure 6. Gross national income per capita
Real 2010 U.S. Dollars

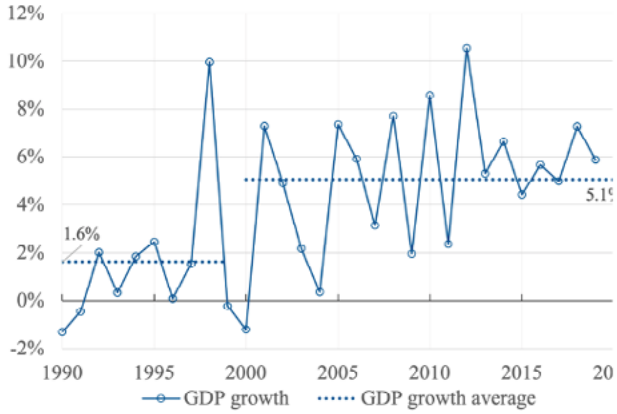


Source: World Bank's World Development Indicators

Appendix Figure 7. Investment,
Percent of GDP

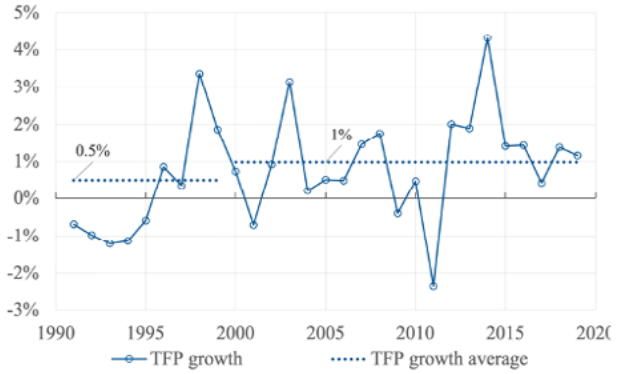
Source: IMF's Investment and Capital Stock Dataset

Appendix Figure 8. Public and private investment,
Percent of GDP



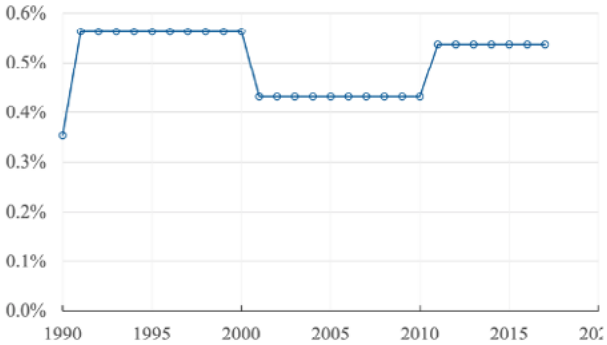
Source: IMF's Investment and Capital Stock Dataset

Appendix Figure 9. Total Factor Productivity,
Three-year growth moving average, Percentage



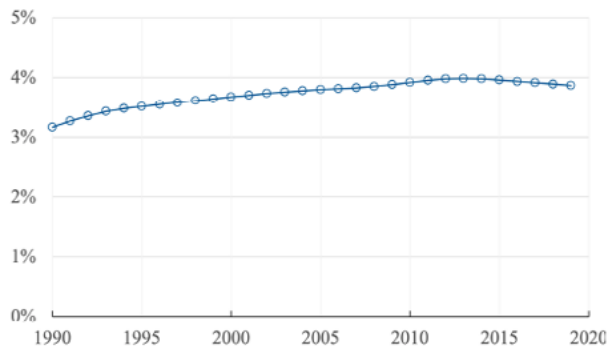
Source: Penn World Table 10.0

Appendix Figure 10. Human Capital Index,
Annual growth rate, Percentage



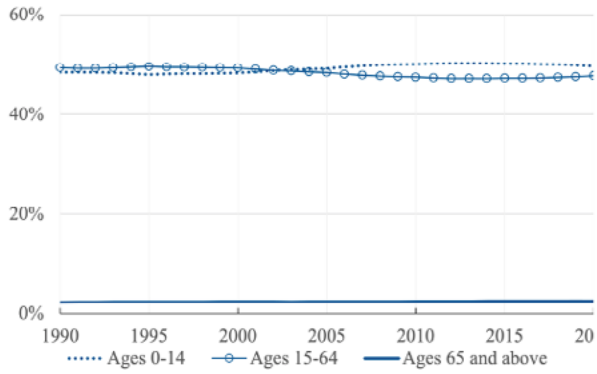
Source: Penn World Table 10.0

Appendix Figure 11. Population growth,
Percent of GDP



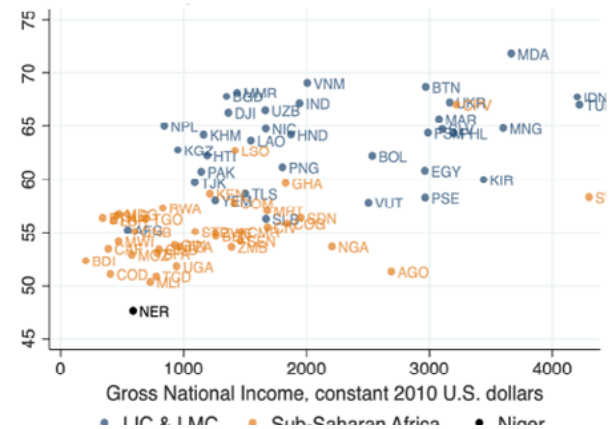
Source: International Labor Organization

Appendix Figure 12. Working-age population (ages 15-64),
Percent of population



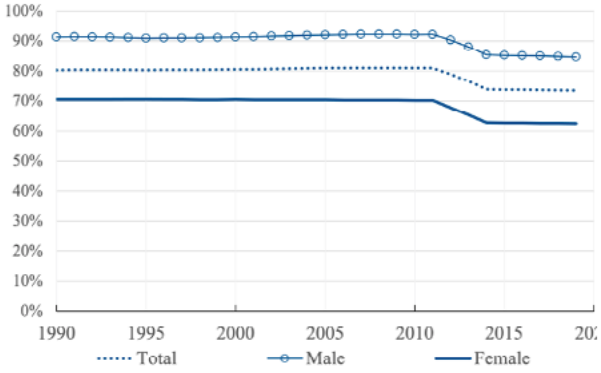
Source: World Bank's World Development Indicators

Appendix Figure 13. Working-age population in low and lower-middle income countries in 2019,
Percent of working-age population (ages 15-64)



Source: International Labor Organization

Appendix Figure 14. Labor force participation rate
Percentage of working-age population



Source: International Labor Organization

Appendix Figure 15. Physical capital-to-GDP ratio

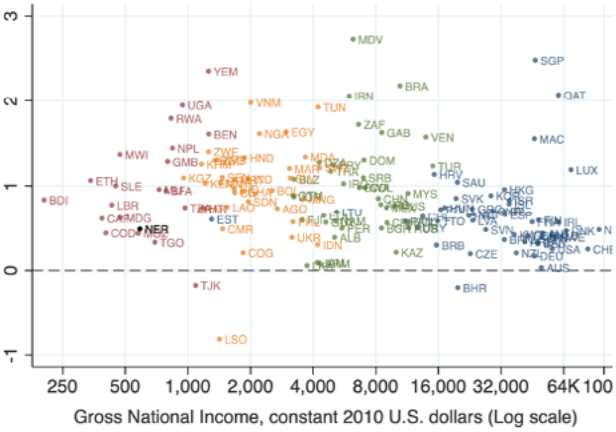
Source: Penn World Table 10.
Notes: Dropped outliers VEN, UKR, YEM, and BRB.

Appendix Figure 16. The Drivers of Growth: Cross-country Experience

Panel A. Total factor productivity growth
Average growth rate over 2000-2019, Percentage

Source: Penn World Table 10.
Notes: Dropped outliers TJK and ARM.

Panel B. Human capital growth
Average growth rate over 2000-2019, Percentage



Notes: Three outliers dropped. Years of schooling predates the 20 years average. Samples are 1979-1999 and 1999-2019.
Data source: Penn World Table 10

Panel C. Private investment
Average over 2000-2017, Percent of GDP

Source: IMF-FAD, Investment and Capital Stock Dataset

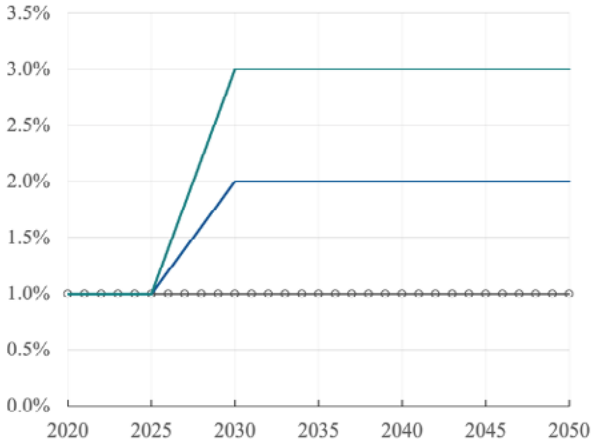
Panel D. Public investment
Average over 2000-2017, Percent of GDP

Source: IMF-FAD, Investment and Capital Stock Dataset

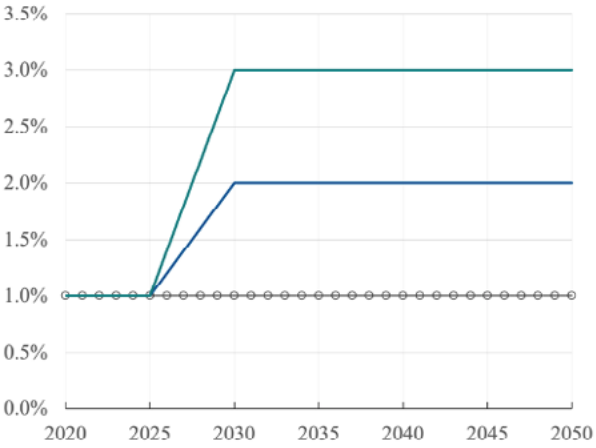
Appendix Figure 17. The drivers of growth under the baseline and reforms scenarios

Baseline — Moderate reform — Ambitious reform

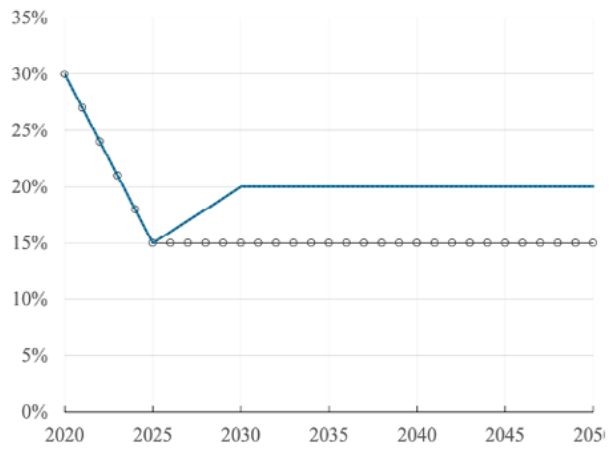
Total factor productivity,
Annual growth rate, Percentage



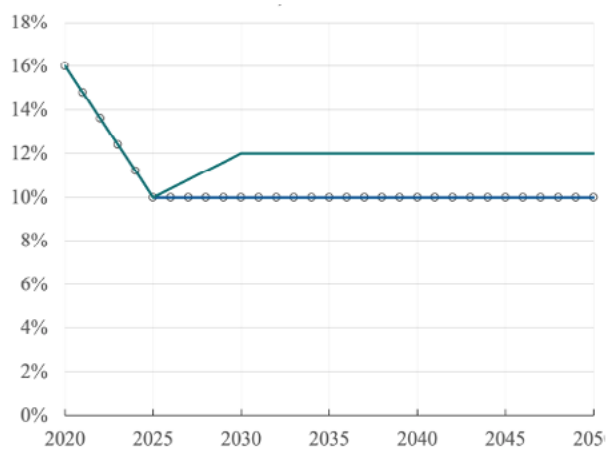
Panel B. Human capital growth
Annual growth rate, Percentage



Panel C. Private investment
Percent of GDP



Panel D. Public investment
Percent of GDP



CHAPTER 2: APPENDIX B.2

Structure of SDGSIM

This appendix provides additional detail on SDGSIM as applied to Niger. Table 2.1 presents the Niger SAM, Figure A.1 summarizes the payment flows that the model captures in in any year while Figure A.2 describes the labor market.

SDGSIM is a CGE model designed for country-level analysis of medium- and long-run development policies with a focus on the SDG agenda and structural change. Technically, the model is made up of a set of simultaneous linear and non-linear equations. It is economy-wide, providing a comprehensive and consistent view of the economy, including linkages between disaggregated production sectors and the incomes they generate, households, the government (its budget and fiscal policies), and the balance of payments. It is an appropriate tool for analyzing structural change issues (like the ones faced by Niger's economy) given the fact that it, in an integrated manner, captures household welfare, fiscal issues, and differences between sectors in terms of household preferences, labor intensity, capital accumulation, technological change, and links between international trade and the domestic economy. In each period, the different agents (producers, households, government, and the nation in its dealings with the outside world) are subject to budget constraints: receipts and spending are fully accounted for and by construction equal (as they are in the real world). The decisions of each agent – for producers and households, the objective is to maximize profits and utility, respectively – are made subject to these budget constraints: for example, households set aside parts of their incomes to direct taxes and savings, allocating what is left to consumption with a utility-maximizing composition. For the nation, the real exchange rate adjusts to ensure that the external accounts are in balance – in the application to Niger, which is part of the West African CFA zone and thus operates with a fixed nominal exchange rate, it is assumed that the real exchange rate adjusts via changes in the domestic price

level in a setting with exogenous foreign borrowing and reserve changes.[111] Wages, rents and prices play a crucial role by clearing markets for factors and commodities (goods and services). For commodities that are traded internationally (exported and/or imported), domestic prices are influenced by international price developments. Given that Niger is a small country, it is assumed that international markets demand and supply the country's exports and imports at given world prices.

Over time, production growth is determined by growth in factor employment and changes in total factor productivity (TFP). Growth in private capital stocks is endogenous, depending on investment and depreciation. Public investment and capital stock changes are determined by policy. For other factors, the growth in employable stocks is exogenous. For labor and natural resources (with sector-specific factors for natural-resource-based sectors), the projected supplies in each time period are exogenous. For natural resources, they are closely linked to production projections. For labor, the projections reflect the evolution of the population in labor-force age, labor force participation rates, and educational attainment.

The unemployment rate for labor is endogenous. TFP growth is made up of two components, one that responds positively to growth in government infrastructure capital stocks and one that, unless otherwise noted, is exogenous.

The basic accounting structure and much of the data required to implement SDGSIM is derived from a SAM. The model also relies on complementary stock, elasticity, and base-year employment data. In this study, the base year for the SDGSIM database is 2019, the most recent year for which sufficient data for the construction of a SAM is available. The SAM and the model database have a total of 36 sectors (production activities each of which produces a commodity or output): 14 for agriculture, 2 for mining (petroleum and other mining),

Most features of a SAM for SDGSIM are familiar from SAMs used for other CGE models. However, a SDGSIM SAM has some non-standard features to provide data needed for its explicit treatment of financial flows and different investment types. Table 2.1 shows the accounts in the SAM, which define the disaggregation of the model.

111 To be more precise, the model variables are net financing (net borrowing minus interest payments) received by domestic institutions (government and households) from the rest of the world and by the government from the other domestic institutions. In post-calculations, the implications for debt stocks are extracted given exogenous interest rates. This treatment has the advantage of not requiring debt accumulation inside the model.

Table 2.1. Disaggregation of Niger SAM and SDGSIM application

Group	Account name	Description
Sectors (activities/ commodities)	a-/c-cer	Cereals
	a-/c-puls	Pulses
	a-/c-gnut	Groundnuts & other oils
	a-/c-leaf	Leafy vegetables
	a-/c-vege	Other vegetables
	a-/c- frui	Other fruits
	a-/c-crop	Other crops
	a-/c-catt	Cattle
	a-/c-milk	Raw milk
	a-/c-poul	Poultry
	a-/c-smlr	Small ruminants
	a-/c-oliv	Other livestock
	a-/c-fore	Forestry
	a-/c-fish	Capture fisheries
	a-/c-petr	Petroleum products
	a-/c-omin	Other mining
	a-/c-food	Food processing
	a-/c-text	Textiles - Clothing - Leather
	a-/c-wood	Wood products
	a-/c-metl	Metals and metal products
	a-/c-oman	Other manufacturing
	c-ncimp	Non-competitive imports
	a-/c-elec	Electricity, gas and steam
	a-/c-watr	Water supply and sewage
	a-/c-cons	Construction
	a-/c-trad	Wholesale and retail trade
	a-/c-tran	Transportation and storage
	a-/c-rest	Restaurants - food services - hotels
	a-/c-comm	Information and communication
	a-/c-fsrv	Finance and insurance
	a-/c-real	Real estate activities
	a-/c-bsrv	Business services
	a-c-gov	Public administration
	a-/c-educ	Education
	a-/c-heal	Health and social work
	a-/c-osrv	Other services

Group	Account name	Description
Margins	marg-d	Domestic distribution
	marg-m	Import distribution
	marg-e	Export distribution
Factors	f-labl	Labor - Less than completed primary educ.
	f-labh	Labor - Completed primary educ. or more
	f-land	Land
	f-capprv	Capital - private
	f-coil	Crude oil
	f-omin	Natural resource for other mining
Institutions (current)	hhd-rur	Households - rural
	hhd-urb	Households - urban
	ent	Enterprises
	gov	Government
	row	Rest of the world
Taxes	tax-act	Tax - activities
	tax-va	Tax -value added
	tax-imp	Tax - imports
	tax-exp	Tax -exports
	tax-com	Tax - commodity/sales
	tax-dir	Tax -income
Institutions (capital)	cap-ngov	Aggregate non-government
	cap-gov	Government
	cap-row	Rest of the world
	cap-fin	Financial institution (foreign reserves)
Investment	inv-priv	Private
	inv-inf	Government infrastructure
	inv-gov	Government other
	dstk	Change in inventories (or stocks)

Each sector has an activity and a commodity (output). The commodity c-ncimp (non competitive imports is the only exception.

Activities produce, selling their output at home or abroad, and using their revenues to cover their costs (of intermediate inputs, factor hiring and taxes). Activity decisions about factor hiring, which determine the output level, are driven by profit maximization. The shares exported and sold domestically depend on the relative prices of their output in world and domestic markets.

SDGSIM includes three core institutions: households, government, and the rest of the world.

- *Households,* split into rural and urban, earn incomes from factors, transfers from the government, and transfers from the rest of the world. These are used for direct taxes, savings, and consumption. The savings share is exogenous or endogenous depending on the mechanism for achieving balance between private investment and available financing. Their consumption decisions change in response to income and price changes. By construction (and as required by the household budget constraints), the consumption value of the households equals their income net of direct taxes and savings.

- The *government* gets its receipts from taxes and transfers from abroad; it uses these for consumption, transfers to households, and investments (providing capital stocks used in the production of government services), drawing on domestic and foreign borrowing for supplementary funding. To remain within its budget constraint, it either adjusts some part(s) of its spending on the basis of available receipts or mobilizes additional receipts of one or more types in order to finance its spending.

- The *rest of the world* (which appears in the balance of payments) generates inflows that may be classified into transfers to government and households, FDI, loans, and export payments. Niger uses these inflows to finance its imports and adjust its foreign reserves. The balance of payments clears (inflows and outflows are equalized) via adjustments in the real exchange rate (through changes in the domestic price level, changing the ratio between the international and domestic price levels in CFA francs) which take place when the balance is in surplus or deficit.

Private investment financing is provided from domestic household savings (net of lending to the government) and foreign investment. It is assumed that household investment spending will adjust in response to changes in available funding or that household savings will adjust to finance a predetermined investment level.

In *domestic commodity markets*, flexible prices ensure balance between demands for domestic output from domestic demanders and supplies to the domestic market from domestic suppliers. The part of domestic demands that is for imports faces exogenous world prices – Niger is viewed as a small country in world markets without any impact on the import and export prices that it faces. Domestic demanders decide on import and domestic shares in their demands on the basis of the relative prices of commodities from these two sources. Similarly, domestic suppliers (the activities) decide on the shares for exports and domestic supplies on the basis of the relative prices received in these two markets.[112]

112 An individual production activity does not respond to changes in relative prices for exports and domestic sales if its output only has one destination, either exported in full or sold domestically in full. By the same token, domestic demanders do not have a choice between imports and domestic output for commodities if only one source is available.

Factor markets reach balance between demands and supplies via wage (or rent) adjustments. Across all factors, the factor demand curves are downward sloping, reflecting the responses of production activities to changes in factor wages. On the supply side of the labor market, unemployment is endogenous – the model includes a wage curve (a supply curve) that is upward-sloping until full employment is reached, at which point it becomes vertical (see Figure A1.2). For non-labor factors, the supply curves are vertical in any single year (the supply is fixed).

The above discussion explains the functioning of model economy in a single year. In SDGSIM, growth over time is endogenous. The economy grows due to accumulation of labor and capital, and the use of natural resources. For labor, the stocks, here disaggregated by educational attainment, grow over time due to growth in the population in working age and/or their labor force participation rates. Improvements in education, reflected here in a growing labor force share for those with more education, raises the productivity of labor and its wages. The accumulation of capital, split into private and infrastructure, is determined by investment and depreciation. For natural resources, the stocks available for utilization change over time on the basis of exogenous projections that, if depleted, decline over time.

Figure A1. Aggregate payment flows in SDGSIM

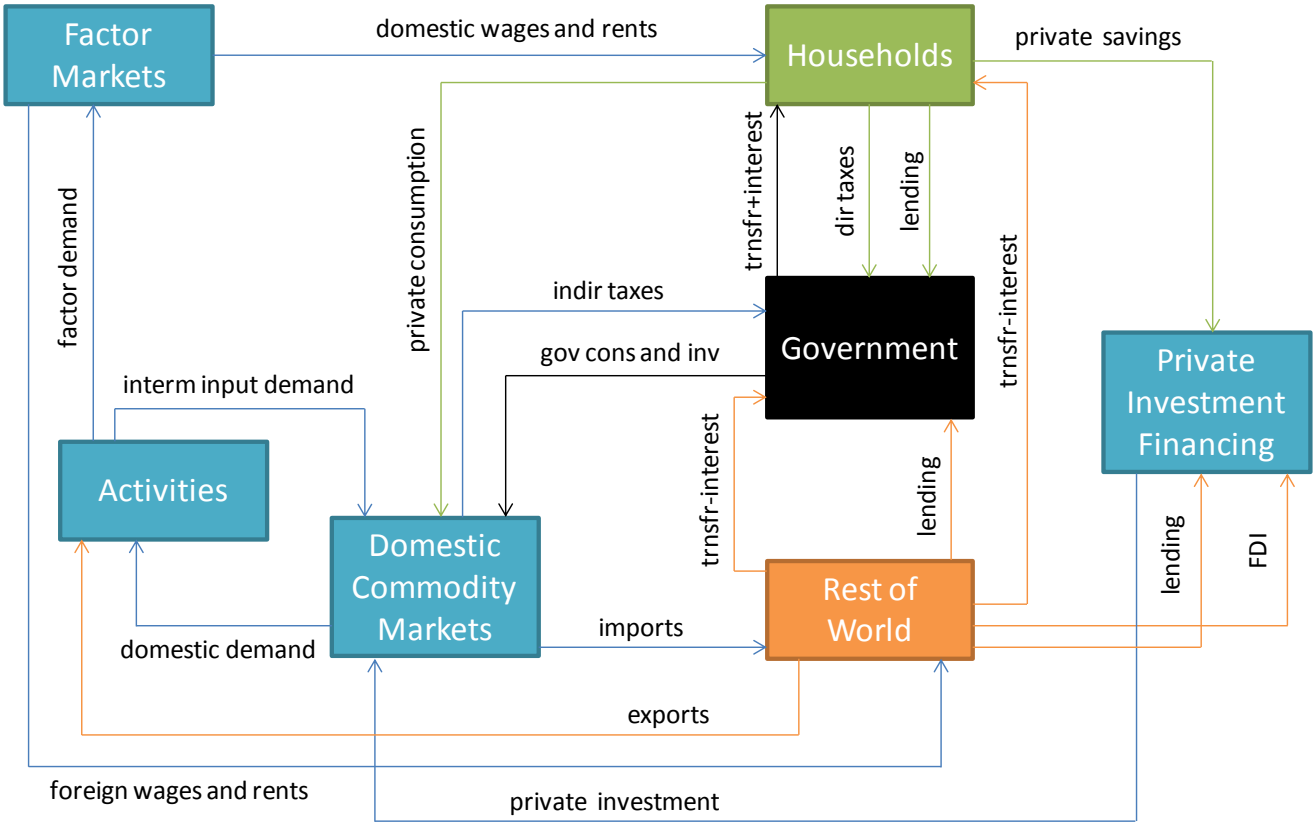
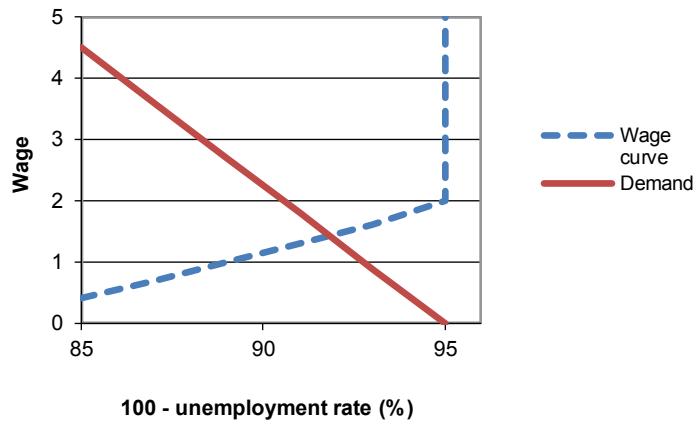


Figure A2. The labor market in SDGSIM



In a post-calculation module, information on poverty rates and Gini coefficients for an initial year, and the evolution of real consumption per capita from the simulations are used to generate one or more synthetic household surveys, assuming a lognormal distribution within each household group (here rural and urban) for which poverty results are generated. Post calculations are also used to extract the evolution of net debt stocks – foreign debt stocks for government (data on non-government foreign debt were not available and are most likely negligible) and domestic debt stocks owed by government to non-government – from the net financing flows from the simulation results (for ease of reading referred to as borrowing), and exogenous data on interest rates and initial debt stocks.[113]

Appendix B.3: Description of model database

This appendix documents the database that was built for SDGSIM Niger. Its main component is a SAM (presented in the above section), complemented by various other data, including elasticities, and physical quantities of labor employment and stocks (the section below). The additional information needed to define the dynamic base run and the non-base simulations is presented in the main body of the text.

B.3.1 SAM for 2019

The main data sources were the International Food Policy Research Institute (IFPRI) SAM for 2018, based on an updated version of an IFPRI 2015 SAM, and complementary data for 2019 from the IMF, the UN, and the World Bank (IFPRI 2020; Randriamamonjy and Thurlow 2018; IMF 2020; UN 2020; and World Bank 2020). The complementary data were used to update the SAM to 2019 and disaggregate its treatment of capital and investment accounts.

113 The following procedure was followed in the computation of foreign financing and debt (in foreign currency): Using the definitions (1) $F_t = B_t - i_t \cdot (D_t + D_{t-1})/2$, and (2) $D_t = D_{t-1} + B_t$, where B_t, F_t, D_t, and i_t stand for borrowing, net financing, end-of-year debt, and real interest rate, respectively, borrowing was defined by first using (2) to substitute for D_t in (1) and rearranging: $B_t = F_t + i_t \cdot (D_{t-1} + B(t) + D_{t-1})/2$. Solving for B_t: $B_t \cdot (1 - 0.5i_t) = F_t + i_t \cdot D_{t-1}$; and (3) $B_t = (F_t + i_t \cdot D_{t-1})/(1 - 0.5i_t)$. Starting from the base year and using (3) and (1), it is straightforward to compute the evolution of the debt stock over time. For domestic government financing, there was one deviation from this procedure: only a fraction of F_t is treated as borrowing. The rest is treated as financing from the monetary system, which does not add to domestic government debt.

In terms of procedure, the first step was to assemble relevant data in an Excel file, construct a 2019 macro SAM inside this file (primarily drawing on IMF fiscal, balance of payment, and monetary sector data), and make the data GAMS readable. After this, a proto SAM (a "raw" 2019 SAM) was constructed in GAMS. Compared to the IFPRI SAM, the key changes were the following: (a) the IFPRI SAM was scled to replicate 2019 GDP at purchasers' prices; (b) households were aggregated into rural and urban;[114] (c) the aggregate savings-investment account of the IFPRI SAM was replaced by institutional capital accounts (split into government, non-government, rest of world, and financial sector) as well as accounts for private investment, government investment, and stock (or inventory) change, populated with data from the IFPRI SAM and the macro SAM; and (d) a cross-entropy program (Robinson et al. 2001) was applied to generate a matrix that was balanced and replicated the information in the macro SAM as well as 2019 data for sectoral aggregates for value added, exports, and imports.

Given the fact that the 2018 and 2019 structure of the economy were relatively similar (judging from the 2019 data that were accessed), the updating aspect of this was relatively straightforward. The only main issue was related to the fact that government consumption according to the IMF 2019 data (which only cover the central government) was much lower than for other sources, which show consumption for the general government. This lower level of government consumption was associated with a higher level of non-government consumption, reflecting the fact that data for 2019 GDP, investment, and trade were very close across the different sources (IMF and other). In the 2018 IFPRI SAM, the values for government and household consumption were consistent with the non-IMF sources. To keep the overall structure of household and government consumption in the new SAM relatively intact while drawing on the rich IMF dataset for updating to 2091, a decision was made to use both sources, reconciling the difference between the two via adjustments in transfers between the government and the domestic non-government institutions (households and enterprise).

114 While the finer IFPRI disaggregation – households are split into rural farm, rural non-farm, and urban, with each group disaggregated by quintile – may be relevant for some purposes such as comparative-static analysis, it is less so in the context of dynamic analysis, which needs to consider demographic change, migration, and changing relative household incomes (invalidating quintile-based household classifications).

Table C.1. Real macro indicators in 2021 and by scenario (% annual growth 2022-2050)

	2021	base	pop-	pop-edu+	ag	agman	agmanser	base-p	combi	combi-0	combi-fg	combi-ef
Absorption	8,710.6	5.5	5.4	5.7	5.7	5.7	5.7	5.3	5.9	5.4	6.0	5.9
Consumption - private	5,281.5	5.3	5.1	5.3	5.5	5.5	5.5	5.0	5.6	5.0	5.7	5.7
Consumption - government	1,323.2	6.6	6.5	7.2	6.6	6.6	6.6	6.5	7.3	7.0	7.3	7.0
Fixed investment - private	1,238.5	5.6	5.5	5.8	5.6	5.6	5.7	5.3	5.9	5.3	6.0	6.0
Fixed investment - government	867.3	5.1	5.1	5.1	5.3	5.3	5.3	5.1	5.3	5.3	5.3	5.3
Exports	1,004.7	7.6	7.5	7.7	7.7	7.8	7.8	7.5	8.0	7.3	8.0	8.1
Imports	1,816.6	5.8	5.8	6.0	5.9	6.0	6.0	5.6	6.2	5.7	6.3	6.2
GDP at factor cost	7,170.6	5.7	5.6	5.9	5.8	5.8	5.9	5.5	6.1	5.6	6.2	6.1
Total factor employment (index)		4.4	4.4	4.1	4.5	4.5	4.5	4.4	4.2	4.4	4.3	4.3
Total factor productivity (index)		1.2	1.2	1.7	1.3	1.3	1.3	1.2	1.9	1.2	1.9	1.91
GNI	7,748.6	5.6	5.4	5.7	5.7	5.7	5.7	5.4	6.0	5.4	6.1	6.0
GNDI	8,396.9	5.6	5.5	5.7	5.7	5.7	5.7	5.4	6.0	5.4	6.0	6.0
GNI per capita	0.3	2.1	2.3	2.6	2.3	2.3	2.3	2.0	2.8	2.0	2.9	2.8
GNDI per capita	0.3	2.1	2.3	2.5	2.2	2.3	2.3	2.0	2.8	2.0	2.8	2.8
Real exchange rate (index)		0.04	0.00	0.09	0.16	0.12	0.13	0.19	0.19	0.01	0.18	0.19
Unemployment rate (%)	20.5	18.7	18.8	19.2	18.4	18.1	17.9	19.5	18.0	20.1	17.6	17.6
Headcount poverty rate (%)	47.5	34.4	32.8	25.9	31.9	31.8	31.6	38.8	22.6	38.8	21.7	21.5

Note:
1. Unless otherwise noted, column for initial year shows data in bn 2015 dinars.
2. For the unemployment and povert rates, the base-year and simulation columns show base-year rates and simulation-specific final-year rates, respectively.

Table C.3. Government receipts and spending in 2021 and by scenario in 2050 (% of nominal GDP)

Indicator		2021	base	pop-	pop-edu+	ag	agman	agmanser	base-p	combi	combi-0	combi-fg	combi-ef
Receipts	Direct taxes	3.1	1.5	1.6	1.8	1.5	1.5	1.5	2.0	1.7	2.3	1.6	1.4
	Import tariffs	2.5	2.7	2.7	2.8	2.7	2.7	2.7	2.6	2.8	2.7	2.8	2.8
	Other indirect taxes	9.1	5.3	5.6	6.3	5.5	5.5	5.2	6.5	6.0	8.8	5.3	4.8
	Private transfers	8.4	10.7	10.6	11.1	10.7	10.6	10.7	10.1	11.1	10.1	11.3	11.3
	Foreign transfers	5.9	5.9	6.0	5.8	5.9	5.8	5.8	6.5	5.6	6.3	6.0	5.5
	Domestic financing	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5
	Foreign financing	1.8	1.1	1.1	1.1	1.1	1.1	1.0	1.2	1.0	1.1	1.0	1.0
	Total	31.5	28.4	28.9	30.2	28.8	28.6	28.2	30.2	29.6	32.4	29.2	28.2
Spending	Consumption	16.1	14.9	15.2	16.3	14.9	14.8	14.7	15.6	16.0	17.5	15.8	14.8
	Fixed investment	11.6	9.6	9.9	9.4	10.2	10.1	9.9	10.4	9.5	10.9	9.3	9.4
	Private transfers	3.8	3.9	3.7	4.5	3.6	3.6	3.6	4.1	4.1	4.1	4.1	4.1
	Total	31.5	28.4	28.9	30.2	28.8	28.6	28.2	30.2	29.6	32.4	29.2	28.2

Table C.4. Balance of payments in 2021 and by scenario in 2050 (% of nominal GDP)

Indicator		2021	base	pop-	pop-edu+	ag	agman	agmanser	base-p	combi	combi-0	combi-fg	combi-ef
Outflows	Imports	25.9	27.2	27.2	28.0	27.9	27.6	27.6	27.5	28.3	27.1	28.4	28.4
	Factor payments	2.5	9.9	10.0	9.8	10.4	10.2	10.1	10.6	10.0	10.0	9.7	10.0
	Change in foreign reserves	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Total	28.9	37.4	37.5	38.1	38.7	38.1	38.0	38.4	38.6	37.4	38.4	38.7
Inflows	Exports	14.3	23.6	23.5	24.2	24.8	24.5	24.5	23.2	25.3	23.0	24.8	25.5
	Private transfers	3.4	3.1	3.0	3.3	3.1	3.1	3.0	3.4	3.2	3.2	3.1	3.1
	Government transfers	5.9	5.9	6.0	5.8	5.9	5.8	5.8	6.5	5.6	6.2	6.0	5.5
	Government borrowing	1.8	1.1	1.1	1.1	1.1	1.1	1.0	1.2	1.0	1.1	1.0	1.0
	FDI	3.5	3.7	3.8	3.7	3.7	3.7	3.6	4.1	3.5	3.9	3.5	3.5
	Total	28.9	37.4	37.5	38.1	38.7	38.1	38.0	38.4	38.6	37.4	38.4	38.7

Table C.5. Real GDP at factor cost by sector - level in 2021 (bn 2019 CFA francs) and annual growth by scenario 2022-2050 (%)

	2021	base	pop-	pop-edu+	ag	agman	agmanser	base-p	combi	combi-0	combi-fg	combi-ef
Aggregate sectors												
Agriculture	2,552.9	4.2	4.0	4.2	4.5	4.5	4.5	4.1	4.5	4.0	4.5	4.5
Industry	1,132.0	6.6	6.6	6.8	6.8	6.8	6.8	6.5	7.0	6.4	7.2	7.1
Mining	444.9	7.6	7.6	7.7	7.6	7.6	7.7	7.4	7.7	7.5	7.7	7.8
Manufacturing	366.4	5.6	5.4	6.0	6.0	6.1	6.1	5.6	6.5	5.4	6.6	6.6
Other	320.7	6.2	6.1	6.3	6.3	6.3	6.4	6.0	6.6	5.9	6.7	6.7
Services	2,515.0	6.3	6.2	6.7	6.5	6.5	6.5	6.2	6.9	6.3	7.0	6.9
Private	1,675.5	6.2	6.1	6.4	6.3	6.3	6.4	6.0	6.7	5.9	6.8	6.8
Government	839.5	6.6	6.6	7.2	6.7	6.7	6.7	6.6	7.3	7.0	7.3	7.1
Total	6,199.9	5.7	5.6	5.9	5.8	5.8	5.9	5.5	6.1	5.6	6.2	6.1

Table C.6. Sector structure in 2021 and 2050 (%)

	Value added	Production	Employment	Exports	Imports	Export/output	Import/demand
2021							
Agriculture	41.2	27.3	73.8	7.3	1.1	2.8	1.0
Industry	18.3	30.2	8.3	69.8	66.2	15.4	31.0
Mining	7.2	7.4	1.7	24.3	3.4	24.5	19.4
Manufacturing	5.9	12.0	4.0	45.5	59.8	23.6	49.7
Other	5.2	12.0	4.0	45.5	59.8	23.6	49.7
Services	40.6	42.5	17.9	23.0	32.8	4.4	10.6
Private	32.0	36.4	16.0	21.3	32.4	4.8	12.1
Government	8.5	6.1	1.9	1.7	0.3	2.2	0.8
Total	100.0	100.0	100.0	100.0	100.0	7.8	16.9
2050							
Agriculture	33.9	21.2	63.5	2.4	1.0	1.6	1.0
Industry	25.6	35.1	12.0	79.3	66.6	23.3	30.7
Mining	13.3	11.8	3.9	51.7	4.1	46.1	11.4
Manufacturing	6.0	11.9	4.5	27.6	59.5	23.1	50.9
Other	6.2	11.4	3.7		3.0		4.6
Services	40.6	43.6	24.5	18.3	32.5	5.4	10.6
Private	33.5	38.2	21.6	16.6	32.2	5.7	11.9
Government	7.1	5.4	3.0	1.6	0.3	3.8	0.8
Total	7.1	5.4	3.0	1.6	0.3	3.8	0.8

	Value added	Production	Employment	Exports	Imports	Export/output	Import/demand
Δ (2050-2021)							
Agriculture	-7.3	-6.1	-10.3	-4.8	-0.1	-1.2	0.0
Industry	7.3	4.9	3.7	9.5	0.4	7.9	-0.2
Mining	6.1	4.4	2.1	27.4	0.8	21.5	1.0
Manufacturing	0.1	-0.1	0.5	-17.9	-0.3	-0.6	1.2
Other	1.0	0.6	1.0		0.0		-0.2
Services	0.0	1.2	6.6	-4.7	-0.3	1.1	0.0
Private	1.4	1.8	5.6	-4.7	-0.3	0.9	-0.1
Government	-1.4	-0.6	1.0	0.0	-0.1	1.6	0.0
Total	0.0	0.0	0.0	0.0	0.0	3.7	0.4

Appendix B.5

The base scenario is designed to provide a central, business-as-usual case for the evolution of Niger's economy up to 2050. This is a scenario without changes in economic policy and without the emergence of major macroeconomic imbalances. It provides a yardstick against which the results for non-base scenarios are measured. For 2020 and 2021, the World Bank's estimated or projected growth in GDP at factor cost are imposed (World Bank 2021a). For the period 2022-2050, the model is set up so that, thanks to the anticipated oil expansion, it generates an expansion of 0.5 percentage points relative to the observed annual rate for 2000-2019 of 5.2 percent.[115] Beyond GDP, starting from 2020, payments related to the government, the balance of payments, savings, and investment, defined as shares of GDP are set to make sure that the path of the economy is sustainable. Moreover, it assumes that, starting from 2022, the growth in the different population age groups follows the UN medium fertility variant (UN 2019) which projects that the diminution in the total fertility rate will follow the same linear trend observed since 2000, moving from 6.95 live births per woman in 2015-2020 to 4.32 in 2045-2050.

The level of income per capita and the extent of poverty in Niger can change radically according to future demographic trends. The first two alternative scenario pop- and pop+ differ from the basis only for the population trajectory. In the first and more favorable scenario (the UN low fertility variant), the trend in the reduction of the total fertility rate observed since the begin of the 2000s will accelerate, moving to 3.82 live births per woman in 2045-2050. As consequence, the average rate of population growth will drop from 3.8 in 2020 to 3.1 in 2050. This alone will allow some benefit in terms of poverty reduction and income per capita, which will increase of around 4.3 percent in 2050 comparing to the base scenario. However, if the pace of the reduction in fertility rate should slowdown so that the number of live births per woman in will still be 4.8

115 Technically, the base scenario was constructed in two steps: (1) It was assumed that the oil sector was stagnant and growth in GDP at factor cost exogenous while, at the same time, the model has an endogenous variable that, in each year, scales TFP in selected production activities so that the exogenous GDP level is generated; and (2) The scenario was rerun with endogenous GDP growth, without endogenous TFP scaling (but imposing the scaling results from step 1), and an expanding oil sector (due to expanding access to the natural resource). The analysis uses the results from step 2, which is what is referred to as the base scenario.

(UN high variant), the level of income per capita will be sensible lower, to XOF 573,000 (2015 values).

The first scenario, pop, addresses population in isolation from other changes. It assumes that, starting from 2022, the growth in the different population age groups switches from the UN medium variant to the UN low fertility variant (UN 2019). As a result, by 2050, the total fertility rate decreases to 3.8 and total population reaches around 61 million as opposed to 4.3 and 65 million, respectively, for the medium variant while the dependency ratio decreases from 78 to 72 percent, something that creates a potential demographic dividend insofar as the addition to the labor force can be productively employed. This alone will allow some benefit in terms of poverty reduction and income per capita, which will increase by around 4.3 percent in 2050 comparing to the base scenario. However, if the pace of the reduction in fertility rate should slowdown, pop+, so that the number of live births per woman will still be 4.8 (UN high variant), the level of income per capita will be sensible lower, to XOF 573,000 (2015 values), as the population reaches 70 million and the dependency ratio will increase to 78 percent of the population.

Such a demographic change is likely to come hand in hand with improvements in educational outcomes and in the saving ratio. Accordingly, the third scenario, pop-edu+, combines the demographic assumption of the scenario pop with increased government spending on education, and an increase in the share of the labor force with completed primary education or more. More specifically, between 2021 and 2024, government education spending increases gradually from 3.8 percent of GDP to 5.8 percent, a share that is maintained throughout the simulation period.[116] With regard to the labor force, it is assumed that the share with completed primary or more starts to grow more rapidly while growth for those with while growth for those with less than completed primary slows down, raising the share for those with completed primary or more from 11 percent in 2021 to 55 percent in 2050, as opposed to a share of 39 percent for the base in 2050.[117] In the model, the gain from this change in shares is due to the assumption that the more educated labor group has a higher marginal productivity and, as a result, receives higher wages. Finally, the fiscal space that is needed for this spending expansion is generated via scaled-up domestic taxes (direct and indirect, not including trade taxes).

Finally, the highest level of GDP will be reached in a scenario such as pop-s+, where the saving-investment channel is fully at work. The lower fertility allow household to increase the share of their revenue which is saved and used to fund domestic investment. This is fundamental element through which the demographic dividend materializes. In this case, even by keeping unchanged the demographic variables, the level of GDP per capita deviate from the baseline

116 Judging from data for the period 2012-2016 for all low-income countries with data, this change in government education spending would move Niger from below the mean to midway between the mean of 4.2 percent and a maximum of 7.4 percent (Andrews et al. 2019, p. 11).

117 The changes in the educational make-up of the labor force were generated drawing on simulated changes in Goujon et al. (2019, 2020a, 2020b).

Appendix Table 3. Selected data for demographic analysis (values in 2021 and by scenario in 2050)

	2021	base	pop-	pop+	pop-edu+	pop-s+
Headcount poverty rate (%)	47.5	34.4	32.8	37.7	25.9	28.2
GDP per capita (CFA fr, constant 2019 prices)	314,303	616,030	643,069	575,326	693,661	720,871
Household savings (% of GDP)	12.1	11.9	11.9	12.0	12.0	16.0
Dependency ratio (%)	110.3	78.0	72.0	84.4	72.0	72.0
Working age population (% total population)	47.6	56.1	58.6	54.2	58.1	58.1

Source: SDGSIM

Appendix B.6: Reform packages in SDGSIM

A more elaborate set of reforms scenarios combines elements of the simulations in the first set with reform aiming at expanding public investment and tests the role of selected assumptions on fiscal space. The first simulation, *combi*, combines changes toward lower population growth, a better educated labor force, and the provision of infrastructure that raises the productivity of the widest range of sectors. The remaining simulations test the impacts of alternative assumptions in the context of the *combi* scenario: (a) *combi-0* assumes the same increases in government spending as for *combi* but without gains in education or productivity – this reflects the impact of deficient governance; (b) *combi-fg* assumes that instead of higher taxes, the need for increased government funding is covered by foreign grants; and (c) *combi-eff* introduces a parallel increase in government efficiency (reduced government spending on public administration without any negative impacts) sufficient to create the fiscal space needed to increase spending on education and infrastructure.

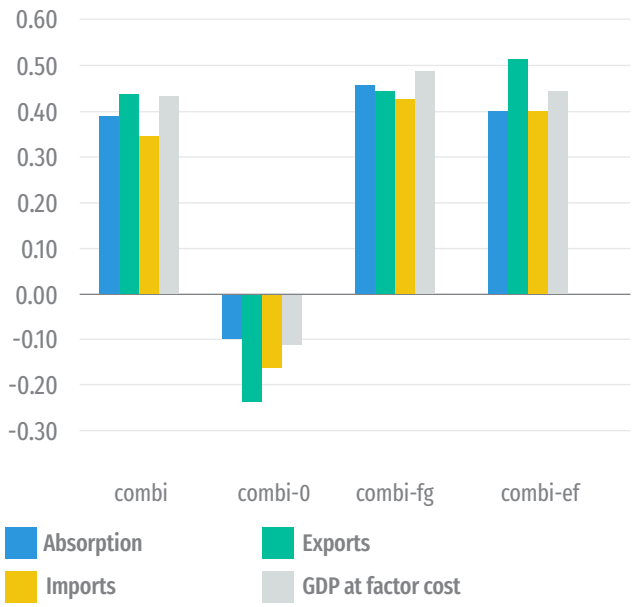
For *combi* and most of the other scenarios, the growth deviations are slightly stronger than the sum of the individual effects of the two "input" scenarios, *pop-edu+* and *agmanser*, indicating the presence of synergies.[118] The results for *combi-0* show the cost of a serious governance failure: for example, instead of a growth increase of around 0.4 percentage points, absorption growth shrinks 0.1 points. Economically, this is due to the fact that allocation of resources to government consumption and investment without any gains comes at the cost of household consumption and private investment that together and improve a wider range of economic outcomes.

In terms of sectoral GDP growth, the patterns of the two input scenarios are reflected in the outcomes for combi (Appendix Figure 20) with some synergy added (i.e., the sectoral growth gains for the two are slightly larger than the sum of those of the individual input scenarios).

Finally, Appendix Figure 22 presents the implications of these 2050 levels of household per-capita consumption for headcount poverty. The three more successful scenarios bring poverty down to around 22-23 percent, i.e., below the lowest level in set 1 of around 26 percent.

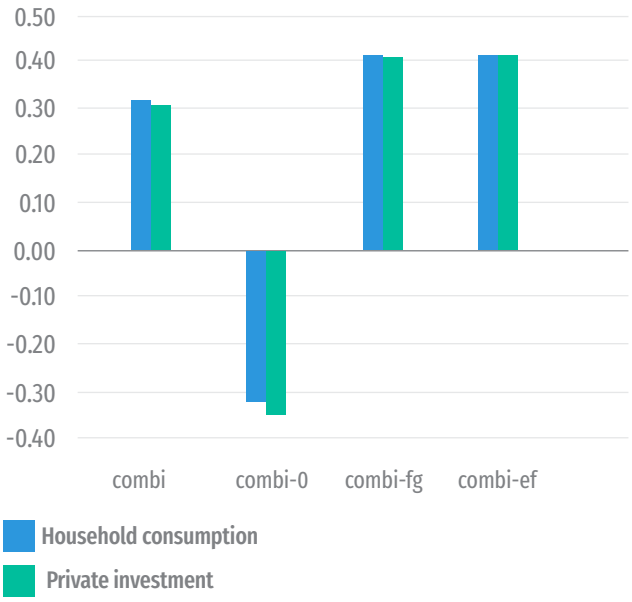
118 For example, the sum of the absorption growth deviations for pop-edu+ and agmanser are 0.35 percentage points while the gain for combi is 0.39 points.

Appendix Figure 18. Absorption, GDP, and trade growth by scenario (%-age pt. deviation from base)

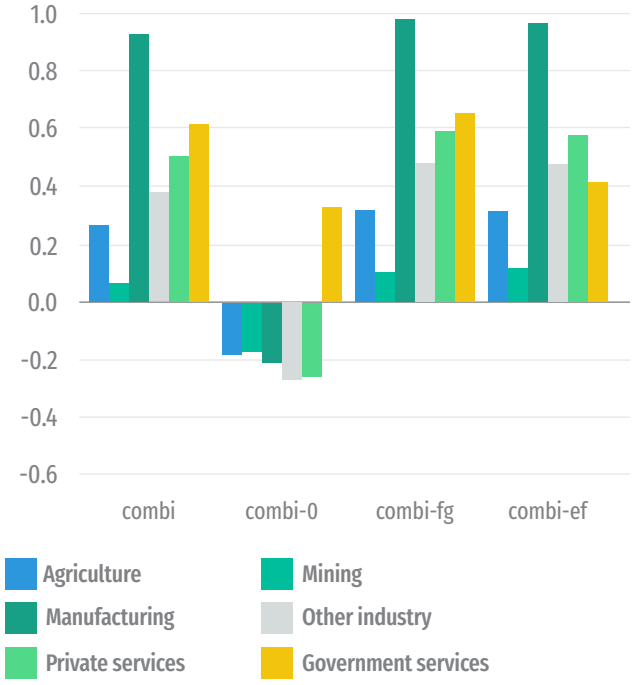


Source: SDGSIM

Appendix Figure 19. Household consumption and private investment growth by scenario (%-age pt. deviation from base)

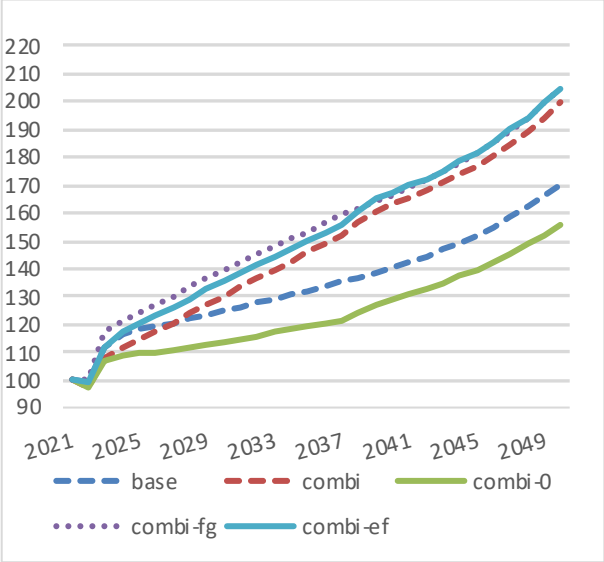


Appendix Figure 20. Sector GDP growth by scenario (%-age pt. deviation from base)

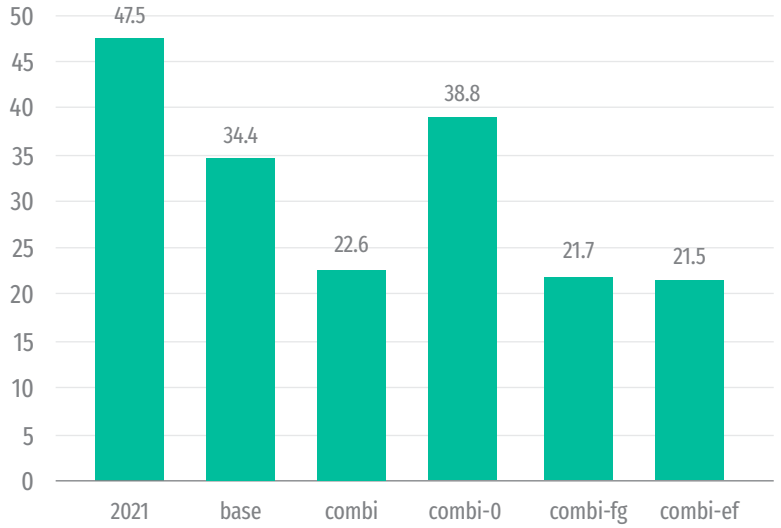


Source: SDGSIM

Appendix Figure 21. Household consumption per capita by year (index 2021=100)



Appendix Figure 22. Headcount poverty rate in 2021 and by scenario in 2050 (%)



Source: SDGSIM

CHAPTER 3: APPENDIX C

Examples of blended finance - BoViMa Madagascar and FinGAP Ghana[119,120]

BoViMa, Madagascar: Three-quarters of Madagascar's population lives in extreme poverty, and 80 percent are dependent on agriculture. Although Madagascar has excellent conditions for cattle and goat production, inadequate veterinary services and infrastructure limit economic opportunities and exports. The government of Madagascar, with World Bank support, has been helping rural herders and farmers improve incomes by expanding veterinary services, developing new road infrastructure, addressing agriculture value chain policy and governance issues, and building related technical capacity.

IFC is complementing these activities with support for a local agribusiness firm, BoViMa, which is developing the country's first modern feedlot and abattoir. With support from the Global Agriculture and Food Security Program (GAFSP), advisory services are provided to help BoViMa improve animal husbandry and strengthen the company's supply chain for both breeders and local farmers who produce animal feed. IFC and GAFSP are also providing a $7 million subordinated debt investment in the company to make the project viable and crowd-in other investors. The blended concessional finance will allow the BoViMa project to help support the livelihoods and operations of more than 20,000 local herders and farmers.

This project illustrates how a comprehensive approach involving advice to government and suppliers, development institution financing, private sector

119 IFC (2021). "Using Blended Concessional Finance to Invest in Challenging Markets - Economic Considerations, Transparency, Governance, and Lessons of Experience", available at: https://www.ifc.org/wps/wcm/connect/1decef29-1fe6-43c3-86c7-842d11398859/IFC-BlendedFinanceReport_Feb+2021_web.pdf?MOD=AJPERES&CVID=ntFHkEh

120 Source: SAFIN / IDB Lab: "Filling a financing gap in Ghana: Blended finance case study," available at: https://5724c05e-8e16-4a51-a320-65710d75ed23.filesusr.com/ugd/f6ddfc_8802e17a260a4836a9f33acc8c201bb6.pdf

sponsorship, and donor-funded concessional co-investment can help create markets. The project required extensive effort to develop but could revive the country's former export market for beef and goat meat. The project also illustrates the importance of higher risk-bearing instruments such as subordinated loans in high-risk environments.

FinGAP, Ghana: An innovative program implemented by Palladium and financed by the U.S government transformed Ghana's agricultural finance market by realigning incentives to motivate behavior change among local private sector actors. The incentives stimulated commercial lending to "missing middle" borrowers in the long-overlooked segment of agriculture that focuses on the staple crops of maize, rice and soy.

Over the course of five years (from 2013 to 2018), Palladium invested $5 million—out of a $22 million USAID program known as the Financing Ghanaian Agriculture Project (FinGAP)—to create "smart incentives" that would encourage business advisory service providers and financial institutions to participate in this sector. Ultimately, FinGAP unlocked $260 million in financing and benefited nearly 3,000 small, medium and large agribusiness enterprises, more than 40 percent of them owned by women.

The incentives, which included subgrants or subcontracts, were accompanied by demand-driven training and technical assistance on how to lend to agricultural supply chains and how to mitigate risk. Palladium also encouraged the use of blended finance at the project level, using strategies such as packaging financing from multiple sources, creating new financial products and layering risk mitigation instruments such as guarantees or subsidies to the private sector. The combination of these blended finance strategies led to significantly expanded agricultural lending—by both local and international financial institutions—that continues today. More significantly, Palladium helped create a market where financial institutions now compete, in the absence of donor funding, for market position in agricultural finance.

Appendix C.1

Opportunities for commercial agriculture in Niger

Several studies find that agriculture can be an important engine for Niger's economic growth, and a suitable option to diversify its exports. Agriculture in Niger is perceived to have a large potential for development and to contribute to reducing poverty that affects large groups of people, including women and youth, in rural areas. The main sources for growth are seen in

- Vast aquifer resources, which offer opportunities to develop diversified and productive agriculture systems.
- Several plant varieties and animal breeds recognized for their adaptive and productive potential in their agro-climatic environments that can be competitively produced and exported, and
- The traditional know-how and good experience of producers in certain specialized production areas typical of the region and landscape, such as flood recession cultivation.

The expansion of irrigated land is clearly one of the most promising paths to increase production of high-value products. Although three-fourths of Niger is classified as hyper-arid desert, the country's overall potential water resources are significant, estimated at 32 billion cubic meters per year. Most of it is external – coming through the Niger river and its tributaries. However, most of those resources have not been adequately harnessed. To date, less than 1 percent (2,000 ha) of Niger's surface water and less than 20 percent of its groundwater are utilized, and less than 1 percent of the total cultivated area (of

15 million ha) is irrigated.[121] There is increasing interest in the installation of small-scale irrigation facilities that rely on small water retention infrastructure or through pumping of ground water, that could be managed locally by communities instead of relying on the larger surface distribution schemes.[122] Expanding irrigation would allow Niger to exploit its potential to produce a variety of exportable agricultural products.

Commercial agriculture, understood as a market-oriented agriculture serving local and international demand, is still in the early stages of development in Niger. While agriculture plays a large role in the local economy, and as a source of nourishment and employment, most farming is undertaken at small to very small-scale units with low levels of productivity with most of the production dedicated to the farmers' own consumption and only small surpluses left for sale. Except for rice, average yields per hectare of agricultural products such as millet, sorghum and groundnuts are well below the Sahelian average, and still much lower than that achieved, for example, by Egypt. As most of the production also uses little or no external inputs, agriculture is, as a matter of fact, not well integrated into markets.

As of 2019,[123] the agribusiness sector was highly atomized with very few medium sized enterprises and modern facilities on the one side, and very large numbers of informal farms and microenterprises on the other. The inventory includes a small number of formal value chain firms[124], several producer organizations,[125] an unknown number of enterprises providing support services to farmers and the small and medium enterprises (SMEs) in the agri-food sector operating in urban areas, and a very large number of small farms with an average area of 0.5 hectares.

The performance of the agricultural sector is highly variable due to high exposure to agronomic, climatic, and security risks with few mitigation options, particularly for frequent climatic shocks, notably drought, which cause food insecurity. On top of this, persistent instability in the Sahel region, the disruptive forces of climate change, and the ongoing COVID-19 pandemic, complicate the pursuance of a long-term development strategy, present key bottlenecks, and additional sources of fragility. Environmental degradation, extensive flooding, overuse of land, soil erosion, and desertification represent the main land use risks, compounded by a weak dynamic of mitigation and adaptation. The exposure to these risks is accentuated by the very low level of capital investment in the sector, and the lack of resources to apply technology to improve productivity and resilience in the face of disruption in production cycles. The main challenges for the development of productive commercial agribusiness include (i) limited access to markets due to the lack of market information, weak transport infrastructure, and the absence of commercial relationships; (ii) the lack of access to finance which is reflected in the lack of access to modern equipment, storage, processing, and logistics; and (iii) poor access to energy. Farmers often look for support to acquire modern equipment, receive training on techniques to improve agricultural productivity, and improve the control and monitoring of their production.

121 Source: WB 2021 Project Appraisal Document of the NIGER INTEGRATED WATER SECURITY PLATFORM PROJECT

122 See: National Strategy for Small Scale Irrigation Development; SPIN, March 2015

123 Source: 2019 Project Appraisal Document for the AGRICULTURAL AND LIVESTOCK TRANSFORMATION PROJECT

124 9 medium sized enterprises operating in commercial farming, the trade of onions, horticulture products, poultry, and the processing of wheat and dairy products, 4 large slaughterhouses, one of which is privately operated, one large dairy processor, "Niger Lait", and a small number of semi-modern dairy operators

125 There are about 8,500 farmer cooperatives who sell the surplus of their production in the market and more recently started to be involved in processing, as well as 50 women associations involved in grinding and processing of fruit, cereals, and dairy products.

CHAPTER 4: APPENDIX D

Appendix Table 4. Summary of Baseline Assumptions for Niger (LTGM-NR)
(Selected Initial Conditions, Main Parameters, and Exogenous Variables)

A. Main parameters	Value	Source
Labor share	52% of non-R GDP	PWT 10
Resource rents	45% of oil GDP	GTAP
Government share	40% of oil GDP	IMF-WCE

B. Initial conditions	Value	Source
Per capita GDP	US$563 (real 2010)	UN-WDI
Non-oil	98% of GDP	NER-SNA
Oil	2% of GDP	NER-SNA
Capital-to-GDP ratio	4	PWT 10
Non-energy	3.9	Eq. MPK
Oil	0.1	Eq. MPK
Reserves of oil	2Bn barrels	BP-Energy

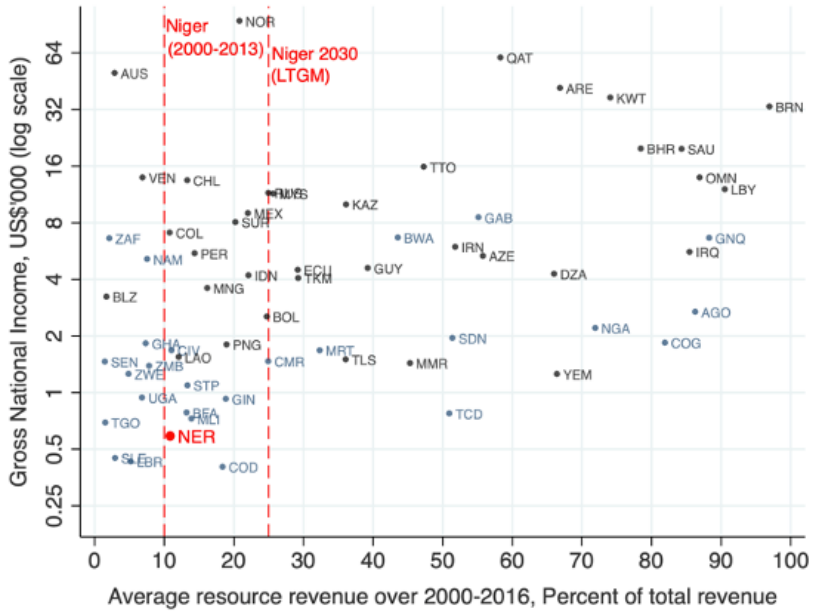
C. Trajectory of exogenous variables, 2021-2050		
Price of oil	US$60/barrel	WB-CMO
Investment:		
Private	30%→15% GDP	IMF-FAD
Public	15%→10% GDP	IMF-FAD
Productivity:		
Non-oil TFP	1% growth	PWT 10
Human capital	0.5% growth	PWT 10
Demographics:	2021→2050	
Population growth	4%→3%	UN-ILO
Working-age pop.	48%→55%	UN-ILO
Participation rate	74% constant	WB-WDI

Appendix Table 5. Summary of Growth Simulations (LTGM-NR)

	Average growth rate, Percentage				Index (2010=100)		
	2026-50	2026-29	2030s	2040s	2020	2030	2030
I. Gross domestic product per capita							
Baseline growth rate, %	1.4%	0.5%	1.0%	2.0%	100	127	173
Incremental growth vis-à-vis baseline, p.p.:							
High oil price ($70):							
Moderate response	~0	+0.1	+0.1	~0		128	175
Strong response	+0.1	+0.1	+0.1	~0		128	177
High Govt. share in oil income	+0.2	+0.4	+0.3	~0		130	182
Low oil price ($40):							
Moderate response	-0.1	-0.1	-0.2	~0		126	170
Strong response	-0.2	-0.2	-0.3	~0		126	167

	Average growth rate, Percentage				Index (2010=100)		
	2026-50	2026-29	2030s	2040s	2020	2030	2030
II. Non-energy GDP per capita							
Baseline growth rate, %	1.5%	0.6%	1.2%	2.1%	100	124	173
Incremental growth vis-à-vis baseline, p.p.:							
High oil price ($70):							
Moderate response	+0.1	+0.4	~0	~0		126	175
Strong response	+0.1	+0.5	+0.1	-0.1		126	177
High Govt. share in oil income	+0.2	+0.8	+0.3	-0.1		128	183
Low oil price ($40):							
Moderate response	-0.1	-0.8	~0	+0.1		119	168
Strong response	-0.2	-0.9	-0.1	+0.1		118	166

Appendix Figure 23. General Government resource revenue,
Percent of total revenue, average over 2000-2016* (Sub-Saharan Africa in blue)



Source: Resource revenue data from UN-WIDER and total revenue data from IMF-WEO. * Data for Niger runs from 2000 to 2013.

Appendix D.1: Literature on institutions and the natural resource curse

There is a rich literature in the disciplines of economics and politics that studies the paradox of many resource-rich developing countries failing to use their resource wealth as a catalyst for growth and development, a phenomenon known as the resource curse. Early economic explanations for the resource curse focused on the Dutch disease, in which a resource boom leads to the appreciation of a country's real exchange, and the shift of labour and capital away from manufacturing, a sector that is conducive to long-term growth. This crowds out the production of growth-enhancing traded goods leading to economic stagnation. Many later theories place more emphasis on institutional explanations for the lacklustre development outcomes, with some such as Easterly and Levine (2003) arguing that the only channel through which natural resources (NR) impact economic development is through their impact on institutions. Different authors cite different transmission channels, and indeed the chain of causality is debated – do natural endowments affect the kind of institutions that develop which then impacts development broadly or do institutions shape the impact of natural resources on development?

One strand of the institutions-resource-curse literature argues that natural resource endowments influence regime type, in particular, leading to the development of undemocratic regimes. Simply put, natural resources generate large rents that undermine the fiscal contract between a government and its people. Such a state is therefore fiscally autonomous, meaning that it is essentially free from the accountability associated with relying on tax revenues for fiscal resources, leading to poor governance.

The type of natural resource – point source or diffuse – matters too in determining governance outcomes. Point source resources, which are geographically concentrated and include minerals, oil and plantation crops, are associated with weaker institutional quality and hence poorer economic and political outcomes. Authors find a positive link between oil rents in particular and corruption (Mehlum et al, 2006; Arzeki and Bruckner, 2009). Diffuse resources on the other hand are those that are dispersed across a wider geographic area and economic base (such as non-plantation agriculture), making them less amenable to appropriation.

The state of the country's institutions at the time of resource discovery is also crucial; where institutions are weak, the impact of natural resources is likely to be negative (Arzeki and Van der Ploeg, 2010).

Appendix D.2: Literature on natural resources and conflict

The literature on the singular effects that natural resources have on conflict is extensive. It draws from the broader literature on the causes of war, which emphasises two mechanisms: grievance and greed. The former argues that conflicts arise out of grievances related to socioeconomic disparities, limited political rights, lack of access to the payoffs from natural resources whilst bearing their environmental costs, as well as broader divisions stemming from ethnic fractionalisation and religious diversity (Ross, 2001 and Regan, 2003). The greed mechanism on the other hand is driven by economic incentives – rents obtained from the control of resource sites or the extortion of resource extractors, may be used to fund rebel recruitment and other start-up costs of war. This finding is drawn from a cross-country analysis of civil wars in 161 countries since 1961, wherein the authors, Collier and Hoeffler (2000), find the extent of primary commodity exports to be the most important factor in determining the risk of conflict.

The link between NR rents and funding the startup costs of war is disputed. Other authors such as Fearon (2005) argue that this relationship is weak, and if there is indeed a link between primary commodities and conflict, it is because of the inclusion of fuel exports in the primary commodities data. This ties into his finding that oil is in particular associated with a heightened risk of conflict. A different mechanism is also proposed. Unlike Collier and Hoeffler (2000) who suggest NR rents increase conflict risk due to the ease of financing to meet the start-up costs of war, Fearon (2005) argues that the risk is driven by oil exporters having weak state apparatus given their income per capita. This occurs because easy access to large revenues reduces incentives for bureaucratic development and the deepening of the state's administrative apparatus as would be the case in non-oil exporters. Ross (2004) likewise finds that there is little evidence of NR rents being used a funding source by emerging rebel groups. However, he finds evidence of a 'separatist mechanism', in which grievances related to the allocation of NR rents drive separatist movements. Blair, Christensen and Rudkin (2021) on the other hand find that natural resources in general do not affect the likelihood of conflict. However, when the results are disaggregated by commodity type, important distinctions emerge. Notably, price increases of agricultural commodities reduce the likelihood of armed conflict, whereas price increases in oil and gas as well as lootable minerals such as alluvial diamonds and gold increase the likelihood of conflict. In this respect it is commodity price changes and not NR abundance itself that determines conflict outcomes.

Beyond influencing the probability of the onset of conflict, NR may also play a role in the intensity and nature of conflict. Natural resources may reduce the intensity of conflict where neither belligerent can secure sole rights to the resource (Ballantine, 2003; Ross, 2004; Le Billion, 2001). The geographic location of natural resources (close to power centres such as the capital or in more remote areas) and the nature of the resource itself (diffuse vs. point source), may also influence the nature of the conflict that emerges (e.g., warlordism, riots, secessionist movements or violent state control).

The type of resource base an armed group has access to determines the characteristics of its members, their strategies and internal organisation, and how they use violence (Weinstein, 2005, 2007). Natural resource wealth is likely to attract opportunistic recruits motivated by short-term gains and are therefore harder to organise, with worse outcomes both for the civilian population (e.g., the use of indiscriminate violence) and the armed group itself (due to lack of discipline or structure), in contrast to recruits driven by long-term interests.

CHAPTER 5: APPENDIX E

Appendix E.1: Actors involved in the field of disaster risk management

1. The National Platform for Risk Reduction and Natural Disasters (PFN-RRC) is a multi-sector consultative committee created in 2012[126], which aims to promote disaster risk reduction at various levels. The National Platform has remained lethargic for a long time due to the non-finalization of its Action Plan, the inadequacy of some of its missions which are more operational than consultative, and the lack of resources for its functionality. The platform is headed by the Prime Minister's Cabinet, and the Ministry of the Interior, Public Security, Decentralization and Customary and Religious Affairs (MI/SP/D/ACR) ensures the vice-presidency, through the Civil Protection General Directorate (DGPC). The Early Warning System Coordination Unit (CC/SAP) had the

126 Decree No. 0030/PM, dated February 9, 2012.

function of secretariat. This function has now been transferred to the Ministry of Humanitarian Action and Disaster Management (MAH/GC).[127] The platform's main mission is the definition of a national DRM framework, which includes policies, and programs, known as the National Plan for the Prevention and Reduction of Natural Disaster Risks (PN-PRRC). It is also responsible for the coordination and harmonization of the activities of all stakeholders involved in DRR processes. The PFN-RRC also includes regional representations and has plans for the installation of department and municipal level representations.

2. The Ministry of Humanitarian Action and Disaster Management (MAH/GC). The creation of the MAH/GC in 2016 resulted from a strong political willingness to prevent and manage climate change, disaster, and humanitarian crises, and improve the coping capacity of households and communities. The mission of this ministry was recently refocused in terms of both strategic and operational roles in the field of humanitarian action and risk management, through three important programs that aim to: (i) strengthen the institutional framework and coordination of humanitarian interventions and disaster management, (ii) improve the effectiveness of the system and responses to humanitarian emergencies, and (iii) strengthen mechanisms for prevention, disaster warning and risk transfer. To implement its mandate, the MAH/GC relies on a central administration including four technical directorates and six support directorates. It also relies on the relevant tools of the National Mechanism for the Prevention and Management of Food and Nutritional Crises (DNPGCCA). The recent decree issued to organize the MAH/GC addresses some of the overlapping responsibilities experienced in the past with certain structures active in the DRM agenda, such as DNPGCCA, and DGPC. In particular, it is in this context that the responsibility for the secretariat of the PFN-RRC was recently transferred to the Ministry as mentioned above.

3. The 3N Initiative "Nigeriens Nourishing Nigeriens", created in 2012 stems from a strong political will to combat hunger and poverty. It is a large-scale, cross-sectoral initiative headed by the President's office that aims to increase livestock, agricultural and forest productivity, while augmenting the resilience of farmers and herders to climate change and food insecurity. The 3N Initiative is based on five strategic axes[128], including Axis 3, which aims to improving the resilience of populations to climate change, crises, and disasters, through (i) improving the effectiveness of mechanisms for anticipating and coordinating interventions in emergency situations; (ii) providing appropriate and adapted responses in emergency situations; and (iii) promoting and strengthening risk management mechanisms by providing appropriate solutions according to the types of risks faced by producers, households and communities.

4. The National Mechanism for the Prevention and Management of Food and Nutritional Crises (DNPGCCA) was set up nearly three decades ago and is headed by the Prime Minister's office. It was created to guarantee food and nutritional security for vulnerable households in the country via the prevention, timely warning and effective management of disasters and food crises. It has undergone several changes including that of December 2016, which

127 Decree 2021-319/PM, dated 2021.
128 Initiative 3N | Mission.

reduced it to a tool for managing food, nutritional and pastoral crises. Other changes also enabled the establishment of mechanisms and strategic guidelines to strengthen early warning systems to better prevent and respond to threats and emergencies. The DNPGCCA is composed of a Permanent Secretariat, an Early Warning System (EWS) Coordination Unit (CC/SAP)[129] , a Food Crises Unit (CCA) and a Social Safety Net Unit (CFS). It is based on state-donor consultation frameworks, interdisciplinary working groups, and other operational technical structures at the decentralized level. Since 2017, the EWS is being supported by the Niger Early Warning Services Modernization Technical Assistance (CREWS) from the World Bank and the World Meteorological Organization (WMO) to strengthen capacities in early warning linked to hydrometeorological events.

5. The National Council of the Environment for Sustainable Development (CNEDD) was created in 1996.[130] Under the supervision of the Office of the Prime Minister, the CNEDD is composed of representatives of the State (1/3) and civil society (2/3) and is responsible for coordinating and monitoring the national policy on the environment and sustainable development, in particular the implementation of the National Environmental Plan for Sustainable Development (PNEDD). It supports the integration of climate change considerations in national policies, strategies, and development programs.

6. The Civil Protection General Directorate (DGPC) is part of the Ministry of the Interior, Public Security, Decentralization and Customary and Religious Affairs (MI/SP/D/ACR). It oversees various DRM functions, including the development of emergency preparedness and response measures and tools. It also participates in the development of national DRM strategies and policies, including post-disaster recovery strategies. The DGPC also coordinates with national and international actors, including government institutions, international organizations, and NGOs. It is also in charge of the operational coordination in response to adverse events, including flooding, fires, industrial and technological disasters, and evaluates humanitarian impacts, and needs for assistance to affected populations. The DGPC also coordinates with affected sectors the evaluation of damages, losses and recovery and reconstruction needs. It is comprised of a General Directorate; Territorial directorates acting at the regional and municipal levels; an operational crisis center, activated at the national and territorial levels; four technical directorates covering emergency preparedness, and disaster management functions; and an administrative directorate.

7. The General Directorate of Water resources (DGRE/DHL) of the Ministry of Hydraulics and Sanitation (MAH), provides hydrological information services on a decadal and monthly basis, based on a network of automatic hydrological stations. DHRE also produces early warnings and hydrological bulletins. Special information notes are also elaborated in case of specific hydrological situations. Since December 2017, DGRE has been testing the Local Early Warning System against the Floods of Sirba (SLAPIS) model to develop an operational early warning system in the Sirba watershed. The Directorate does not develop seasonal forecasts but actively participates

129 It was created by Decree No. 89/003/PM of September 23, 1989 and amended by Decree No. 95-081/PM of 31 May 1995, then by Order No. 0070/PM of September 3, 2002, and amended by Order No. 0012/PM of 19 January 2012.

130 It was created by Decree No. 96-004/PM of January 9, 1996; amended and supplemented by Decrees No. 2000-272/PRN/PM of August 4, 2000 and 2011-57/PCSRD/PM of January 27, 2011.

in the Seasonal Climate Prediction in Africa Sudan-Sahelian Countries (PRESASS) forum, co-organized by the African Center for Meteorological Application for Development (ACMAD), AGRHYMET and other partners. The Climate Prediction Tool (CPT) software is used to produce seasonal forecasts and climate change projection.

8. The National Meteorology Directorate (DMN) of the Ministry of Transport, created in 1962.[131] The DMN's mission is to: (i) collect, process, validate, store and secure meteorological, climatological and agrometeorological data; (ii) develop and disseminate weather forecasts (including season forecasts) for the needs of users in all development sectors (agriculture, livestock, water resources, forestry, civil protection, energy, transport, health, wildlife, fisheries, trade, industry, tourism, public works, etc.); and (iii) provide the necessary data for the development of alerts on adverse climate events including rainfall, extreme temperatures, and drought conditions that may cause damage to people and their assets. As other national meteorological services in the sub-region, DMN participates in the PRESASS forum.

9. Regions and municipalities. Municipalities are responsible for (i) developing preparedness and response plans at the local level, (ii) the dissemination of warnings, as part of the Early Warning System, and (iii) community awareness and information sharing to the population. Regions and municipalities are also responsible for the elaboration of their development plans, which take into account in an integrated manner, aspects related to climate change and fragility. These development plans, covering a period of four years, are annually broken down into investment plans (PIA), from which their annual budget is derived. The Government has recently started supporting these entities to integrate into their budget the financing of activities related to early warning system risk reduction, and emergency response. However, technical capacities in DRM and resilient planning at the local level remain low, and no specific, and reliable funding is assigned to DRM functions.

10. The Regional AGRHYMET Center (RAC) is a specialized agency of the Permanent Inter-State Committee against Drought in the Sahel (CILSS). Member countries are Benin, Burkina Faso, Cabo Verde, Chad, Cote d'Ivoire, Gambia, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Senegal, and Togo. It was created in 1974 and has an international status with headquarters in Niamey, Niger. AGRHYMET's main objectives are to (i) contribute to food security and increased agricultural production in member countries of CILSS and the Economic Community of West African States (ECOWAS); and (ii) help improve the management of natural resources of the Sahel and West Africa.

11. The African Centre of Meteorological Applications for Development (ACMAD)'s mission is the provision of weather and climate information and the promotion of sustainable development of Africa (notably within the context of national strategies for poverty eradication) in the fields of agriculture, water resources, health, public safety and renewable energy. ACMAD carries out its mission through; capacity-building for the 53 National Meteorological Services (NMSs) of its Member States in weather prediction, climate monitoring (including extreme events), transfer of technology (telecommunications,

131 Decree No. 62-056/MTP of March 1, 1962

computing, and rural communication) and in research. Moreover, ACMAD encourages the NMSs to prepare strategic development plans, which integrate new African initiatives (the New Partnership for Africa's Development - NEPAD, and other regional integration initiatives) and the socio-economic conditions related to the changing global environment (post Rio Conventions, Kyoto Protocol).

12. UN Agencies, through the Humanitarian Country Team (EHP/HCT), and its Clusters and Working Groups, including one for Early Recovery, provide technical and financial support to the government and other NGOs in the implementation of disaster prevention and management.

13. Civil Society Organizations (CSOs), such as the Niger Red Cross Society, national and international NGOs, and Community-Based Organizations (CBOs) are also part of the DRR and DRM processes.

Appendix E.2. Identified DRM-related programs and actions

100	**Management and administration of the Prime Minister's Office**
10003	Management of special health center
103	**Support for the implementation of sectoral programs**
10302	Monitoring of environmental and multilateral agreements (AEM)
10310	Support for the reduction of vulnerability to food and nutritional insecurity (DNPGCA)
106	**Coordination of specific programs with technical and financial partners (PTF)**
10605	Construction of the Kandadji dam
172	**Coordination of humanitarian and disaster management interventions/responses**
17201	Coordination, monitoring and evaluation of humanitarian action and disaster management activities
17202	Establishment and creation of structures destined to humanitarian aid and disaster management
17203	Strengthening advocacy for better mobilization of national partners and insurance companies
17204	Coordination of responses at the national level in relation to the ministries and structures concerned
17205	Development of policies and strategy for humanitarian action and disaster management as well as their action plans
17206	Development and implementation of communication plans on humanitarian action and disaster prevention
17207	Sensitization of stakeholders on the construction ban in flood-prone and non-constructible areas
17208	Provision of information and awareness tools on humanitarian action and disaster management
17209	Capitalization of achievements and good practices in humanitarian and disaster management
17210	Strengthening of the technical, operational, and infrastructural capacities of the Ministry
173	**Improving effectiveness of the system and the responses provided before humanitarian emergencies**
17301	Internalization and monitoring of the single humanitarian response plan
17302	Creation of a database on humanitarian emergencies and disasters

17303	Monitoring and evaluation of the management of camps for refugees and displaced persons on the national territory
17304	Mobilization and sensitization of people in distress for emergency relief
17305	Organization and provision of emergency responses in post-crisis situations
17306	Establishment and operationalization of emergency humanitarian relief tools
174	**Strengthening mechanisms for prevention, disaster warning, and risk transfer**
17401	Capacity building of the MAH / GC and regional and local structures in disaster risk reduction
17402	Promotion of disaster risk reduction
17403	Knowledge dissemination for better governance of disaster risks
17404	Establishment and operationalization of financial instruments for risk transfer
175	**Support for early recovery and strengthening the resilience of communities affected by crises**
17501	Support for early recovery of populations affected by disaster crises
17502	Promotion and capacity building on technological innovations
179	**Planning and modernization of cities**
17904	Construction and rehabilitation of urban infrastructure
180	**Improvement of the citizen's quality of life**
18002	Update and harmonization of the regulatory and institutional framework for sanitation and landscaping
18005	Reinforcement of the water drainage system
189	**Reducing the adverse effects of climate variability and change**
18904	Capacity building of staff and other actors
207	**Steering and administration of environmental policy**
20701	Human resources and career management
20702	Financial and material management
208	**Sustainable land and water management**
20801	Recovery of degraded land
209	**Environment and improvement of the living environment**
20901	Dissemination of tools for adaptation and mitigation to climate change
20902	Improvement of the living environment
20903	Program operation

APPENDIX F

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