



United Nations
Economic Commission for Africa

North Africa and the challenges of the Covid-19 era





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First printing March 2021

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Designed and printed in Addis Ababa, Ethiopia by the ECA Printing and Publishing Unit. ISO 14001:2015 certified. Printed on chlorine free paper.

Cover photos: Shutterstock.com



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Acknowledgments

This publication was prepared under the guidance of Khaled Hussein, Acting Director of the Subregional Office for North Africa of the Economic Commission for Africa (ECA). It was prepared by Zoubir Benhamouche, economist, and benefited from the contribution of Christophe Hurlin, Professor of Econometrics at the University of Orléans, CEA consultant.

This publication benefited from comments of participants in the webinar organized on October 28, 2020 under the theme: “North Africa facing the challenges of the Covid-19 pandemic”.

Preface

The Covid-19 pandemic dragged the world into an economic crisis of unprecedented proportions since the 1929 crisis. The Economic Commission for Africa has revised downwards its growth estimates for the year 2020, which is expected to be around 1.8% in best case scenario. Due to its magnitude and the speed with which it brought entire sectors of the economy to a standstill, some of which represent important sources of employment for North Africa (such as tourism), the crisis soon became multidimensional, putting high pressure on public finance. For North African countries, the crisis comes at a time when the countries' development models were showing signs of running out of steam, as evidenced by the net slowdown in per capita GDP growth from 2010. At the dawn of the pandemic, North Africa was facing volatile growth, chronic fiscal and external deficits, and a high unemployment rate expected to exceed 15% in 2020.

As the pandemic persists, governments in the subregion have the heavy task of managing a crisis which is undermining the resilience of underdeveloped social and health systems. The nature of the crisis and its far-reaching medium-term consequences complicate the response of public authorities, which must both deal with the short-term emergency and adapt to the changes brought about in the medium term at the global level.

The crisis has not generated a mere cyclical shock; it has induced profound and lasting changes in a large number of areas at the global level (digital acceleration, transformation of work organization, reorganization of global value chains, etc.). The changes induced by the pandemic are conditioning future public policies to create the conditions for an economic recovery commensurable with the socio-economic challenges, particularly in terms of employment and the fight against precariousness and poverty. This report takes stock of the situation in the sub-region in various dimensions (economic, social, technological, governance, etc.) in light of the impact of the pandemic in the short and medium term. It analyzes the strengths and weaknesses of North Africa in the face of the crisis, as well as its vulnerabilities. Finally, it introduces a number of public policy recommendations to prepare North Africa for the challenges of the Covid-19 era.

Khaled Hussein

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1. Introduction

2020 was marked by an unprecedented pandemic with a dramatic impact on the global economy. To deal with an unknown and highly contagious virus and protect their populations, almost all the world's countries have adopted lockdown measures. As a result, in a matter of weeks oil has lost around half its value, a large number of sectors (transport, tourism, etc.) have come to a standstill, millions of workers have lost their jobs, and the G7 stock markets dropped by about 33%. The economic and social consequences of the Covid 19 pandemic are manifold and far-reaching on both short and medium terms. The pandemic has suddenly plunged the global economy into a deep recession, with a -4.9% growth according to the IMF for the year 2020 (IMF (2020)), and job losses estimated at nearly 200 million by the International Labor Office (ILO 2020). Because of this, the recession is expected to force tens of millions of people into poverty. It is most likely that the slow

economic recovery will extend over several years, leaving a significant portion of the world's population, particularly in emerging and developing countries, in a state of utter fragility and jeopardizing the attainment of the Sustainable Development Goals (SDGs). Looking further down the road, a lasting impact of the economic recession is expected given its downward effects on investment and the erosion of human capital caused by job losses and impacts on school attendance. Meanwhile, fragmentation of international trading system and global supply chains, coupled with rising digitalization, will change the face of international division of labor and question the economic and social strategies adopted by developing countries.

Under these circumstances, North African countries have no option but to rethink their development models. The macroeconomic situation in the subregion in 2019 is symptomatic of the un-

derlying structural weaknesses and the flagging development models prevailing in the countries of the subregion. Although Egypt and Mauritania have posted significant growth rates (5.5% and 5.9%, respectively), overall growth has remained volatile and dependent on the price of primary resources. It was noted that the economies of the subregion are still not sufficiently competitive in spite of the efforts made, witness the structural external deficits. The trade deficit (as a % of GDP) exceeded -7% in all countries except Sudan (-1.7%). From a budget standpoint, in spite of the efforts made by some countries to rationalize government spending (notably through the reduction of energy and food subsidies), resource mobilization and public spending efficiency leave room for improvement. With the exception of Mauritania, which for the second consecutive year posted a budget surplus of 2% of GDP, all countries reported budget deficits above -3.5%, with as high as -8.1% in Egypt, -9.6% in Algeria, and -10.8% in Sudan. As a result, public debt continues to widen and debt servicing sucks up an ever-greater chunk of public resources (e.g. close to 15% in Tunisia). This budgetary situation has curtailed the States' freedom of action in the face of the economic and social crisis brought about by the pandemic. The unemployment rate still remains very high (above 13% on average in 2019), mainly among women (above 20% on average) and young people (above 30% on average), in particular educated young people, and the participation in the labor market (46.7% on average) is one of the world's lowest.

The structural weaknesses of the subregion are reflected in a relatively low per

capita GDP growth rate of 2.25% on average for the period 1990-2018, against 5% for the group of comparator countries (China, India, Malaysia, Poland, Turkey, Vietnam). This situation reflects a relatively weak structural transformation, thereby inadequately contributing to productivity growth. The total factor productivity contribution to growth was negative over the period 2000-2018 in all North African countries with the exception of Tunisia, albeit with a very low contribution of 0.2%. Physical labor is the main contributor to growth. This is reflective of economies whose level of technological development is below the potential of their income class, relatively low levels of innovation capacity and human capital development. In this digital age and with the fast pace of digitalization prompted by the pandemic and its potentially devastating consequences for employment, it is essential to make up for this poor performance and make it a central tenet of the necessary reforms in the subregion.

This report reviews the economies of North Africa against the background of the global upheavals wrought by the Covid-19 pandemic. It consists of two complementary sections. The first section provides an overview of the situation in North African countries at the light of the crisis generated by the Covid-19 and its consequences (growth, employment, etc.) on economies on the short term, but also the medium and long terms, with particular emphasis on the development trajectories of the countries of the subregion. The second section provides a summary score measuring the subregion's vulnerability to the pandemic from the health and socio-

economic standpoints. As far as we can tell, this is the first vulnerability score proposed for North African countries.

The health dimension of the crisis brought to light the structural weaknesses of health systems and, more broadly, social systems. In addition to allowing the health system to identify, contain and provide care for the sick, the lockdown measures have had an immediate impact on millions of daily workers, most of whom without social security coverage. Furthermore, the slowdown in economic activity (if not the outright freeze in certain sectors such as tourism) brought to light the absence or weakness of adequate compensation mechanisms to support businesses (especially short-time work). These mechanisms have had a real impact on safeguarding employment in some European countries, such as France. The State's role in managing the crisis proved to be crucial, which implies the existence of budgetary capacities, and sufficiently effective governance to simultaneously adopt emergency public policies in a variety of areas.

That said, in addition to short-term management, the States will still have to manage the long-term crisis. The capacities of the public sphere will prove all the more decisive as the world will most likely embark on an increasingly digital era characterized by greater uncertainties (climatic, geopolitical, technological, etc.), thereby putting into question the strategic economic and social development choices. From a global perspective, there are already clear indications of the strengths and weaknesses of North African economies as we move into the Covid-19 era.


The first section provides a macroeconomic picture of 2019 and reviews the situation in the subregion from a number of dimensions, useful in grasping the immediate and global impact of the crisis. The second section will address the evolution of the subregion, focusing on "structural" strengths and weaknesses. The third section will shed light on the fundamental changes brought about by the pandemic, along with their repercussions on the development choices of countries in the subregion. The fourth section will pinpoint the strengths and weaknesses of the subregion in responding to the new development challenges in the Covid-19 era. Finally, the report will examine the principles of an approach to managing the short-term consequences of the crisis and designing the necessary reforms to deal with the longer-term challenges generated by the crisis, along with an identification of key areas of reform.

The last section of the report will address the construction of a summary score measuring North African countries' vulnerability to the pandemic. The approach adopted to construct the score builds on the tools used in the wake of the 2008 last major global financial crisis. As a result, we have developed a scoring method directly inspired by the one currently used by the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS) for the identification of financial institutions vulnerable to systemic risk. In fact, this approach is warranted by the large number of similarities existing between the notion of pandemic risk and the notion of systemic financial risk.

Our proposed score is based on 52 indicators grouped into 8 categories reflecting the main sources of vulnerabilities identified in the first section of the report, i.e.: spread of virus, health vulnerability, health-care capacities, economic vulnerability of the population, economic structure, State capacities, adaptive capacity, and governance. The resulting score provides a simple and relevant summary of various indicators reflecting the health, economic, demographic, societal and structural vulnerabilities of the countries in the region. The implemented methodology keeps arbitrary choices to a minimum and strives not to give ex ante precedence to a specific source of vulnerability over the others, in order to pick up on weak signals. This summary measure has the advantage of being easy to analyze by public decision-makers and the population, while being totally transparent in

its construction methodology, fully reproducible and easy to implement.

North African countries' vulnerability scores are broadly similar, reflecting the area's relatively homogeneous nature to the risk of a pandemic. However, it is worth noting that Algeria and Mauritania carry the highest risks and stand out from the other countries in the subregion. In reality, these differences between countries in the area reflect the different sources of vulnerabilities in each country. While some countries are highly vulnerable in terms of governance and adaptive capacity, others are essentially vulnerable from a health capacity perspective. Conversely, countries of the subregion exhibit relatively similar risks in terms of economic structure and economic vulnerability of the population, with certain nuances.



2. The subregion's macroeconomic assessment on the eve of the pandemic

As the Covid-19 crisis dawns, and as shown by the indicators in the Table 2-1, the countries of North Africa, albeit to varying degrees, are facing a waning of their development models, characterized by volatile growth, chronic budgetary and external deficits, high unemployment, and mounting public debt.

As oil-dependent economies, Algeria and Sudan have been hit hard by the downturn in oil prices in 2014. The growth of the Algerian economy slid to

0.8% in 2019 from 1.4% in 2018, largely due to a real growth in the hydrocarbon sector which continued its bearish trend at -4.9%, against -6.4% in 2018. Though other sectors fared relatively well, they still suffered a drop in their added value. The sector of agriculture recorded the slowest growth, edging down to 2.3% in 2019, from 5% in 2018, largely owing to unfavorable weather conditions across the subregion. The economy also suffered a major political crisis in the first three quarters of the

Table 2-1: Main macroeconomic indicators, North Africa, 2019

	Growth of GDP in %	Inflation %	Unemployment rate in %	Trade balance as a % of GDP	Current account as a % of GDP	Budget balance as a % of GDP	Public debt as a % of GDP	External debt as a % of GDP
Algeria	0.8	1.95	11.7	-6.9		-9.6	45	0.01
Egypt	5.5	12.2	10.8	-12.5	-1.7	-8.1	78.4	29.2
Morocco	2.5	0.2	9.01'	-8.9	-4.1	-3.6	65.3	.
Mauritania	5.9	2.2	9.5	-7.4	-10.9	2	76.4	54
Sudan	-1.3	53.5	16.5	-1.46	-14.9	-10.8	200	.
Tunisia	1	6.7	14.9	-17.7	-8.5	-3.5	72.2	51.2

Source: National data (Central banks, Finance ministries, and NSOS), except for Sudan (CBOS, IMF and World Bank).

year, only to end with the December 2019 presidential elections.

Sudan continues to bear the brunt of the 2011 crisis, losing 75% of its hydrocarbon export revenues due to the lack of economic diversification. Most of the growth over the past few years has been fueled by the rising agricultural production and, to a certain extent, an increase in exports, primarily oil exports to China. In 2019, growth remained negative at -1.3%, compared with -2.3% in 2018, as the activity in the tertiary, real estate and agriculture sectors contracted.

In fact, this approach has been vindicated by quite a few similarities between the notion of pandemic risk and the notion of systemic financial risk. While the Mauritanian economy has been dynamic over the period, the economic growth remained volatile and hinging on the price of minerals. Over the period 1998-2018, the value of the GDP grew six-fold thanks to the oil exploitation, which started in 2006 and intensified in recent years. Growth in 2019 reached 5.9%, up from 2.1% in 2018, driven by the rising production of extractive industries (12.2% in Q1 of 2019) and the increase in exports in the fisheries sector (5% in Q1). With the exception of extractive industries, real GDP growth came to 3.6% in 2019, compared to 3.5% in 2018, mainly driven by the recovery in the fisheries sector and, most importantly, improved agricultural production.

The performance of the group of more diversified countries: Egypt, Morocco and Tunisia, varies greatly. In 2019, the Egyptian economy grew by 5.5%, up from 2.1% in 2018. At the sectoral level, growth

was driven by manufacturing, natural gas, tourism, construction and telecommunications as the prime engines of growth, thereby stressing the need to shift to a more sustainable sectoral structure. The Egyptian economy is relatively diversified and is built around the following sectors: manufacturing (16%), real estate and construction (16%), wholesale and retail trade (14%), agriculture, forestry and fisheries (11%), and mining and extractive industries (10%). The economy has benefited from the reforms introduced in the “National Economic Reform Program” initiated in 2016. Historically, Egypt’s macroeconomic policies were marked by inconsistencies resulting in large imbalances in 2016 (fiscal and external deficits). These factors brought about a drastic reduction in foreign exchange reserves, high inflation and unsustainable levels of public debt, leading to reduced growth and high unemployment.

Although Morocco’s economy is relatively diversified, it remains sensitive to climatic conditions, particularly owing to the effects on the agricultural sector. The country has made significant efforts to reduce the volatility of agricultural production (notably through the Green Morocco Plan) and to expand the manufacturing industry (through the Industrial Acceleration Plans), but the decline in growth and its volatility prompted Morocco to start contemplating the overhaul of its development model. In 2019, growth fell to 2.5% down from 3% in 2018, following a -5.4% drop in the agricultural value added (compared to a 3.9% increase in 2018) owing to the drop-in grain production. Other higher value-added agricultural sectors have posted significant performances.

Finally, the Tunisian economy continues to be adversely affected by an obvious lack of political stability. GDP growth hardly reached 1.0% compared to 2.5% in 2018 and 1.9% in 2017. This drop is explained by the decline of -0.7% in 2019 in manufacturing industry (against +0.3% in 2018 and +0.5% in 2017), owing notably to the slump in the textile, clothing and leather sector (-3%) and in the mechanical and electrical industries (-1.5%). The hydrocarbon sector continues its downward trend to -8.1%, much like the construction sector, which reported a negative growth of -0.4% in 2019, compared to a growth of 0.8% in 2018.

On the fiscal front, North Africa has entered the pandemic with relatively large deficits and rising public debt. Aside from Mauritania, which posted a budget surplus of 2% in 2019, all countries reported a deficit above -3.5% of GDP, and as high as -8.1% in Egypt, -9.6% in Algeria, and -10.8% in Sudan. In Algeria, public finances have been affected by the drop in oil prices and persistently high level of expenditures, particularly operating and social expenditures. Like other countries of the subregion (such as Egypt), the country has launched a reflection on rationalizing public expenditure particularly through subsidy cuts and social transfer programs. In Sudan, the substantial budget deficit was due to massive subsidies of certain products (wheat and energy) and weak revenue mobilization. As a matter of fact, fiscal revenues represent less than 6% of GDP (compared to nearly 30% in Morocco), and are likely to decrease due to the economic crisis generated by the Covid-19 and the ineffective tax management. Oil revenues also are expected to be ad-

versely affected by the renegotiation of royalties paid by South Sudan for the use of Sudanese oil facilities. The problem of deficit financing will clearly become more pressing as access to financial markets is no longer available and public debt becomes alarmingly high.

Mauritania has managed to maintain budgetary discipline through continued expenditure control and increased domestic revenue. As a result, the country posted a budget surplus of 2% of GDP for the second year running in 2019, down from 2.5% in 2018. The combined effect of fiscal consolidation and accelerated growth caused a drop in the debt-to-GDP ratio (excluding the debt to Kuwait) from 82.5 percent of GDP in 2018 to 76.4 percent in 2019.

Despite the significant efforts and reforms initiated in 2016, Egypt continues to incur a large budget deficit equal to -8.2% of GDP, albeit down from -9.7% in 2018. The government introduced an ambitious three-year plan to curb the budget deficit with fiscal accounts under continued pressure, driven mainly by tax revenues well below potential. In Morocco, the budget deficit stood at -3.6% of GDP, compared to -3.8% in 2018, mainly due to the control of current expenditure. Finally, Tunisia has pursued the consolidation of its public finances, largely thanks to better tax revenue collection and a tighter control of expenditures, particularly operating expenditures. This led to the reduction of budget deficit from -4.8% in 2018 to -3.5% of GDP in 2019. At the same time, however, the public debt soared to 72.2% of GDP, leading to a significant debt service burden, consuming 14.5% of current revenue.

On the inflation front, price increases were kept under control except in Egypt, Sudan, and Tunisia. In Egypt, inflation soared to 12.2% following a new wave of fuel subsidy cuts in July 2019, putting additional pressure on consumer prices. In 2018, inflation hit 21.6%, mainly fueled by the depreciation of the Egyptian pound after an exchange rate adjustment. Although inflation has slowed down in Tunisia, it remains high at 6.7% against 7.3% in 2018. The monetary policy pursued by the Central Bank of Tunisia has contributed to slowing down the pace of inflation, notably through a 100 base point increase of the key interest rate in February 2019 to 7.75%.

Finally, in terms of external trade, all countries in the subregion are posting large trade deficits, reflecting their difficulty to improve their competitiveness and position themselves into the global value chains. In Algeria, under the combined effect of a drop in oil prices, a slowdown in production and a heavy concentration of exports in hydrocarbons, the trade balance deficit rose to -6.9% (against -6.7% in 2018). Note however that following a peak of -17% of GDP in 2014, the deficit has been curbed, notably through reduced imports. The latter have decreased by almost 9% between 2018 and 2019. In Sudan, the trade balance deficit reached -1.46% of GDP, owing in particular to the decline in hydrocarbon exports. In Mauritania, the deficit stands at -7.4%, up by 11.9% compared to 2018, thanks in particular to a 26% increase in exports, mainly iron ore and gold.

Egypt incurs a structural trade deficit (-12.5% of GDP in 2019) caused by the

weak competitiveness of its exports, a consistent share of irreducible imports (the world's largest wheat importer), and an industrial production that is 40% dependent on imported inputs. Meanwhile, Egyptian exports have not taken advantage of the depreciation of the national currency, leading to the increase in the export bill.

Morocco's trade balance also faces a structural deficit, notably with Europe. In 2019, the trade deficit stood at -8.9 percent of GDP. Exports grew (+2.4%) slightly more than imports (+2%), driven by the growth of Morocco's global business lines, especially aeronautics (+7.3%), automotive (+6.6%), agriculture and food processing (+4.1%). Similarly, Tunisia runs a structural deficit with the EU, equal to nearly 75% of its exports. The country has a trade deficit of -17.7% of GDP with a growth rate of imports (5.4%) lower than that of exports (7.0%). Its Mechanical and Electrical Industries (MEI) provided 51% of these exports. The ongoing trade deficit should lead the Central Bank of Tunisia to devalue the dinar, a move that could prove beneficial to Tunisian exports, were global demand to pick up again and providing it overcomes barriers to the competitiveness of the Tunisian economy. That said, it will exert renewed inflationary pressures and upward stress on civil service wages in a time of economic crisis.

The cyclical performance described above reflects to a large extent a number of structural weaknesses whose details will be described, to better grasp the impact of the Covid-19 crisis over the short and medium term.



3. Structural Evolution of North African Economies: Strengths and Weaknesses as we move into the Covid-19 Era

North Africa as a whole is far from being an economically homogenous region. In terms of development, when measured by GDP per capita, a distinction can be made between two groups of countries (cf. Table 9-1 in the Appendix): Algeria, Egypt, Libya, Morocco and Tunisia on the one hand, with a per capita GDP above US\$2,500 in 2018, and Mauritania (US\$1,334) and Sudan (US\$1,856) in the second group with much lower per capita incomes. All countries showed relatively low per capita GDP growth between 2000 and 2018 (cf. Table 9-2 in annex 9-1). For one thing, growth is slowing down in all countries of the subregion (except in Libya owing to political instability and its effects on oil production) and, for another, the per capita GDP growth rate is well below that of the emerging comparator countries. This sluggish growth in per capita GDP reflects a relatively low growth in Total Factor Productivity and a structural change, not contributing sufficiently to the growth in productivity.

3.1 Uneven diversification across countries and weak structural transformation across the subregion

Clearly, the subregion's economic structure has witnessed a drastic change over the past 20 years, notably a reduction in the share of agriculture to the advantage of industry and tertiary sectors (cf. Table 9-3, annex 9-1). Relative to other middle-income countries, however, a lesser reallocation of production factors has been observed. The decline in the value-added share of agriculture over the period 1991-2018 averaged -29% in North Africa against -59% on average for the control group of emerging countries. The decline in the share of employment in agriculture averaged -33% in North Africa, compared to -51% for the other countries in the group.

This diversification of production has been accompanied, in the case of Egypt,

Morocco and Tunisia at least, by a diversification of exports (cf. Table 9-4, annex 9-1). The economies of Algeria, Mauritania, Libya, and Sudan showed no improvement in their degree of diversification, with a diversification index remaining above 0.8 over the 1995-2017 period. Conversely, Egypt (0.58), Morocco (0.66) and Tunisia (0.52) reported a significant increase in the degree of diversification of their economies. With an average index of 0.73 (2017), North Africa is far less diversified than the middle-income comparator countries (average index of 0.46). Exports from North African countries are also highly concentrated, with a concentration index of 0.48 for Algeria and Libya, 0.37 for Mauritania, 0.14 for Tunisia, 0.15 for Egypt, and 0.17 for Morocco, compared to an average of 0.12 for middle-income countries in the control group. To better understand the impact of structural changes in the economy on per capita GDP growth, it is appropriate to look at the evolution of sectoral productivity. Table 9-6 (attached as annex 9.1) shows the development of labor productivity at sectoral level over the period 1991-2018. All sectors combined, labor productivity growth in North Africa has been lower than in middle-income countries, as well as in high-income countries in the comparison group. As industry includes the hydrocarbons sector, the development of productivity in the case of Algeria and Sudan is dominated by the mining sector. The declining labor productivity in the industrial sector in Algeria can therefore be traced to the downturn in the production and value of hydrocarbons over the past decade. For North African countries with a strong industrial base (Egypt, Morocco and

Tunisia), it is clear that labor productivity growth has been relatively low compared to countries such as Malaysia, Turkey or Vietnam. This also applies to the tertiary sector, where productivity growth has been lower in North Africa.

The other important fact results from the comparison of sectoral productivities. Table 9-4 attached as annex provides the ratio of labor productivity in industry compared to that in agriculture. In North Africa, this ratio decreased between 1991 and 2018, while it did not in most middle-income countries (except for Turkey and Vietnam). The same is true for the service sector ratio. As such, the reallocation of work from agriculture to industry and services occurred amidst a reduction in the relative productivity of these two sectors. This may go some way to explaining the low contribution of structural transformation to labor productivity growth. Table 3-3 gives a breakdown of labor productivity in two components. The first (Intra-sectoral growth) is a result of the reallocation of work within each sector, i.e., between the activities and enterprises of the same sector. The second, reflecting the contribution of structural transformation, measures the effect on productivity of labor reallocation across sectors (between activities and firms in different sectors). One can therefore observe the limited contribution of the structural transformation component in North Africa, compared to other middle-income countries such as India or Turkey.

The breakdown of GDP growth over the period 2000-2018 reveals a number of information (Table 3-4). First, compared with the middle-income reference coun-

Table 3-1: Structural transformation contribution to productivity growth

	Panel A: All sectors				Panel B: excl. the mining sector		
	Per capita GDP growth	Labor productivity growth	Intra-sectoral growth	Intersectoral growth	Labor productivity growth	Intra-sectoral growth	Intersectoral growth
Algeria	1.75%	1.24%	1.08%	-2.32%	3.40%	3.18%	0.22%
Egypt	2.49%	6.23%	11.08%	-4.84%	6.93%	6.78%	0.14%
Libya	-2.37%	-9.05%	-12.45%	3.39%	-3.10%	-2.85%	0.24%
Morocco	3.08%	5.40%	5.39%	0.03%	5.70%	4.40%	1.32%
Tunisia	2.87%	5.40%	5.69%	-0.02%	7.80%	7.19%	0.65%
North Africa	1.90%	1.35%	2.16%	-0.80%	4.16%	3.74%	0.42%
Turkey	2.97%	7.90%	7.30%	0.60%	7.70%	4.30%	3.40%
India	5.20%	16.80%	15.60%	1.20%	16.80%	13.70%	3.10%

Source: 2019. The breakdown covers the period 1994-2013.

tries, growth in labor input measured in terms of quantity has contributed more to the growth in North Africa (except for Tunisia). The contribution of human capital to growth was just as high as in the comparator countries group, with the exception of Morocco, where there was only 0.1% growth, versus a 6-fold growth in Tunisia or Algeria. As for the physical capital, it contributed an average 2.7% in North Africa, compared to 4.5% in the comparator countries. And finally, an

important fact is a negative Total Factor Productivity contribution in all North African countries but Tunisia, although with a very low contribution of 0.2%. This quite obviously contrasts with the Middle-income comparator countries, whose contribution was broadly significant, except in Turkey (-0.2%) and Vietnam (-1.6%). Of note, the industrialization effort in Vietnam has been marked by a dominant contribution of capital of 7.4% (for a GDP growth of 6.4%).

Table 3-2: Breakdown of GDP growth (% , average for the period 2000–2018)

	GDP growth	Work contribution quantity	Work contribution quality	Contribution of capital	Total Factor Productivity
Algeria	3.4	1.5	0.6	2.4	-1.1
Egypt	4.3	1.5	0.4	3.3	-0.9
Morocco	4.1	1.3	0.1	2.7	0.0
Sudan	4.1	1.4	0.4	3.3	-1.0
Tunisia	3.2	0.6	0.6	1.7	0.2
Middle-income comparator countries					
China	7.6	0.2	0.3	6.6	0.5
India	6.9	0.9	0.6	3.8	1.6
Malaysia	4.9	0.9	0.4	3.4	0.2
Poland	3.7	0.2	0.4	1.9	1.3

	GDP growth	Work contribution quantity	Work contribution quality	Contribution of capital	Total Factor Productivity
Turkey	4.9	0.8	0.5	3.7	-0.2
Vietnam	6.4	0.5	0.1	7.4	-1.6
High-income comparator countries					
South Korea	4.0	0.2	0.1	2.7	1.0
Sweden	2.3	0.4	0.2	1.5	0.1
United States	2.3	0.3	0.3	1.4	0.4

Source: The Conference Board, 2020.

A study led by ECA in 2019 highlights distortions among North African economies, precluding an efficient allocation of production factors and a reallocation of the least productive activities to those productive, especially between enterprises. The report investigates distortions in the financial system and in the labor market, as well as certain distortions directly impacting the Total Factor Productivity. The report notes that inefficient institutions can actually create an environment where businesses are faced with many distortions, likely to result in a lower return on investment and potentially an impact on long-term growth.

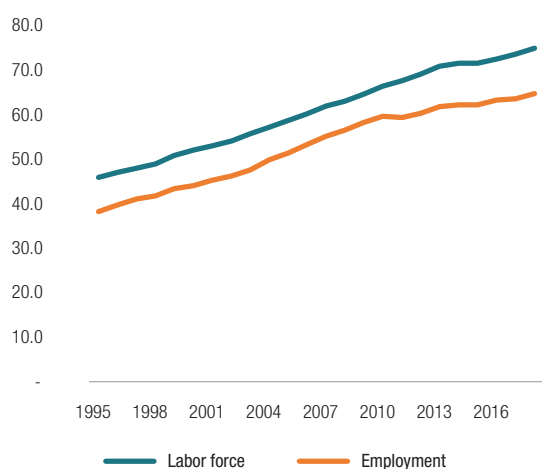
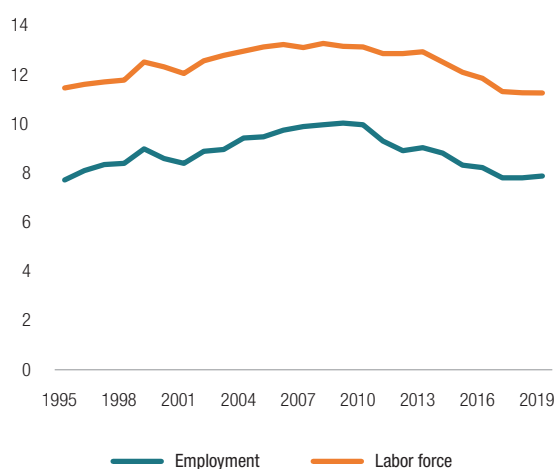
As an illustration, the example of education investments in North Africa can be used, involving distortions undermining the private sector and restricting the capacity of new market entrants. As will be discussed in the following section, a weak private sector and scarce employment opportunities for educated workers have led to a vicious circle where: (a) young educated people remain unemployed or hold jobs where they are not able to use or develop their skills, (b) incumbent firms fail to take full advantage of the human capital in the economy, (c) returns to education in the private sector are reduced, and

(d) investment in education tends to be directed to the formal education needed in the public sector. North Africa's relatively weak performance in structural transformation and productivity growth resulted in a labor market lacking sufficient dynamism to absorb the flow of new arrivals on the job market, especially skilled youth.

3.2 Inadequate job creation, particularly for skilled youth

The subregion is plagued by endemic unemployment and insufficient job creation to cater for the growth of the labor force. Figure 3-1 and Figure 3-2 show a rapidly widening gulf between employment and the working population, both globally and for young people. Actually, while the growth rates of the working population and employment were respectively 2.4% and 3% over the period 2000-2009, they stood at 1.6% and 1.2% respectively over the period 2010 to 2018. As a consequence, the employment deficit over the period increased by 5%. Youth employment followed the same trend.

A second major characteristic of the region is high unemployment, particularly of youth and women. As seen in the

Figure 3-1: Evolution of the active population and employments (millions), North Africa**Figure 3-2: Active population and employments among youth (millions), North Africa**

Source: International Labor Office

Table 3-5, unemployment rates in the subregion are generally close to 10% (Algeria, Egypt, Mauritania, Morocco) while it is only 6.8% on average in Africa. The unemployment rate actually reached 16% in Tunisia, 16.6% in Sudan and 18.6% in Libya. Needless to say this unemployment rate does not account

for informal sector, but still constitutes a reliable international benchmarking indicator. Unemployment is high and affects particularly young people, with youth unemployment rates often above 30%, except in the case of Mauritania and Morocco.

Table 3-3: Unemployment rate, 2019

	Global	Males	Females	Youth
Algeria	11.7	9.7	21.1	29.5
Egypt	10.8	7.2	22.1	31.0
Libya	18.6	15.5	24.6	50.5
Mauritania	9.6	8.4	12.1	14.8
Morocco	9.0	8.6	10.4	22.1
Sudan	16.6	11.7	27.8	31.5
Tunisia	16.0	13.4	23.4	36.3
Africa	6.8	6.3	7.5	10.1
Middle-income comparator countries				
China	4.3	4.8	3.7	10.3
India	5.4	5.4	5.2	23.3
Malaysia	3.3	3.1	3.7	11.3
Poland	3.5	3.5	3.5	11.6
Turkey	13.5	12.1	16.4	23.7

	Global	Males	Females	Youth
Vietnam	2.0	2.1	1.9	7.3
High-income comparator countries				
South Korea	4.2	4.3	3.9	11.0
Sweden	6.5	6.7	6.2	17.8
United States	3.7	3.7	3.6	8.5

Source: International Labor Office statistics

For comparison purposes, youth unemployment in middle-income countries has always remained under 25% and is generally closer to 10%. Unemployment particularly affects women, with a rate above 20%, except in Morocco and Mauritania. Unemployment affects in particular educated youth (Table 9-6 in annex 9.1) although several North African countries were among the 20 countries investing most in education between 1980 and 2010 (Table 9-7, annex 9.1). Jaramillo and Melonio (2011) estimated the share of unemployed post-secondary graduates in Egypt, Morocco, and Tunisia to be nearly seven-fold that of OECD countries in 2010, further suggesting that even for the highly-educated, employment opportunities remain inadequate.

The third prominent feature is low participation in the labour market. Clearly, the performance of North African countries as a whole is lower than that of comparator countries, with an average labor force participation rate of 46.7 percent, compared to an average of 62 percent across the comparison group of middle-income countries (Table 9-8, annex 9.1). The employment rate averaged 40%, compared with 58.7% for the comparator group.

ECA (2019) partly attributes this relatively youth and women's weak employ-

ment performance and labor market participation to existing labour market distortions. The report addresses notably the distortions caused by the excess of public employment sector, coupled with a positive public-private wage gap in some countries, primarily Morocco and Tunisia, and to a lesser extent Algeria, thereby causing an allocation skew and accumulation of human capital in the economy. Hence, to improve their chances of getting a job in the public sector, young people opt for higher education programs that are not relevant to the private sector. Those who can afford it prefer to wait for a job in the public sector, in the hope of a somewhat higher pay for less productivity. Another negative effect is on labour force participation. As a matter of fact, better-paid and more secure public jobs can deter family members from earning an additional wage. A case in point: the existence of a cultural context where women's work is not encouraged, in turn contributing to low labour market participation. Finally, in comparison with statistics on the constraints perceived by businesses, it is striking that according to quite a few businesses in Morocco and Tunisia access to a skilled labor force came out as the biggest constraint. This is a strong indication that the public sector takes up skilled labor, therefore no longer available for the private sector, hence

contributing to lasting distortions and to losses in production in both countries.

3.3 A private sector facing relatively weak financial development

The development of the private sector is utterly critical for the socio-economic advancement of the subregion. In North Africa, SMEs account for anywhere from 24% to 46% of total employment, with a high potential for reducing high youth unemployment and contributing to poverty-reduction efforts (economic indicators, VESs/SMEs 2019). Over the past two decades, job creation in the formal private sector, much of which is driven by start-up microenterprises of less than five years of age and with fewer than five employees, has not kept pace with the region's rising youth workforce. Out of 123 countries, Egypt, Algeria, Morocco, and Tunisia had the lowest formal sector entry densities, underscoring the difficulties faced by young firms to gain access to markets (Rijkers, 2014). Also,

the growth in productivity and employment of Moroccan and Egyptian firms over their life cycle is hampered by misallocation of resources, and small firms in Tunisia are having more difficulty to grow than their peers in Lebanon or Turkey (Schiffbauer et al., 2015).

Several reasons account for the low private sector development, such as an insufficiently favorable business climate, though access to finance was one of the major obstacles pointed out by businesses (Schwab, 2018). According to World Bank Enterprise surveys, 23% to 28% of Egyptian, Moroccan and Tunisian businesses with less than 100 employees surveyed mentioned financing as a major or severe constraint (Table 3-6), compared to less than 15% in countries like India, China or Turkey.

According to IFC estimates, the potential demand for microenterprise and SME financing - in formal and informal sectors - in 128 developing countries now stands at about \$8.9 trillion, over twice the current figure (Bruhn et al.,

Table 3-4: Enterprises' financing constraints

	Finance being the strongest constraint	Finance being a major or severe constraint
North Africa	9.00%	23.84%
Rest of the world	15.34%	27.12%
Egypt	10.36%	28.46%
Tunisia	10.17%	23.94%
Morocco	9.78%	27.67%
Sudan	5.68%	15.28%
Emerging comparator countries		
Turkey	17.43%	11.46%
India	11.67%	15.11%
China	22.44%	2.85%
Sweden	6.70%	3.28%

Source: World Bank Enterprise surveys (combination of different surveys)

2017). In the case of North Africa, the financing gap is even wider: for Morocco and Egypt, the current supply of loans to VSEs/SMEs stands well below the average level for developing countries (14% of GDP), accounting not only for less than half of potential demand, but between one-fifth and one-fifteenth respectively of estimated potential demand for Morocco and Egypt (World Bank data on the financial gap, 2018). The SME combined funding shortfall across the three countries is estimated at about 66.4 billion USD.

In contrast to this funding shortfall, which takes into account estimates of potential demand and includes the informal sector, the figures from the business survey paint a more positive picture of SME financing in Morocco and Tunisia. The share of businesses of more than five and less than 100 employees having received a bank loan or line of credit is relatively high for Tunisia and Morocco, reaching about 50 percent compared to 5 to 7% in Egypt. Despite the comparatively high share of formal SMEs taking out loans in Morocco, estimates of the IFC's funding shortfall show a much higher potential. In addition, roughly one of four Moroccan and Tunisian firms surveyed mentioned access to finance as a major constraint, though slightly less so in Egypt (World Bank Enterprise Surveys).

The issue of financing small and medium-sized enterprises is the result of several factors, related both to the development of the financial sector and to how companies are structured (family-owned businesses, lack of financial transparency, formalization problems,

etc.). North Africa still lags far behind in terms of financial sector development. Table 3-7 shows the measures taken by the International Monetary Fund to develop the financial sector. A first index provides a measure of the overall development of the financial sector, a second assesses the development of financial institutions (banks, etc.), while a third measures the development of the financial markets. The primary feature is a significant heterogeneity within the subregion, with two groups of countries. The first, comprising Egypt, Morocco, and Tunisia, with an average level of financial sector development. The second, comprising Algeria, Libya, Mauritania, and Sudan, with a relatively low level of financial sector development, compared with the middle-income comparator countries.

Another noteworthy fact is the very low level of development of financial markets in North Africa, which poses a major challenge for business financing and development of innovative financing tools. The degree of development of financial institutions is fairly similar in the subregion, but the banking sector in North Africa varies in depth and diversification (see Table 9-7 in annex 9.1). It is also relatively concentrated, which creates a problem of competitiveness compromising the banking sector's ability to meet the needs of businesses. In fact, for the entire North African region, the Lerner Index, a mechanism used to measure market power of the banking market, stands at 0.35, a relatively high level compared to other regions outside of Africa with indices between 0.2 and 0.27 (ADB, 2015). In addition, the public sector takes up a big chunk of

Table 3-5: Financial sector development

	Financial development index	Financial institutions development score	Financial markets development score
Algeria	0.16	0.32	0
Egypt	0.30	0.33	0.27
Libya	0.15	0.31	0
Mauritania	0.13	0.24	0.01
Morocco	0.41	0.54	0.27
Sudan	0.11	0.22	0
Tunisia	0.26	0.45	0.07
North Africa	0.22	0.34	0.09
Emerging comparator countries			
China	0.64	0.63	0.64
India	0.42	0.39	0.45
Turkey	0.52	0.48	0.54
Malaysia	0.68	0.69	0.65
Poland	0.48	0.60	0.34
Vietnam	0.29	0.43	0.15

Source: International Monetary Fund, Financial development index

bank financing, causing a crowding-out effect on the private sector.

Accordingly, the loan-to-GDP ratio for public and private enterprises is 70.7% for Egypt, 37.7% for Algeria and 22.2% for Morocco, compared with 9.4% in Tunisia, the only country with a ratio similar to that of countries with comparable income levels in other world regions. And yet the Tunisian banking sector has a greater difficulty, i.e. an overall financing gap and a drop in banking sector capitalization below the required thresholds (Frewer, 2016). In Algeria, over 90% of the commercial banks sector is dominated by State-owned banks. In Egypt, three of the five largest banks are State-owned (OBG, 2018). High government ownership further compounds the issue with the overall instability and inefficiency of the financial sector, and research indicates the existence of a higher risk

of non-performing loans given the large proportion of bank assets owned by the government (Rocha et al. 2011, Benhas-sine et al., 2009).

3.4 Countries with unequal access to global value chains

The impact of the Covid-19 crisis on North African economies, over both the short and medium term, is a function of their economic structure (relative contribution of sectors) and their integration into the Global Value Chains (GVCs). From a structuralist perspective, the pandemic has had an overall effect on reducing both demand and supply, albeit with a degree of asymmetry across sectors. Some sectors, like transport, tourism or energy have been badly affected, causing the countries de-

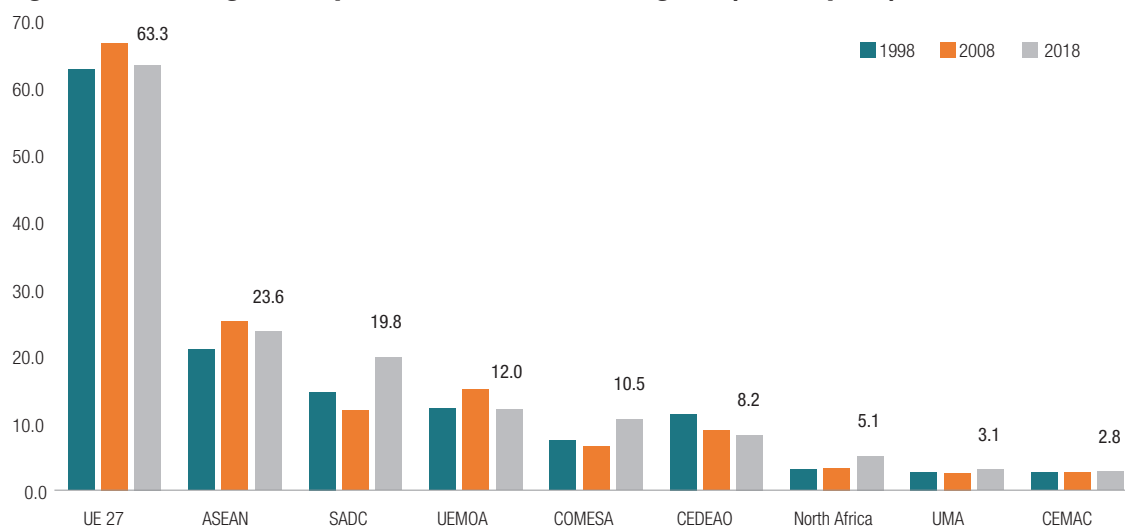
pending relatively on these sectors to be heavily impacted (tourism in the case of Egypt, Morocco and Tunisia, and energy in the case of Algeria, Sudan and Libya).

Integration to GVCs depends on the degree of economic diversification and has a bearing on crisis recovery trajectories. North African countries are far from being evenly integrated into GVCs. Three countries: Egypt, Morocco and Tunisia, have varying degrees of integration into GVCs. Tunisia enjoys a relatively high level of integration into GVCs with some 45% of its exports being connected to GVCs, primarily textiles and electronics, with the EU as its main partner. Morocco's integration into GVCs is more diversified, through a presence in horticulture, chemicals, textiles, electrical machinery, automotive and aeronautics industries as well as ICT and transport services. In 2015, 43% of the added-value from Moroccan exports were connected to the value chains. Finally, Egypt has a lower level of GVC integration, with only 10% of its 2018 exports linked to GVCs. Other countries in the subregion are as yet not really integrated into the GVCs. The ongoing reorganization of world trade will have repercussions on the economies of North Africa. A number of factors are coming together to reshape the international division of labor: (i) the combined geopolitical tensions induced by the Covid-19 crisis, (ii) the risks of disruptions from the concentration of suppliers, (iii) the development of new technologies increasing the profitability of proximity of production with the end consumer, and last (iv) the development of Artificial Intelligence and robotization, with strong

impact on the needs of different types of labor and localization of production.

Needless to say that countries with a sound integration to GVCs are better placed to take advantage of a rebound in global trade, but more importantly, to better position themselves on the reorganized GVC chessboard. To be able to adapt and find their place in the new international division of labor configuration, North African countries will have to implement far-reaching reforms to improve the competitiveness of their economies and their social systems. According to several studies, the Covid-19 era will be marked by the strengthening of local value chains. Using an analysis of the impact of the disruption of global value chains on sectors such as electronics and automotive in various Asian countries, Liu et al (2020) pinpointed two trends precipitated by Covid-19: the decoupling of Chinese supply chains and the outsourcing of strategic manufacturing operations out of China. This being said, North Africa stands to gain from improving its economic integration, mainly by tapping the full potential of the African Continental Free Trade Area (AfCFTA).

It is a fact that North Africa is one of the world's least integrated subregions, and the least integrated in Africa despite the gains expected from greater integration. Figure 3-3 shows the percentage of intraregional exports in the region's aggregate exports. North Africa's intra-African exports, although up in 2018, only accounted for 5.1% of North Africa's exports, and 3.1% for UMA, compared to 10.5% for COMESA or 19.8% for SADC.

Figure 3-3: Intraregional export levels across world regions (% of exports)

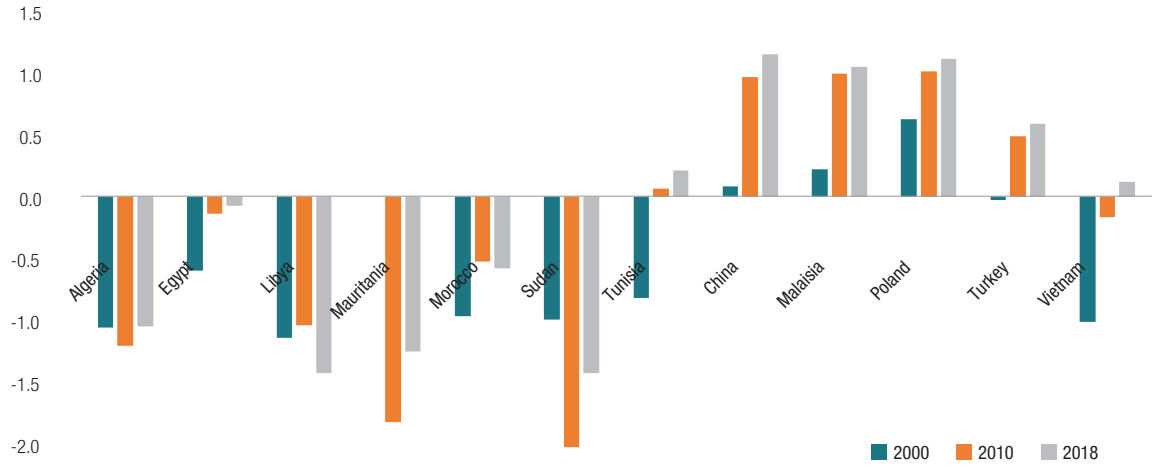
Source: UNCTAD STAT

Another weakness of the subregion is the level of sophistication of its exports which remained quite low, despite the progress made. The percentage of exports with a (low or high) technological content is 22.7% in North Africa, compared to 58.8% on average for the comparator emerging countries, and 65.8% for the comparator developed countries (see Table 9-11 in annex). There are however differences between North African countries. While the share of exports with technological content of hydrocarbon-dependent countries is less than 5%, the shares of Morocco and Tunisia are higher, with 51% and 53.8% respectively. They are slightly below the average of comparable emerging countries. As a comparison, Egypt's share of technological content products is only 30%. The technological level of North Africa's exports clearly reflects its level of economic complexity. Figure 3-4 illustrates the evolution over the period 2000-2018 of the Economic Complexity Index (ECI), assessing the current state of a country's productive knowledge. A country's ECI is deemed higher when

the number and complexity of products it is able to export successfully is higher.

All North African countries, except Tunisia, had a negative ECI throughout the entire period under review. Egypt and Morocco made some progress, as did Mauritania to a lesser extent, while the other countries have seen the ECI remain flat or decline. Comparator countries all showed a positive index over the period, with the exception of Vietnam, which still significantly improved its ECI. Rodrik et al (2006) and Hausmann et al. (2007) were first to show that countries producing highly sophisticated products develop faster than those manufacturing less sophisticated products. Further research (Felipe et al. (2012), Jankowska et al. (2012), or Hausmann and Bustos (2012)) has revealed a positive correlation between economic complexity and the growth rate in developing countries. North Africa's relatively poor performance in technology exports can be attributed to a number of factors, related both to private sector development barriers (business climate, financial sec-

Figure 3-4: Evolution of economic complexity



Source: <https://atlas.media.mit.edu/en/rankings/country/eci/>

tor development level, economic distortions, etc.) and to the ongoing limited technological absorptive and development capacity.

3.5 An inadequate technological absorptive and development capacity

The ongoing technological revolution, coupled with a speedier adoption of technology tools induced by the Covid-19 crisis, will ultimately cause significant global economic repercussions, particularly on the developing countries' economic development trajectory. This technological capacity building will be instrumental to the success of North African countries. Table 3-9 lists four indicators helping to measure the technological capabilities of countries. North African countries' performance is fairly weak compared to that of comparator countries. Using the "technology creation" index as an example, not surprisingly, all countries score zero, considering their level of

development, with the exception of Tunisia, whose score is still very low.

Certainly, all emerging countries used as comparators have a low index compared to the three developed countries (South Korea, Sweden and the United States) taken as reference. The Global Innovation Index (comparing 129 countries) measures a country's capacity and success to innovate. The index comprises a number of dimensions, such as human capital and research, infrastructure, or the degree of business sophistication. Tunisia scored highest (35.8) in North Africa and Algeria scored lowest (23.1), against an average of 40 for the comparator emerging countries and 58.3 for the developed countries used as benchmark. Finally, the latest innovations dissemination index clearly shows North African countries' limited capacity of to embrace new technologies.

Finally, technological development also depends on absorptive capacity, which can be measured by a series of indicators such as the number of researchers,

Table 3-6: Technological development

	Technology Achievement Index 2016	Technology Creation Index 2016	Knowledge and Technology Index	Global Innovation Index 2019	Latest innovations dissemination index 2016
Algeria			13.42	23.1	
Egypt	0.308	0	21.13	28.5	0.17
Libya	0.221				
Mauritania					
Morocco	0.304	0	19.88	30.9	0.31
Sudan	0.124	0			0.11
Tunisia	0.35	0.0007	23.39	35.8	0.29
Emerging comparator countries					
China	0.419	0.0015	56.5	44.7	0.48
India	0.229	0.0003	30.3	36.2	0.18
Malaysia	0.536	0.0015	17.9	46.9	0.76
Poland	0.522	0.007	33.5	40.1	0.42
Turkey	0.412	0.004	30.2	36	0.28
Vietnam	0.402	0	25.7	34.8	0.51
Developed comparator countries					
South Korea	0.661	0.075		53.3	0.71
Sweden	0.685	0.427		61.4	0.59
United States	0.635	0.131		60.3	0.56

Source: See Annex

Table 3-7: Technological absorptive capacity

	Number of researchers per 1 million inhabitants	R&D spending as a % of GDP	Human capital and R&D index	Human Capital Index
Algeria	819.3	0.54	27.9	0.52
Egypt	687.7	0.58	19.7	0.49
Morocco	1073.5	0.71	27.8	0.50
Tunisia	1771.6	0.67	44.4	0.51
Emerging comparator countries				
China	1224.7	2.18	47.6	0.67
India	252.7	0.65	33.5	0.44
Malaysia	2396.5	1.44	44.2	0.62
Poland	2542.5	1.21	41.2	0.75
Turkey	1224.7	0.96	36.3	0.63
Vietnam	707.7	0.52	31.1	0.67
Developed comparator countries				
South Korea	7497.6		66.5	0.84
Sweden	7596.9	3.34	62.1	0.80
United States	4245.3	2.84	55.7	0.76

Source: World Bank and GII - Global Innovation Index 2019

R&D spending and the level of human capital. Table 3-10 shows that irrespective of the indicator used, North African countries performance is overall below that of comparator emerging countries and well below that of developed countries. To reach a higher stage of development, Egypt, Morocco, and Tunisia need to build more complex economies and move up the value chain by producing higher technological content goods. Their economies still suffer an inadequate technological absorptive capacity. In terms of R&D spending, all three countries spend on average 0.65% of their GDP, compared to 1.16% for comparable emerging countries, and an average of nearly 3.7% for South Korea, the United States and Sweden. The 2018 average of global spending on R&D was 2.27% of GDP.

Table 3-10 also features two human capital measurement metrics. The World Bank's Human Capital Index (HCI) is an international metric benchmarking educational attainment, educational quality measuring tests and life expectancy. North African countries for which the index has been reported have very similar scores, around 0.5, compared to an average of 0.63 for emerging comparator countries. However, the review of some components of the MCI revealed a poorer performance of education quality in North Africa. As a matter of fact, North Africa has an average score of 367 on education level tests, compared to 466 for the comparator emerging countries and 537 for developed countries. The second human capital metrics is the Global Innovation Index, which includes the R&D, higher education, etc. indicators. Under this

indicator, only Tunisia achieves a score above 30 and performs equally well as the majority of emerging countries of comparison, whose average is 38. Accordingly, if the countries of North Africa are to tap into the changes and the reshaping of the global economy created by the Covid-19 era, they will need to substantially step up their investments in human capital.

This development and technological absorptive capacity picture reflect the gap of the subregion's countries in economy digitalization.

3.6 Economy digitalization still in need of improvement

Although digitalization is expanding globally, much remains to be done on the African continent, especially North Africa, to usher economies into the digital age. There is urgent need to increase digitalization efforts particularly as the crisis caused by Covid-19 has led to an acceleration of digitalization (McKinsey, Mai 2020). Experts say that following the Covid-19 crisis, it has become urgent for African businesses to digitalize and fully harness the enormous potential offered by e-commerce.

Digitalization relies on a number of factors, among which the development of infrastructures and not least of which is access to Internet and electronic payment methods. In spite of the improvement in Internet access, many countries of the subregion continue to have a very low access rate, much like the 4G coverage, as shown by the indicators in Table 3-11.

Table 3-8: Access to digitalization (as a % of population)

	4G coverage	Internet Access	Fixed line penetration rate	Mobile phone penetration rate
Algeria	39.70	42.94	9.95	111.66
Egypt	45.60	44.95	7.99	95.28
Morocco	98.00	17.52	6.10	124.17
Mauritania	60.30	52.19	1.36	103.70
Libya		98.09	8.00	91.47
Tunisia	86.80	55.50	11.26	127.70
North Africa	66.10	51.87	7.44	109.00
Emerging comparator countries				
China	99.00	54.30	13.45	115.53
India	97.00	32.29	1.62	86.94
Indonesia	85.00	60.42	3.10	119.34
Malaysia	93.00	59.09	20.41	134.53
Poland	99.80	94.29	17.34	134.75
Turkey	95.00	64.68	14.13	97.30

Source: Development Indicators, World Bank

As explained in the earlier section, the development of the financial sector is still insufficient, with very low rates of access to banking services in some countries. The percentage of adults with a “mobile money account” remained below 3% in North Africa in 2017 (according to the World Bank’s Global Index, 2019), compared to 11% in Malaysia, 16% in Turkey, and 21% in Sub-Saharan Africa (excluding countries with the highest incomes). According to the International Telecommunication Union, in 2019, only 28% of Africans used the Internet, while online shopping is still relatively low. Kenya, Mauritius, Namibia and South Africa are the only African countries with a share of online shopping above 8%, while in most other countries on the continent the share remained below 5%.

Of note, some governments are not doing enough to embrace digitalization. In the area of public policy, North Afri-

can countries rank rather poorly on the Global Innovation Index 2019’s e-government index. Algeria ranks 125th, Egypt 101st, while both Morocco and Tunisia perform better, ranking 75th and 44th respectively, compared to Malaysia and Turkey, for example, ranking 27th.

E-commerce is still little developed in North Africa, as the crisis proved to have the potential to be an effective means of stemming the decline in demand provoked by the lockdown measures. As per UNCTAD’s B2C e-commerce index, ranking 147 countries globally, most North African countries are below the 97th rank. Tunisia is the highest ranked country (79th), tailed by Morocco (85th). Morocco has the highest e-commerce volume, reaching \$1,285 million in 2017 and ranking 85th in the UNCTAD B2C e-commerce index, second only to Tunisia (rank 79). Some ICT, Internet and connectivity

development indices are listed in Table 9-9. By every dimension, North Africa is underperforming comparator emerging countries. For instance, the “Mobile Connectivity Index”, tracking the performance of 165 countries relative to the main drivers of mobile Internet adoption, shows that North Africa lags behind, with an average of 3.0, compared to 4.13 for comparator emerging countries and above 5.5 for the developed countries used a benchmark.

These indicators reflect North Africa’s backwardness in terms of ICT adoption and footprint. With the accelerated pace of digitalization, largely driven by the Covid-19 crisis, the position of North Africa in the global economic reconfiguration process currently underway has been eroded and will undoubtedly continue in the years to come.

3.7 State capacities yet to be strengthened

State capacities should be seen here in its broadest sense, both regarding fiscal capacity and governance. The combination of both has a bearing on the States’ capacity to play their role and carry out effective public policies. That is an important aspect, especially since the efficiency of public spending is a major issue, particularly in a context of dwindling budgetary resources. North Africa’s public spending has been sustainably high, with a somewhat mitigated effect on economic growth. (Figure 9-1 in annex).

When it comes to resource mobilization, the countries of North Africa are

quite heterogeneous. Two North African countries (Algeria and Morocco) are among Africa’s countries with the highest government revenues (as a % of GDP), while Sudan is amongst those with the lowest (cf. Figure 9-3 in annex). The increase in public expenditure, combined with a relatively lower revenue increase, has led to higher budget deficits and debt levels. Budget deficits have been an endemic problem in North Africa, although most countries have made efforts to rationalize public finances and reduce deficits (cf. Figure 9-4 in annex).

Total public debt has risen considerably since 2008 only to stay well above African average. Figure 9-5 in annex shows that North Africa tops the other African regions in terms of debt. External debt jumped from 11.4% of GDP in 2015 to 44.6% in 2018. The increase in debt has led to a rise in debt service equal to 4% of GDP in 2016, a level well above the African average.

A critically important component of States capacity, governance seems to be North Africa’s Achilles heel. Table 3-12 lists a number of indicators measuring the different dimensions of public governance. Irrespective of the dimension examined and the indicator used, North Africa’s performance has been rather poor, albeit with some disparities. The performance of Morocco and Tunisia was in fact better than that of other countries in the subregion.

A key lesson of the pandemic is that handling a crisis of such magnitude requires a high degree of cooperation. This has instant implications on the


Table 3-9: Governance indicators

Economy	Corruption Perception Index (2019), rank over 180	World Bank Governance Indicators (2018), maximum score = 100	International Crisis Group Indicators; Bureaucratic quality 2017; maximum score = 4	World Economic Forum – Institutions, 2019; rank over 141	Mo Ibrahim Foundation Governance index 2018, maximum = 100	Economic Freedom of World index 2020, rank over 186	BTI; Governance Index 2018 ;Maximum score = 10	BTI; Governance Performance 2018 ;Maximum score = 10
Algerie	106	22.7	2	111	50	169	4.6	5.1
Egypte	106	23.7	2	82	50	142	4.0	4.4
Libye	168	2.9	1.5	.	28	.	2.3	2.4
Mauritanie	137	23.1	.	136	43	130	4.1	4.3
Maroc	80	41.7	2	45	58	78	4.3	4.7
Soudan	173	5.5	1	.	31	173	2.0	2.0
Tunisie	74	44.4	2	73	64	128	5.3	6.0
Pays de comparaison								
Chine	80	42.8	2	29	.	103	4.8	5.3
Inde	80	48.4	3	59	.	120	6.0	6.7
Malaisie	51	64.9	3	25	.	24	5.2	6.0
Pologne	41	72.1	3	60	.	46	6.3	7.7
Turquie	91	37.9	2	71	.	71	4.7	5.4
Vietnam	96	40.9	2	89	.	105	4.5	5.0
Corée du Sud	39	77.3	2	26	.	25	6.5	7.9
Suède	4	94.7	4	10	.	22	.	.
Etats Unis	23	84.3	4	20	.	17	.	.

Source: World Bank, International Crisis Group Indicators, Mo Ibrahim Foundation, BTI-Bertelsman Transformation Index (www.bti-project.org) and World Forum.

modes of governance and gives “inclusive governance” advocated in the context of Sustainable Development Goals (SDGs) a whole new meaning.

Thorough governance reforms, notably using new technologies, have become an imperative to address the changes induced by Covid-19.



4. The pandemic's near-term impact and the ensuing medium-term changes

While there is some understanding of the short-term impact of the pandemic on the economies of North Africa, there is not yet a clear picture of the medium-term consequences. But what is certain is that the pandemic has had significant short-term consequences on the economies of the subregion. The growth rate in North Africa for 2020 will drop to -1.8%, while full-time equivalent employment losses could peak at 5 million jobs. A direct consequence of a 50% drop in oil prices and the lockdown measures, Algeria's GDP could fall from -4.5% to -5.8% in 2020, while Libya's GDP could drop by -5.5%. Morocco and Tunisia, whose economies have been hit hard by the fall in tourism and demand from the EU, are expected to report GDP growth of -3.7% and -5% respectively. In Mauritania, GDP is expected to edge down by 2 percent, as a result of the contraction in exports and investment. Egypt is the most resilient country, with widely varying estimates

according to sources, ranging from -1.1% by UNDESA to 2% by the Arab Monetary Fund.

Looking ahead to the medium term, the economic recovery will be confronted with many challenges. First, the massive destruction of businesses and the erosion of those that managed to emerge will weigh on their capacity to recover in a context of slackening demand. Second, a number of sectors, such as tourism, will continue to bear the brunt of a demand remaining relatively weak for years to come and of far-reaching changes at both consumer and supply levels. On the demand side, businesses (and globally economic and social structures) will be expected to adapt to new consumer habits and demands, including greater propensity for online and other forms of "off-site" spending. On the supply side, there is a risk that the changes will be radical in the medium term, under the combined effect of var-

ious complementary factors. The first is the reorganization of global value chains, probably with a less fragmented world trade, more organized around local value chains. It should be noted that the slowdown in global trade fragmentation has been underway since 2011, according to Rodrik et al. (2018), but is expected to accelerate. If they are given the means to do so, North African countries could emerge as one of the biggest winners from this transformation. The second is the digital revolution, with its far-reaching consequences on the developed and developing countries societies. The digital revolution has a direct bearing on the supply side, affecting obviously the type of goods, the patterns of production (with robotization, for example), customer relations, supply chains and the organizational structure of companies. For developing countries, digital technology is both an opportunity and a threat. An opportunity since it offers multiple applications allowing to solve more effectively the problems related to economic development and to reach the SDGs (see, for instance, TWI2050 - The

World in 2050 (2019)). And a threat, because low-skilled jobs are the most likely to be automated, at a faster pace in light of the breakthroughs in Artificial Intelligence. The digital revolution is equally likely to widen the technology gap between developed and developing countries. Most studies quantifying the impact of robotization on employment in Africa generally suggest even greater losses (in proportion) compared to developed countries. For example, Arntz et al. (2016) estimate that the proportion of workers at high risk of automation is 40% in the case of workers with a junior high school diploma and above 50% in the case of workers with primary or lower education. The manufacturing industry is acutely exposed to robotization, thereby lessening the attractiveness of industrialization as a vehicle for economic development. Also worth noting is the downward trend observed in the labor intensity of exported industrial products (Rodrik et al. (2018)). Under the circumstances, as automation and digitalization accelerate, the countries of the subregion will need to rethink their development trajectory.



5. Strengths and weaknesses of North African economies in addressing the short and medium term challenges induced by the pandemic

The Covid-19 crisis is questioning national development strategies and will doubtless rebalance the priorities of the countries of the subregion. While tourism, for example, accounted for 10% of global GDP in 2019, international tourist arrivals are expected to decline by 60 to 80% in 2020. For North African countries, the tourism sector has the potential to be a development axis and a source of employment and foreign exchange. Yet, it is highly likely that the crisis will bring into question both mass tourism and the factors of competitiveness in this sector. In the short term, it is unlikely that tourism spending will recover to pre-crisis levels before 2024, thereby jeopardizing as many as 120 million jobs globally.

If the developed countries managed to absorb part of the lockdown effects through teleworking and e-commerce, developing countries have failed to do so, for lack of sufficient e-capacities, but also because of the structure of their econo-

mies (large informal sector, low economic complexity, etc.). On the social front, the fragility of the social security systems of North African countries has emerged as a self-evident truth, severely reducing the ability (though to varying degrees depending on the country) to quickly deploy resources in support of the most vulnerable populations in the short term. In addition, the lack of reliable systems for the compensation of fully or partially unemployed workers has proven a major impediment to sustained economic activity. Such examples give a hint of the many challenges to be confronted by developing countries, spanning economic, social and institutional areas. From an institutional point of view, the capacities of the States and governance categories are stretched to the limit given the multiple challenges to be addressed quickly, and the paucity of resources. In addition, the response to the crisis should not be focused solely on the short term, since recovery from the crisis will hinge heav-

Table 5-1: SWOT matrix

Internal	<p>Strengths</p> <ul style="list-style-type: none"> - Young and relatively well-educated population - Natural resources - Market size, potential of economic integration - Cultural proximity 	<p>Weaknesses</p> <ul style="list-style-type: none"> - Economic diversification - Technological absorptive and development capacity - Economic complexity - State capacities and governance
External	<p>Opportunities</p> <ul style="list-style-type: none"> - Development of local value chains - Proximity to Europe - Digitalization and use of new technologies 	<p>Threats</p> <ul style="list-style-type: none"> - Adoption of digitalization and new technologies - Climate change - Epidemics

ily on the policies implemented to adapt to the medium-term consequences of the pandemic (accelerated digitalization, reorganization of value chains, etc.)

Considering the challenges inherent in the short and medium-term handling of the crisis, Table 5-1 provides a summary analysis of the strengths and weaknesses of the subregion, both from an internal and external perspective. We have already examined most of the stated factors. Here, new technologies are being presented as both an opportunity and a threat. An opportunity inasmuch as their faster adoption has the potential to more effectively address the challenges of economic and social development. And a threat, also, on account of their job destruction potential, the inequalities likely to be induced (e.g., widening income gulf between skilled and unskilled workers), and the risk of downgrading for North African countries (and more generally developing countries.)

Climate change has been put forth as a potentially significant external threat on account of its consequences, expected

to become more apparent in the near future, probably within the next 10 years. The economic consequences of global warming will cause prejudice to property and infrastructure, loss of productivity, mass migration and threats to the security of countries. One of the factors exacerbating the effects of global warming is the temporal proximity between its effects and the current crisis on the one hand, and the adverse impact of the crisis on policies aimed at fighting global warming, on the other hand.

Whilst it took several years for many economies to recover from the financial crisis of 2008, the current crisis will have a much more protracted impact, with a recovery process spanning many years. This further adds uncertainty to the future and to the developing countries' development trajectories. The Covid-19 era is therefore likely to be marked by greater instability and volatility, creating more erratic economic growth and posing a lasting threat on development gains. This, in turn, will further challenge the resilience capacity of the economies of the subregion.



6. Pandemic Vulnerability Index (PVI) Dashboard

This section aims to propose a vulnerability score of North African countries to the risk of a pandemic, providing a summary of all the strengths and weaknesses identified above. To our knowledge, this is the first vulnerability score ever proposed for these countries. The advantage offered by this statistical tool is that it offers a synthesis of different indicators reflecting the health, economic, demographic, societal and structural vulnerabilities of the countries of the region. This synthesis measure is simple to analyze both by public decision-makers and the population, fully transparent in its construction methodology, perfectly reproducible and easy to implement. It is calculated by gradually integrating the latest changes in indicators revealing weak signs of change in the level of vulnerability to pandemic risk. Such ease of implementation makes it possible to analyze the temporal dynamics of the score from an *Early Warning System perspective*. The score, however, com-

puted on a global scale for all countries with available data, also provides an assessment of the comparative dimension, upon which we will focus the first analyses in this report.

The rationale behind the vulnerability score ?

The main benefit of a scoring method is its ability to synthesize sparse and hard-to-grasp information from a large set of factors. The outcome of this procedure, namely the score, is a number which, once analyzed, can be narrowed down to a single dimension. Though scores are used today in many areas such as marketing, they have often been associated with risk analysis. Whether in medicine and biostatistics (mortality or disease risk), industry (default risk) or finance (credit risk), etc., scores are often used to evaluate a risk from a one-dimensional point of view, derived from a greater or lesser set of risk factors. It is therefore axiomatic that the analysis of the

pandemic risk, be it in its human or economic dimension, comes perfectly within the scope of scoring methods.

The purpose of the score is to pinpoint North African countries' sources of vulnerability to pandemic risk. This is where the international comparative dimension takes on its full meaning. By reducing vulnerabilities down to quantified measures, scores facilitate the creation of international rankings according to different dimensions, making it easy to gain insights.

How to develop a vulnerability score?

A wide range of methodological approaches can be contemplated in building a Pandemic Vulnerability Index (PVI) Dashboard, which can be applied to North African countries. However, no such optimality or comparison criterion exist which will ultimately determine which method would be best suited to reveal these vulnerabilities. Just like in many other areas of risk¹ analysis, no optimal scoring method to use exists in this context. We are therefore taking a different approach in this report. The underlying idea is to propose a scoring method modeled directly on the one used by the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS), both of which are international² financial institutions emanating from the G20, for the assessment of systemic financial risk. Many similarities exist indeed be-

tween the notion of pandemic risk and that of systemic risk, at the origin of the 2008 global crisis, warranting such an approach. (cf. annex 9.3).

The Systemic Risk Score applied every year by the BCBS and the FSB is designed to identify financial institutions of systemic importance. The systemic risk rating methodology is simple and intuitive (CBCB 2013 and 2014). The score compiles information contained in twelve indicators broken down into five major categories of vulnerabilities: size, interconnection, substitutability, complexity and cross-border activity. Each of these five categories has a score based on the aggregation of a set of associated indicators. Based on the scores by category, the Basel Committee develops a systemic risk score for each bank part of the sample. An important point to note: to avoid discriminating in favor of a particular aspect of systemic risk, the Basel Committee uses a simple equally-weighted average of the scores in all categories. Financial institutions scoring above the threshold of 130 base points are classified as global systemically important financial institutions (G-SIBs) and are subject, inter alia, to regulatory capital surcharges.

These scores carry many advantages. They are easy to analyze by public decision-makers. They are designed to be totally transparent, and the number of arbitrary methodological choices is re-

¹ See, for instance, the theoretical works of Chen, Iyengar and Moallemi (2013) on the concept of consistent systemic risk measure.

² The Financial Stability Board (FSB) is an association comprising ministries of finance, central banks and financial authorities from 24 countries. The Association coordinates internationally the work of national authorities and develops guidance materials designed to strengthen global financial stability. The Basel Committee on Banking Supervision (BCBS) constitutes a forum for discussion on topics pertaining to banking supervision. Both institutions are based at the Bank for International Settlements in Basel.

stricted to a minimum. They make it possible, in particular, not to choose one or the other of the different systemic risk aspects, making it easier to pick up on the weak signals of risks. Furthermore, their implementation does not require sophisticated econometric techniques. They are fully reproducible and may be used at regular intervals. Finally, scores can be used to classify international financial institutions according to their vulnerability to system risk. For this reason, given the large number of similarities between pandemic risk and systemic risk, on the one hand, and the advantages of the scores currently used by international institutions, on the other hand, we suggest to develop a Pandemic Vulnerability Index (PVI) Dashboard for North African countries using the same approach as the Basel Committee approach to the scoring of systemic risk.

6.1 Vulnerability score construction methodology

This section provides a brief overview of the methodology for building the Pandemic Vulnerability Index (PVI) Dash-

board. The methodology is further described in appendix 9.3.

6.1.1 General principle behind the construction of the vulnerability score

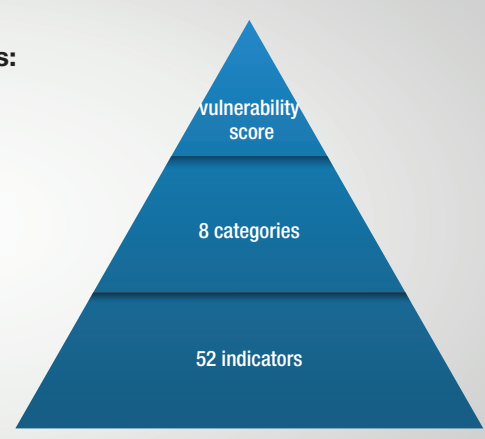
The general principle is the following: we consider a set of 52 indicators divided into 8 categories. Each of these categories aims to grasp a specific dimension of economic, social and institutional vulnerabilities to pandemic risk.

A score is calculated for each category. To avoid placing too much emphasis on certain indicators versus others when calculating the score per category according to their variances, all indicator values are standardized. Note: All indicators by convention have a positive effect on vulnerability and are standardized by the sum of the indicator across all countries; they are expressed in base points (Bps).

Using the scores by categories, it is possible to construct an aggregated score. The vulnerability score of a country is defined by the simple average of the scores obtained for the 8 categories.

Below the headings for these eight categories:

- Category 1: Spread of virus
- Category 2: Health vulnerability
- Category 3: Healthcare provision capacity
- Category 4: Economic vulnerability of the population
- Category 5: Economic structure
- Category 6: Budgetary capacity
- Category 7: Adaptive capacity
- Category 8: Governance



The same logic as the BCBS is used here, with an equally weighted sum of the category scores being used to define the aggregated vulnerability score to pandemic risk. This follows from the fact that when faced with a protean risk, no one vulnerability should be overweighted to be able to pick up on the weak signals of the risk. It is standard practice to standardize the sum of the scores for all countries to the unit or 10,000 base points. The higher a country's score, the more vulnerable the country is

6.1.2 Categories and indicators

The following section provides details on the choice of categories and indicators used in the composition of the pandemic risk score.

The category “spread of virus” seeks to sum up information on the spread and lethality of the Covid-19 virus observed during the first wave in the period from March to May 2020. This category includes four indicators. The first indicator reflects the ratio of the number of confirmed cases of contamination to the overall population, as of the reference date of May 31, 2020. The second indicator is the average growth rate of the number of Covid-19 cases identified between March 31 and May 31, 2020. These two statistics present a comparative assessment between countries of how far the pandemic has spread at a given date (information that can be updated in real time), but also of its dynamics measured over a 2-month observation time frame. Similarly, two mortality indices are introduced to summarize the lethality of the virus: (i) cumulative number of deaths due to the virus, standardized by the number of cumulative cases

observed at baseline, and (ii) cumulative number of deaths in proportion to the total population at baseline. To date no mutation of the virus has been observed at the global level. As a consequence, the differences in lethality identified between countries are mainly due to health, demographic and social factors, but also to differences in the policies rolled out by the authorities to fight the pandemic. This is the reason why these indicators can be designed as ex-post measures of pandemic risk vulnerability.

The category “health vulnerability” includes 5 indicators on demographic and health vulnerabilities. It includes two indicators of population density, i.e. the density in urban areas and the density of the global population. The role of population density, especially urban density, is a matter of debate. It is a priori plain that density can be a potentially aggravating factor in the transmission of the virus. But since many other factors come into play, such as the intensity of exchanges, hospital facilities, population age structure, etc., strict causality is hard to demonstrate. As an example, a World Bank study (Fang and Wahba, 2020) involving 284 Chinese cities, has shown that population density has virtually no effect on the infection rate. Conversely, whilst the recent study by Carozzi et al. (2020) using US data, confirms that there is no relationship between population density and the number of Covid-19 cases and fatalities, it underscores the fact that density does affect the timing of epidemic onset in each region, with densely populated areas being more susceptible to an early epidemic. Finally, differences in population density are likely to impact disease control policies,

which are more or less restrictive, with varying degrees of social and economic consequences. The third indicator selected for this category is the share of population over 65. Similarly, at the individual level, it is obvious that age is the biggest risk factor for mortality from Covid-19. At an aggregate level, one finds this importance of demographics in the analysis of disease-related mortality. Dowd et al (2020) outline the role of population age structure and inter-generational contact in understanding differences in mortality between countries and in estimating the pandemic's potential impact on different populations, whilst acknowledging the need for more information on the prevalence of co-morbidities. In developed countries, over 9 in 10 people dying from Covid-19 are over 65. Similar observations have been made for different African countries (see for example the WHO report (2020), or Mburu and Boum (2020) to name but a few). This influence of age structure on the virus mortality has often been claimed as one of the explanatory factors for the low mortality observed in Africa³, as the youthfulness of the population has to some extent protected it from more serious human consequences. The last two indicators in the category address the prevalence of diabetes in the population aged 20-79 in 2019, along with the mortality rate from cardiovascular disease, cancer, diabetes and other chronic respiratory diseases in the population aged 30-70. These indicators can be used to track the burden of certain chronic diseases, acting as co-morbidity factors, with the potential

to offset the effects of the population age structure, e.g., younger populations with different epidemiological characteristics.

The third category consists of four healthcare provision capacity indicators. Typically, this is the number of hospital beds per 1,000 inhabitants in 2015, the number of doctors per 1,000 inhabitants over the period 2011-2018, the average share of the total health expenditure in GDP over the period 2009-2019, and a health system efficiency index using the basic capacities laid down in WHO International Health Regulations.

The fourth category, entitled "economic vulnerability of the population", consists of the largest number of indicators, namely 13 indicators, on account of the wide range of effects considered here. Overall, the general notion is that the pandemic's implications will be not only economic, but also human, particularly important as it will affect vulnerable populations. As such, the first four indicators in this category are the rate of the working poor in the over-15 population, the poverty rate defined as the ratio of the population living on less than \$1.90 a day, the self-employment and family employment rate in the labor force, together with the percentage of employment in at-risk sectors. These four measures aim to understand the working poor's vulnerability to the risk of a pandemic, whether human or economic. From a health perspective, the working poor and informal sector workers cannot observe physical distancing and lockdown mea-

³ By the end of May 2020, the virus had infected over 4 million people and killed over 300,000 worldwide. Over the same period, Africa had only 84,000 cases and just under 3,000 deaths. By that time, 75% of African countries had fewer than 1,000 confirmed cases.

sures without serious consequences for their lives and livelihoods. Therefore, they become more likely to be affected by the disease. The World Bank foresees that the Covid-19 pandemic will exert a particularly heavy humanitarian and economic toll on emerging markets and developing economies with large informal sectors (World Bank (2020)). Informal sector workers generally do not have access to government support. Informality is associated with pervasive poverty, lack of access to financial systems, inadequate access to medical resources, and weak social safety nets. Such vulnerabilities further compound the pandemic's economic burden on the livelihoods and threaten to thrust large numbers of people into extreme poverty. This impact is likely to be particularly severe for women, owing to their presence in the informal sectors most affected by the pandemic. In order to illustrate this gender effect, we have introduced a Gini index to capture the gender-specific distribution of income.

The next four indicators are focused on unemployment, since by definition an economy is all the more economically vulnerable to the risk of a pandemic when it is confronted with high unemployment. These four indicators are over-15 unemployment rate, 15-24 youth unemployment rate, female unemployment rate, and labor force participation rate of the 15-24 age group. These four indicators provide a means for measuring the different dimensions of vulnerability induced by unemployment in the different strata of the population. Finally, the last four indicators in the category "economic vulnerability of the population" are the Gini index of distribution of income

across the population, the illiteracy rate in the over 15 population, the share of basic products imported, and the average share of social protection spending in GDP since 1995.

The fifth category "economic structure" breaks down the economic vulnerabilities into six indicators. The first three indicators relate to the diversification of production between sectors, product export diversification and the export diversification from a geographic standpoint. The fourth indicator looks at the technological content of exports, approximated by the percentage of exports of manufactured goods. The higher the technological content of exports, the less subject the country will be to the recessive effects of world trade over the medium term. Another indicator supports this idea: the economic complexity index, reflecting the changing resilience of economies. Finally, The last indicator is made up of the value-added share in the sectors most at risk, particularly the tertiary sector. The crisis of March-May 2020 has brought to light the significant vulnerability of countries, whose activity was largely dependent on services, particularly in the tourism sector.

The category "budgetary capacity" provides a summary of six indicators related to governments' fiscal space in dealing with the long-term economic effects of the pandemic. During the crisis of the first half of 2020, the adoption of very tight fiscal and monetary policy responses curbed, to some degree, the slowdown of the economic activity, despite sometimes very strict lockdown measures. In many countries, fiscal measures replaced part of household

income, and managed to dampen the corporate default risk. The injection of liquidity by central banks has helped the financial system to continue to function. But whether States are able to pursue such policies over time and deal with the economic consequences of a possible second wave of the pandemic remains an open question. This depends on their pre-crisis fiscal positions and their future ability to levy higher taxes. That is why the first three indicators in the category are the ratio of taxes and social contributions to GDP, the ratio of non-tax revenue to GDP, and the budget deficit expressed as a percentage of GDP. On the other hand, the need to ensure debt servicing and renewal allow the levels of external debt and central government debt in relation to GDP indicators of the vulnerability of public policies to support the economy (Reinhart, 2020), especially in developing countries (Arenallo et al., (2020)). Economies that were highly indebted before the crisis are likely to incur higher interest rates during the crisis, thereby increasing the cost of servicing debt relative to income levels at the most difficult time. Then, the last indicator in the category is the total debt service-to-GDP ratio.

The seventh category, referred to as “adaptive capacity”, encompasses nine highly diversified indicators, given the magnitude of the effects to be measured. Adaptive capacity is the ability of businesses to cope with the human and economic crisis. This concept can be grasped in many different ways, which we will approach through a selection of nine indicators centered on the notions of economic freedom, innovation and

new technologies, competitiveness and education. The first indicator looks at access to Internet and smartphone, expressed as the number of subscription agreements per 100 inhabitants. With the digitalization already profoundly transforming African economies, most African countries have also been actively using digital technologies to make cashless transactions, including the use of mobile money, thereby helping to reduce the risk of disease spread. The second indicator focuses on financial inclusion, defined by the private sector’s ratio of domestic credit to GDP. The two following indicators are related to innovation: on one hand, the countries’ innovation capacity index developed by Cornell University and the World Intellectual Property Organization (WIPO) and, on the other, a measure of the adoption of digital technology by companies, approximated by the percentage of businesses having their own website. Complementing this analysis is the World Bank’s Human Capital Index (HCI), which provides a way to quantify the contribution of health and education to worker productivity. The final four indicators are respectively the Index of Economic Freedom (Heritage Foundation), the World Bank competitiveness index, a measure of the new business density in the economic fabric, and a score for the ease of doing business in each of the countries based on World bank-led surveys. These various statistics measure the vulnerability of countries facing barriers to economic freedom, freedom to do business, and competitiveness (see Bjørnskov (2016) as part of a review of the relationship between economic freedom and economic crises.

The last category: “ Governance “ includes five indicators. It is generally accepted that resilience and effective governance go hand in hand. The steps taken by governments in an attempt to control the spread of the pandemic along with managing its large-scale impacts highlight the essential relationship between the State and the population in the design and identification of government responses, strategies and approaches to address the crisis. Despite the prompt and effective response by governments (Janssen and van der Voort (2020), the pandemic has brought to light, in many respects, some of the existing shortcomings in the country’s resilience to the crisis, including the way in which the State interacts with its population in realizing the values and principles of effective governance. Good governance is indeed one of the key components of the Agenda 2030 for sustainable development, providing a global transformation strategy aimed at creating resilient societies. Thus, the five governance indicators adopted in the category represent efficiency scores for public policy, quality of bureaucracy, corruption control, rule of law and civil liability.

6.1.3 Scores by category and aggregate score properties

The data used to develop these indicators involve a set of 217 countries and are derived from different sources such as the World Bank, the International Monetary Fund (IMF), the United Nations Conference for Trade and Development (UNCTAD), the World Health Organization (WHO), the international Labour Organization, the World Intel-

lectual property Organization (WIPO), the *Heritage Foundation*, *Cornell University*, INSEAD {European Institute of Business Administration} and the John Hopkins University. Table 9-10 provides a summary of all the indicators selected for each of the eight categories.

To summarize, considering the data available, we have developed a vulnerability score for a full sample of 149 countries. For the record, a higher score means by convention a higher vulnerability to the risk of a pandemic. The aggregate score ranges from 40 (minimum value) to 136 (maximum value), with a mean value (70) close to 1/149 base point and a variance of 355. Although the scale of the crisis varies from one part of the world to another, it is clear that most emerging and developing countries experience vulnerabilities, further compounded by these external shocks. Some developed countries, notably European (such as Spain, Italy, Belgium and Sweden) also have strong vulnerabilities as well.

For more details, Appendix 9.4 provides an analysis of the properties of the Systemic Vulnerability Score and Category Scores at the global level

6.2 Vulnerability of countries of North Africa to pandemic risk

Our Pandemic Vulnerability Index (PVI) Dashboard can now be applied to the five North African countries with data availability⁴. As shown in Table 6-1 and Figure 6-1, their vulnerability scores

⁴ Owing to lacking data for a large number of indicators, Lybia is not included in the analysis.

are fairly similar, reflecting the relatively homogeneous nature of the region to pandemic risk. Two countries, however, stand out as having the highest risks and are slightly different from other countries in the region: Algeria, with a score of 82, and Mauritania with a score of 78. Next come Egypt with a score of 69, followed by Tunisia and Morocco with very close scores, respectively 60 and 58. Such discrepancies across the countries of the region reflect the difference in their sources of vulnerability. Table 6-1 shows the overall score and the scores by category for the five countries of the subregion

With 38,583 confirmed cases as of August 17, 2020 and 1,370 deaths (source: Johns Hopkins University) i.e. respectively 32.4 deaths per one million inhabitants, Algeria is the most affected country of the zone, followed by Morocco (42,489 cases and 658 deaths, i.e. 18.3 deaths per one million inhabitants) and Mauritania (6,701 cases and 157 deaths, i.e. 35.7 deaths per one million inhabitants). This country has also had the strongest epidemic dynamics since April, while other countries of the region have experienced a later peak. These differences can be seen in “spread of virus” category score, Algeria scoring

the highest among the countries in the region while, it is worth recalling, the indicators considered for this category apply to the period March-May 2020. It was noted that health vulnerabilities (category 2) are slightly higher in Egypt compared to other countries in the region, owing mainly to its higher urban density, population density, and chronic disease prevalence. It is also noteworthy that Tunisia’s health vulnerability is slightly higher than other countries’, except Egypt, owing in particular to the age structure of its population and a larger proportion of people over 65. Mauritania faces the highest level of vulnerability in terms of health capacity (category 3) due in particular to the country’s public health sector difficulties. This vulnerability is easy to explain in light of the various indicators: Mauritania, for example, has less than 0.5 hospital beds and 0.187 medical doctors per 1,000 inhabitants. Conversely, other countries’ health situations are very similar.

As far as the economic vulnerability of the population (category 4) is concerned, Mauritania is again indisputably the country with the highest score, particularly on account of its social and gender inequalities and its low labor force participation rate. The score gap

Table 6-1: Score by category of countries of North Africa

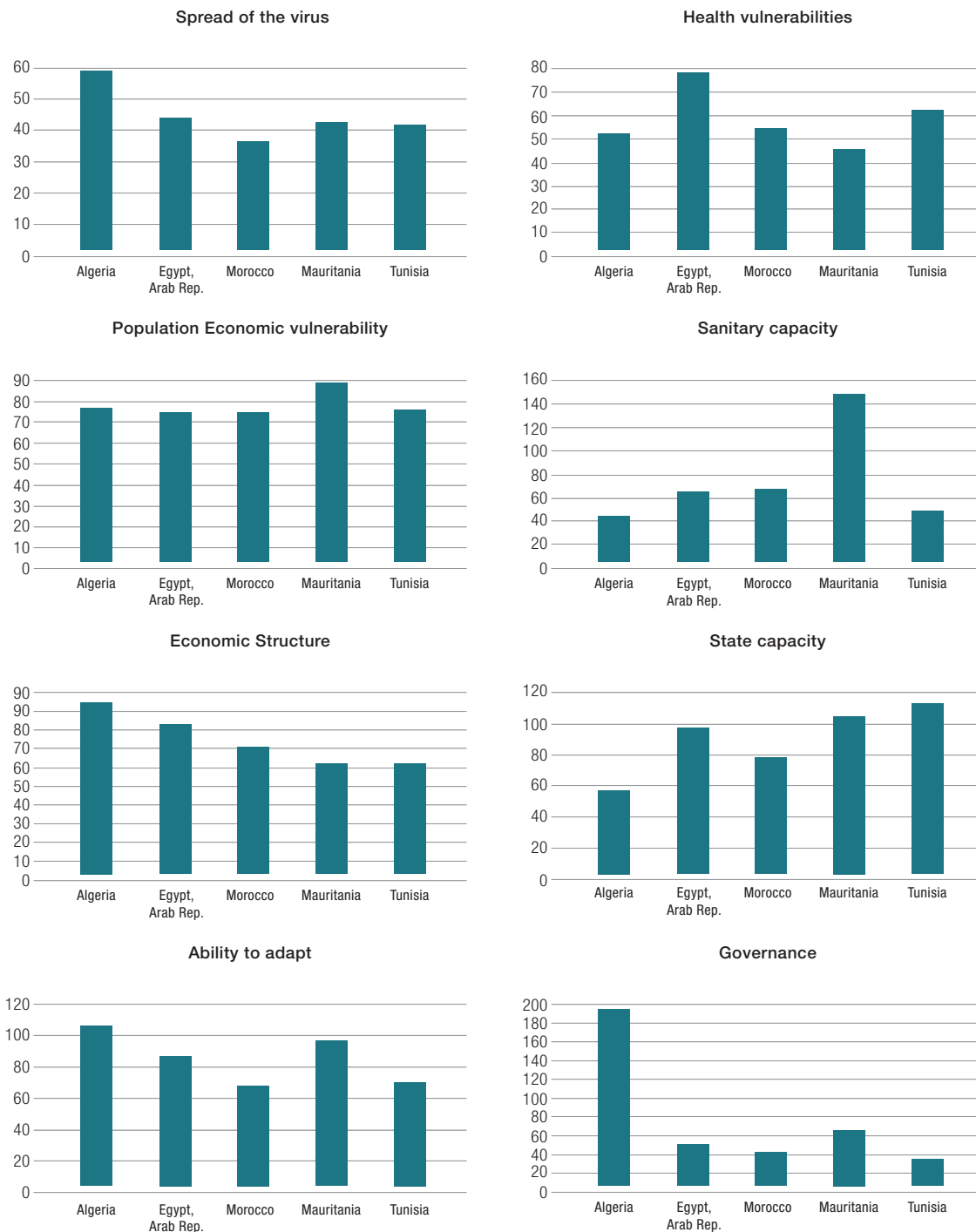
	Score	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Cat. 6	Cat. 7	Cat. 8
Algeria	82	57	50	74	40	92	53	102	188
Egypt	69	42	76	72	60	80	93	83	44
Morocco	58	35	52	72	62	68	74	64	36
Mauritania	78	41	43	86	143	59	101	93	59
Tunisia	60	40	60	73	44	59	109	66	28

Note: Category 1: Spread of virus, Category 2: Health vulnerability, Category 3: Healthcare provision capacity, Category 4: Economic vulnerability of the population, Category 5: Economic structure, Category 6: Budgetary capacity, Category 7: Adaptive capacity, Category 8: Governance.

versus other countries in the zone is quite significant. The region's remaining four countries feature broadly similar vulnerability scores, attesting to the region's relative economic and social homogeneity, with roughly the same strengths and weaknesses.

Algeria and Egypt have the highest vulnerability scores relative to their economic structure (category 5). This result explains these two countries' low production and exports diversification levels and the low technological content of their exports. Witness to this extreme

Figure 61: Scores by category of countries of North Africa



Source: Vulnerability scores by category as calculated by the authors.

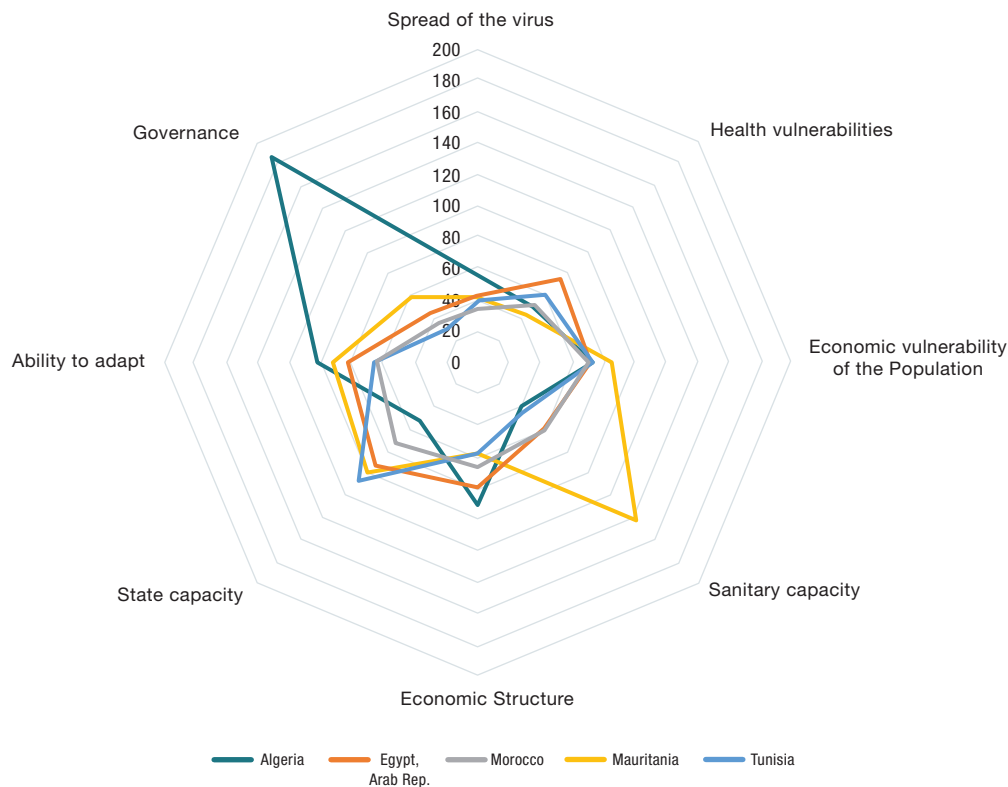
concentration the hydrocarbons exports, accounting respectively for 92% and 40% of total Algerian and Egyptian exports. This absence of diversification creates a significant vulnerability to pandemic risk which, albeit smaller, exists in other economies in the region.

As for the budgetary capacity of countries to cope with the economic risk inherent in the pandemic (category 6), our score shows that Tunisia, Mauritania and Egypt have the least amount of fiscal and budgetary leeway. With a level of public debt in 2019 standing at 97%, Mauritania has the highest public debt rate in the region, followed by Tunisia (73%) and Morocco (63%). The steep slump in global demand for raw materials has eroded Mauritania's exports, adversely affecting the country's non-oil sectors and financial capacity. Meanwhile, Tunisia has been badly affected by the sharp drop in tourism, although its public finances had been already strained in the run-up to the crisis, reaching a budget deficit above 4% of GDP in 2019. These countries need to adopt measures designed to credibly restore fiscal sustainability over the medium term to mitigate their vulnerability to the risk of a pandemic. It is worth noting that in 2019 (before the crisis) Algeria scored the best in the region on account of a very low external debt level and a low fiscal deficit thanks to the tax revenues derived from sales of hydrocarbons. Yet, it is expected that the growing level of central government debt and deficit, excluding resource-based tax revenues, and lower oil and gas prices, will eventually substantially increase Algeria's vulnerability in this category.

Whilst Algeria has some fiscal space, it has the highest vulnerability in the area of adaptive capacity (category 7). This performance may be attributed to economic freedom, competitiveness indicators or the use of digital technology. Such vulnerabilities exist in Egypt and Mauritania as well. In this category, Tunisia and Morocco scored highest. Finally, in the "Governance" category, Algeria reported the highest vulnerabilities. Public sphere efficiency indicators seem to be somewhat eroded, a situation which creates a strong vulnerability not seen to the same extent in other countries of the subregion.

Figure 6-2 and Figure 63 provide a visual comparison of North African countries' main vulnerabilities to the risk of a pandemic. Here again, the main takeaway is that these countries share roughly similar vulnerability levels compared to other countries in the sample. Their aggregate vulnerability scores are relatively close, in the range of 60 to 82.

This relative homogeneity conceals however some differences when considering the different categories. As such, Mauritania faces very high health vulnerabilities and on a lesser scale, high economic vulnerabilities. For its part, Algeria faces significant vulnerabilities associated with its adaptive capacities and governance indicators. For Egypt, the risks are primarily due to the country's health factors, adaptive capacity and economic structure. Tunisia and Morocco exhibit the lowest vulnerability levels in a wide range of areas.

Figure 6-2: Comparison of scores of the countries of North Africa

Source: Vulnerability scores by category as calculated by the authors.

The value of the vulnerability score is in that it provides a single measure against which North African countries' performance can be compared to that of the other 144 countries in the sample. Table 6-2 provides a ranking of the countries in the zone based on the score level. As a reminder, a higher score means a higher vulnerability and a lower ranking. Hence, countries with a rank equal to 1 have the

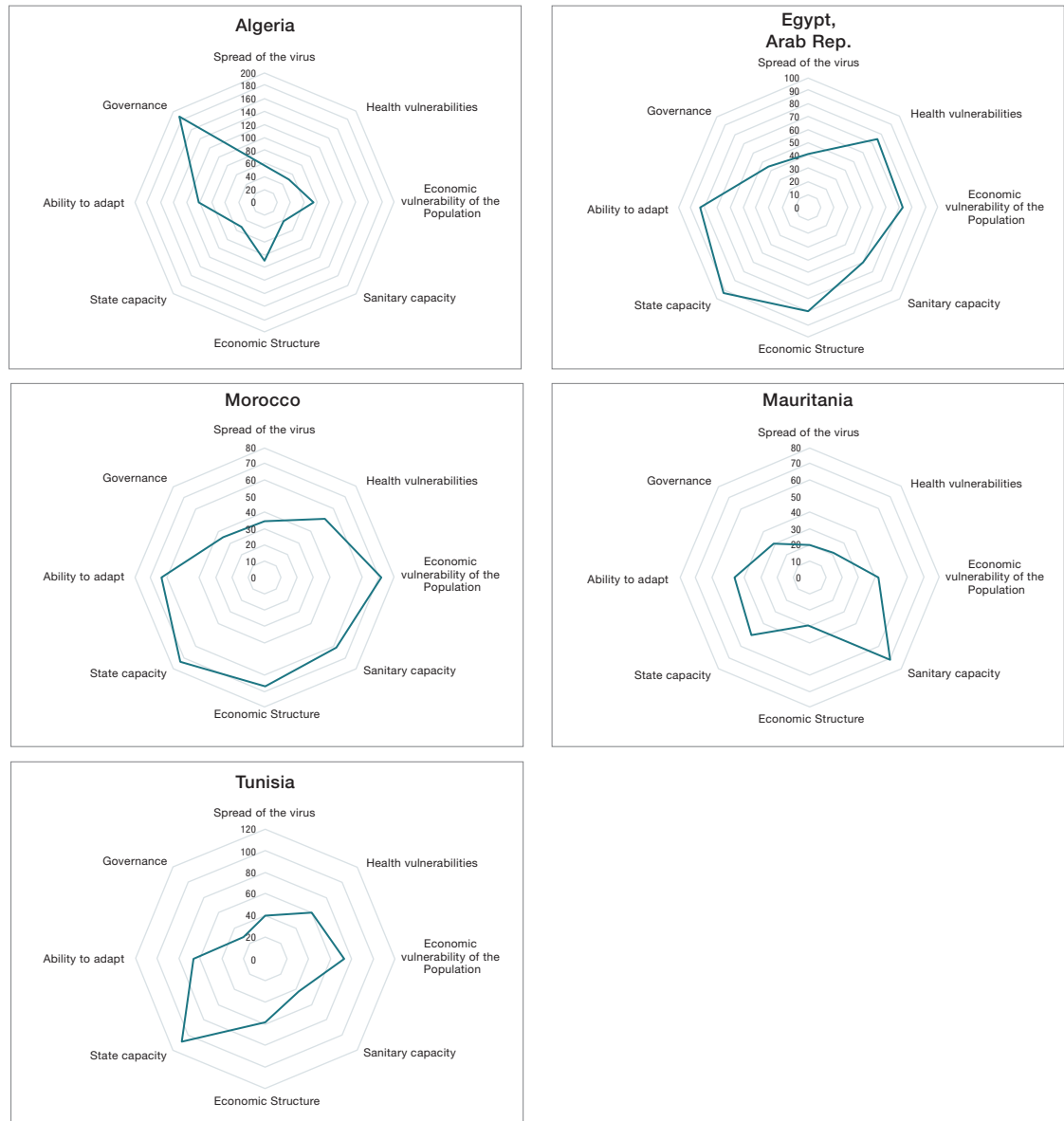
highest level of vulnerability. The aggregate score shows that Algeria, the most vulnerable country in the zone, is 35th worldwide, closely tailed by Mauritania in the 42nd position. Morocco and Tunisia, the two countries with the least risk, rank respectively 119th and 107th out of 149 countries, a position that places them in the first third of the world's least vulnerable countries.

Table 6-2: Global ranking of countries of North Africa by category

	Score	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Cat. 6	Cat. 7	Cat. 8
Algeria	35	52	108	61	99	23	128	31	9
Egypt	65	76	27	67	58	38	34	54	53
Morocco	119	93	104	68	57	60	70	94	68
Mauritania	42	77	128	44	16	91	23	40	31
Tunisia	107	81	86	63	90	90	11	89	88

Note: Category 1: Spread of virus, Category 2: Health vulnerability, Category 3: Healthcare provision capacity, Category 4: Economic vulnerability of the population, Category 5: Economic structure, Category 6: Budgetary capacity, Category 7: Adaptive capacity, Category 8: Governance.

Figure 6-3. Vulnerability scores by category, countries of North Africa



Source: Vulnerability scores by category as calculated by the authors.



7. Reforms designed to tackle the consequences of Covid-19 crisis

Two types of reforms are needed: reforms to manage the short-term consequences of the crisis, and reforms aimed at cutting vulnerabilities and preparing countries for the “post-Covid-19 era”. Addressing the short-term effects of the crisis is crucial, in particular to mitigate the long-term effects of the crisis and contain the loss of development gains. For governments, the size of the shock has made it difficult to carry out reforms in many areas and to mobilize significant resources. Besides, the recovery from the crisis requires a medium- to long-term vision. As underlined above, we are not dealing with a mere cyclical shock, rather with a profound crisis that will bring about a thorough shake-up of production and consumption patterns. That in turn has implications on short-term public policy. A case in point is tourism. The return to business as usual in this sector will be very slow, and it is highly likely that consumer behavior and travelers’ expectations will change, as in the areas of health

safety, types of accommodation, length of stay, etc. Support to the sector by governments must be consistent with the changes to be undertaken. More broadly speaking, sectoral policies simply cannot ignore the medium- to long-term sectoral impact of the crisis. Supporting sectors or activities that are unlikely to remain competitive, for example, may prove to be irrelevant. Combining short-term reforms with medium-term reforms is an increasingly important requirement considering the paucity of fiscal resources and the necessity of governments to make a tradeoff between allocating resources to short-term social and economic measures or carrying out medium- and long-term reforms. An analytical framework of the sectoral impact of the crisis seems therefore necessary. Also of note: the crisis will induce a sharp increase in public debt, thereby making it all the more necessary to consider the impact of government spending on medium-term growth, in order to cushion the future debt burden.

This section is not so much about proposing a list of reforms to address the entire structural problems of North African countries, but rather about proposing an approach for all the countries of the sub-region, complemented by a few key reforms to help them embark the Covid-19 era with greater equanimity.

7.1 Approach

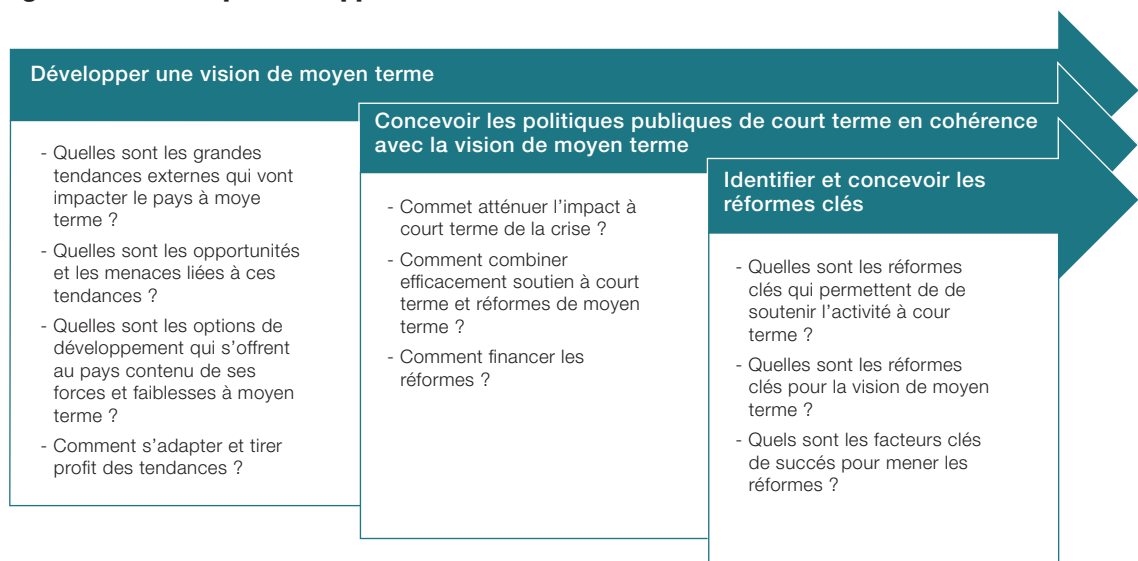
We are proposing a three-pronged approach: (i) a medium-term vision, (ii) consistent short- and medium-term reforms, and (iii) identification of key reforms.

The articulation of a medium- or even long-term vision is of prime importance considering that the crisis will spark profound changes, with potentially significant consequences on the subregion's development strategies. A number of countries started a reflection on working out a medium-to-long term vision, such as the new development model in Morocco or the Algeria 2035 vision. This reflection, updated in the light of the changes brought about by the current crisis, may

well constitute a new vision of economic and social development over the medium term. (10 or 15 years).

The integration of short-term public policies (to stem the crisis) with the medium-term vision is crucial, as we discussed above, as it makes it possible to: (i) anticipate future changes to create the right incentives (ii) streamline the public resources allocation process (e.g., to limit spending with low social returns in the medium term), and (iii) boost the effectiveness of public policies. A case in point is the assistance provided to most vulnerable households or distressed businesses. Most governments have been faced with the challenge of identifying the beneficiaries (data gaps, particularly due to the disproportionate importance of informality) and of ensuring that actually get the aid (e.g., lack of access to banking services). Since the Covid-19 world threatens to be marked by wide-spread shocks and a protracted recovery, there is a need to rethink the entire social system and its financing. As proposed in the SDGs, it is essential

Figure 71: Reform process approach



that the medium-term vision, especially in the Covid-19 period, includes objectives geared to curtailing poverty and social vulnerability. Designing a process to grant aid that sets the stage for future reforms should align short-term aid with medium-term objectives, along with the associated reforms for their attainment. Public policies can be designed more effectively when they are based on evidence, thereby making the availability of information essential. Setting up a system for information gathering on aid beneficiaries may be a simple way to prepare the ground for future reforms. Also, using new technologies may be a cost-effective and a time-efficient way to do this.

Finally, the last step in the process involves the identification and design of key reforms, i.e. those that will form the basis of the reform package necessary to achieve the objectives of the medium-term vision. These are exactly the reforms we will be addressing below.

7.2 Reducing short-term vulnerabilities

In the broad sense, health vulnerabilities (factors contributing to the spread of the virus, health vulnerabilities and health-care capacities) vary greatly according to structural factors (population density, urban density, etc.), and most of all capacities (medical facilities, doctors, etc.) made possible by investments. Without a meaningful increase in health and, more generally, welfare investments, reducing these vulnerabilities may indeed seem difficult. Short-term measures are however needed to help increase North African countries' health resilience in the

face of a pandemic currently out of control. We first recommend that policies for pandemic management be strengthened. In addition to raising public awareness on the virus (including prevention and efficient distancing measures), the aim is to ensure that prevention and care-centered policies are better targeted at the most vulnerable populations, particularly the elderly or those suffering from chronic diseases and other co-morbidities. When sanitary capacities become reduced, it is recommended to address them by limiting the management of cases with the least risk. Today, knowledge of the main risk factors leading to the most serious consequences (resuscitation or death) of Covid-19 has improved. Recognition of these risk factors should make it possible to channel healthcare resources to patients most likely to develop severe forms of the disease. The third recommendation relates to the screening policy: the sooner Covid-19 cases are identified, tested and isolated, the harder it becomes for the virus to spread and the less national health care capacities will be strained. There is need to generalize the screening policy as much as possible, especially in the countries (especially Mauritania and Egypt) of the subregion with the highest health vulnerabilities. Put simply, collective resources should be channeled where risks are highest. As physical and human capacity building of health systems will be a long-term process, it will prove necessary to improve its effectiveness and roll out new technologies to address short- and medium-term capacity constraints. Finally, tariff and non-tariff barriers to trade in medical equipment and supplies obviously need to be reduced, along with those for all basic necessities.

In the medium term, governments must provide the health systems with the means needed to address the risk of a pandemic, by hiring and properly managing physicians and hospital staff, providing hospitals and health facilities with adequate operating budgets, raising salaries, and streamlining administrative control procedures. Moving to a health system built on collective trust and social recognition will contribute to reducing health vulnerabilities far beyond the sheer mechanical effect of increasing healthcare spending.

As with health vulnerabilities, reducing economic vulnerabilities will require both short-term emergency measures and a medium- to long-term response. In the short term, governments' efforts should continue to be geared towards implementing emergency measures and stimulating economic recovery. These include: (i) supporting access to financing (through, inter alia, mechanisms such as secured loans, or extension of maturities, credit smoothing, etc.); (ii) stimulating employment, through cost-cutting measures, temporal smoothing of taxes, and training subsidies (to facilitate industrial retraining); and (iii) undertaking a major administrative streamlining exercise to significantly curtail restrictions on businesses. The latter point is important as all businesses in the subregion, to varying degrees and depending on the country, suffer an inadequately favorable business environment. With firms facing asymmetric shocks (such as demand shocks), the reorganization of value chains, and the developments related to the Covid-19 crisis, it is becoming essential to overcome the barriers confronting firms through better

allocation of resources within the economy. Finally, the last recommendation addresses the need to support demand, by better channeling social policies to those most affected by the economic crisis (informal sector workers, etc.). As we will see in the following section, here again new technologies will prove very useful in quickly developing a social information system aimed at gaining more knowledge of the social situation of individuals, and thus implementing more targeted policies.

The following section examines medium- to long-term reforms.

7.3 Paving the way out of the crisis on the medium term and addressing the challenges of the Covid-19 era

The first section of the report highlighted how one of the major consequences of the crisis was the acceleration of the digital transformation, including the rapid expansion of e-commerce, a faster pace of adoption of telemedicine, the sustainable adoption of teleworking, e-learning and fintech. The impacts of the digital revolution spans all areas, including social and economic, international division of labor and organization of world trade. It also impacts the consumption and production patterns and enterprise business management models. Digital transformation is indeed both a threat and an opportunity for North African countries. Therefore, the challenge lies in curtailing the adverse consequences and taking full advantage of their potential. North African countries are certain-

ly not all equally equipped to deal with the digital revolution and the changes brought about by the pandemic. While not all of them - especially the least developed - will be able to make the necessary adaptation efforts, they must all, each according to their capacities, brace their societies for an “emerging new world”. Given the scale of the expected medium- and long-term changes, rising uncertainty, and a more volatile growth pattern, it will be imperative to build resilience and adaptation capacities. Four reform pathways are likely to meet this objective: (i) adoption and adaptation of digital technologies, (ii) human capital, (iii) innovation in its broad sense, and (iv) State capacity. A fifth area of focus is the subregion’s economic integration.

7.3.1 Adoption and adaptation of digital technologies

Section 1 highlights the subregion’s backwardness in the area of digital development. Embracing digital technologies not only requires infrastructure, but also human resources, including a strategy to help societies become digitally literate. It is clear that the development of the digital economy will require widespread use across society, to realize its potential to the fullest. X areas of reform can be identified:

- **Investing in infrastructure:** The subregion is inadequately equipped with 4G access and has a substandard connectivity performance. To remedy this, it is not enough to invest in the construction of public digital and data infrastructure, it is equally important to further open the telecom sector to competition, ensuring that it remains inclusive and universal.
 - **Developing the regulatory framework:** create effective regulatory frameworks for the promotion and regulation of digital technologies, including the ability to facilitate secure electronic transactions.
 - **Developing human resources:**
 - Set up a training system geared to: (i) impart basic digital literacy to workers and the unemployed. Such a system may combine public and private financing options (ongoing corporate training), (ii) career-long training to be able to adapt to constant changes.
 - Introduce a reform of the education system to include new technologies and computer programming, very early on in the school curriculum.
- Thanks to the large-scale e-learning and teleworking experience facilitated by the crisis, it is now possible to use existing digital platforms to deliver some of these training courses.
- **A « digital plan »:** Initiate a “digital plan” driven by an accelerated development of e-government and using public procurement to stimulate the development of national businesses in the digital universe. E-government must not be viewed only through the lens of digitalization of government services, but must go far beyond and promote the increased use of digital technologies in mainstream public policy. Actually, there is an increasing number of cases where the use of digital technologies can provide

solutions to development issues (see Cheney, C. (2018))⁵. These are intended to hasten the adoption of digital technologies and stimulate innovation in this area.

- **E-government:** E-government must be given priority by all countries in the subregion. We suggest that the reforms revolve around 2 areas of focus:
 - a plan for the digitalization of the administration
 - A plan to “digitalize” public policies: the aim is to deploy more and more digital technologies to respond to development issues and base them more on empirical evidence (data).

The acceleration of digitalization in public services is critical, as revealed by the difficulties encountered by governments in implementing social and business emergency measures. Much like in India, the creation of a single digital corporate identity would help remedy these difficulties and formulate a social policy that is better targeted to the population.

The underlying objective will be to promote the national digital industry (creation of start-ups, development of SMEs with a dig-

ital focus, etc.). “Addhaar”, part of IndiaStack, an Indian government-led initiative geared to digitalize the economy and society, is a case in point. A set of open applications and programming interfaces (APIs), IndiaStack is a public digital infrastructure providing a presence-less, paperless, and cashless service delivery solution for government and other public institutions, businesses, start-ups and developers.

- “Data” development: Data are at the core of digital technologies and central to digital transformation in general. They are also critical to defining evidence-based policies and making effective use of new technologies to achieve SDGs. Aside from increasing the statistical capacity of countries, the aim is to:
 - design a holistic approach to data production and exploitation, based on cooperation, sharing and co-production between the State and all development stakeholders (businesses, public service users, etc.), through data ecosystems.
 - place data production and use at the heart of public policy: promote a culture of evidence-based policy and public policy evaluation. As an example, where evaluation is

⁵ Application areas are quite vast: credit schemes for natural and legal persons unable to access the financial market, such as M-Shwari in East Africa, M-Kajy in Madagascar, and MoMo Kash in Côte d’Ivoire; agriculture: to help, for example, improve irrigation or disease detection, or fight against tax evasion and corruption, etc.

integrated ex ante into public policy development, the policy should be designed and delivered for the purpose of collecting and producing data.

- Build an environment conducive to a climate of trust between all stakeholders: security, cyber security, protection of private data, etc.

7.3.2 Human capital: education and social protection

The term human capital includes education in its broadest sense, including precariousness and health. Section 1 discusses how the subregion is falling behind in this area. It is true that significant efforts have been made to improve access to education but, as revealed by the PISA results or the performance of North African universities on the Shanghai ranking, the quality of education is still lacking. The fact is that even in terms of access, some heterogeneity continues to exist between countries. As far as health and precariousness are concerned, the health and social protection systems of North African countries are relatively weak. Given the risk of epidemics and the digital revolution, investing more in human capital is critical for North African countries. Considering the significant cost involved in the « traditional »⁶ investment scheme, making use of new digital technologies has become critical. Obviously, this poses a major challenge as there is still a lack of human resources and digital infrastructure, especially in rural areas.

The use of new technologies in education can help reduce the cost and time needed to improve the quality of education, develop educational methods tailored to the individual characteristics of students, and provide a personalized learning experience. Bearing in mind the medium-term effects of the crisis on employment, the vocational training sector will be in great demand, mainly for the retraining of workers whose skills need to be adapted to the changing qualifications. The countries of the subregion need to invest heavily in a more efficient training system.

On the health front, telemedicine, including remote sharing of medical data, will doubtless greatly benefit the countries of the subregion given the time and cost involved in increasing the physical infrastructure and medical personnel.

Speaking of social protection, as mentioned previously, on top of the implementation of social protection tools, new technologies also make it possible to more efficiently care for individuals, notably through use of individual data. For countries in the subregion, gradual extension of social protection is an important measure to take. This should be achieved by allocating resources as efficiently as possible, using a social data and efficient public service delivery system. This will require innovative policies using recent technologies. Undeniably, the new technologies have made leapfrogging in public policy possible. But to do so, it is essential for governments in the subregion to unleash the potential and build the capacity of society to innovate on all fronts.

⁶ I. e. in the case of education, the classical trainer-led classroom teaching system.

7.3.3 Promoting the capacity to innovate

The subregion countries' capacity to innovate, in the broader sense (including societal), still remains inadequate. In an ever-increasing digital world, where innovation is gathering more momentum, with impacts in all areas of life, it is becoming important for North African societies to do away with rigidity and instead cultivate a capacity to adapt through increased innovation. Given the new technologies' inherent capacity to benefit from network effects and address problems more effectively, it is important to foster a culture of societal innovation and remove any barriers on the way.

From the purely economic standpoint, North African countries must significantly improve the quality of public⁷ regulation so as to create a more competitive environment and reduce barriers to entry. Similarly, creating a more favorable environment and providing support to digital start-ups, still too few in the subregion, is more than ever necessary.

From an innovation standpoint, there is a need to invest more in R&D, to develop research ecosystems including public and private research centers, companies and public institutions, and to strengthen incentives for R&D within companies. The State has a key role to play in developing the digital sector. The fact is that very often, in the subregion, the administration is suffering from inertia due to the combined effect of the (public) organizational nature and an overly bureaucratic red tape. This is at

odds with the public service's inherent role in responding to the current crisis, and more broadly, to the new economic and social development challenges. As a result, it is essential to foster a culture of governmental innovation, drawing on the digital approach defined above. More generally, this ties in with the development of the capacities of States, a theme that we will be addressing more specifically.

7.3.4 States' capacities

Several definitions of State capacity exist, and we include here governance, as it is a central dimension of States Capacity. Section 1 outlined three main weaknesses of North African countries, which need to be addressed to ensure that the State is endowed with greater capacity to fully play its role in the Covid-19 era: (i) inadequate capacity to mobilize resources, (ii) insufficient impact of public spending on economic growth and, more generally, attainment of SDGs, and (iii) insufficient governance. Undoubtedly item (iii) has an impact on items (i) and (ii), but the impact of inefficient governance is far wider, particularly as the first two items are caused by factors not directly related to governance.

A number of proposals have already been put forth to improve resource mobilization capacities, including streamlining the tax system, tightening the integrity of the tax authorities, reducing the need for compliance audits, and so on. Speeding up the tax revenue mobilization digitalization and management process is another important dimension.

⁷ With a dynamic adaptive regulation, able to keep up with market changes. Regulation must also prevent monopoly positions in the digital sector, as these can be quickly gained, considering the competitive advantage of being first to enter a market.

Digitalization can be put to effective use to increase the efficiency of tax collection, reduce the burden of bureaucracy, and stem corruption. Also, when combined with a modern data analysis tool, digitalization provides an enormous potential for enhancing the efficiency of the tax system through adoption of better evidence-based policies.

It is urgent in the current context to increase the efficiency of public spending, measured in terms of impact on growth and SDGs. We therefore call for the promotion of a culture of public policy evaluation and transparency of the government budget. These are actually key parameters for increasing the efficiency of public spending. Evaluation of public policies goes hand in hand with transparency, as it is essential for the monitoring of public spending and government accountability. There again, digital technologies support this in a number of ways. Technologies such as AI, for example, can help streamline procurement processes, improve public entity or budget audits, refine budgeting forecasting processes, find opportunities to rationalize spending, and analyze a broad set of data to better streamline spending, e.g., by better targeting populations (households or businesses). Emerging digital technologies can further help improve the design of a public expenditure process incorporating ex ante policy

evaluation and increasing the efficiency of spending. AI has the potential to cut costs significantly, improve the delivery of public services and ensure better management of related risks.

7.3.5 Further strengthening of economic integrity

The subregion is very little integrated, leaving ample room for co-development. To illustrate this, the gains from greater integration of the Maghreb countries are estimated at 2% of GDP. However, potential gains are much greater, partly due to technological change and partly to the effects of the Covid-19 pandemic. No single North African country alone is expected to develop the capacity necessary to absorb and adapt technological knowledge, let alone being able to convert it into economic opportunities in the emerging global value chains. There needs to be a genuine cooperation between countries, in order to pool resources and develop common technological capacities, thus providing North African companies with access to a broader market. More cooperation, particularly through investments in infrastructure (physical and digital), education, R&D, and most obviously in the regulatory field to facilitate trade (bricks and mortar & electronic) and investment, is critical to position the subregion in the GVCs and thus reap the full benefits of the AfCFTA.



8. Conclusion

The report highlights the structural weaknesses of North African economies in light of the disruptions caused by the Covid-19 pandemic in the short term and the changes it is likely to induce over the medium and long terms.

The countries of North Africa will have to brace themselves for very strong pressures, demanding far-reaching reforms in a number of areas (health, education, economy, governance, etc.) amidst economic recession and public finances already under strain.

The short-term measures adopted by governments to counter the crisis should be aligned with structural reforms, so as to rationalize public spending and increase their efficiency.

Institutional reforms for better governance will be all the more critical in this context, as all of society's capacities and potential, not least in terms of innovation, will be mobilized. Inclusive and participatory governance, grounded on transparency and accountability, will prove invaluable in designing and implementing effective reforms designed to help countries of the subregion transition smoothly into the Covid-19 era.

9. Annexes

9.1 Charts and figures

Table 9-1: GDP per capita, adjusted for the 2010 constant dollars

	Average for 2000-2015	2016	2017	2018
Algeria	4,282	4,830	4,794	4,764
Egypt	2,368	2,761	2,817	2,907
Libya	9,335	5,670	7,086	7,537
Mauritania	1,197	1,322	1,325	1,334
Morocco	2,617	3,213	3,305	3,361
Sudan	1,418	1,911	1,946	1,856
Tunisia	3,746	4,315	4,344	4,401
Middle-income comparator countries				
China	3,799	6,884	7,308	7,753
India	1,212	1,874	1,987	2,101
Indonesia	2,876	3,968	4,120	4,285
Malaysia	8,625	11,244	11,729	12,120
Poland	11,383	15,102	15,845	16,659
Turkey	10,421	14,063	14,875	15,069
Vietnam	1,178	1,753	1,853	1,964
High-income comparator countries				
South Korea	20,211	25,484	26,152	26,762
Sweden	50,877	56,776	57,367	57,921
United States	48,296	52,534	53,356	54,579

Source: World Development Indicators, World Bank 2020.

Table 9-2: Average annual growth rate of GDP per capita (%)

	1990-2018	1990-2000	2000-2010	2010-2018
North Africa				
Algeria	1.0	-0.2	2.4	0.9
Egypt	2.3	2.5	3.1	1.4
Libya	3.8	2.1	3.0	4.7
Mauritania	0.9	-0.2	1.6	1.0
Morocco	2.4	1.5	3.4	2.2
Sudan	2.8	1.8	3.9	2.7
Tunisia	2.6	3.3	3.3	1.0
Emerging comparator countries				
China	8.6	8.7	9.7	7.2
India	4.7	3.6	4.8	5.8
Malaysia	3.7	4.7	3.0	3.9
Poland	3.8	3.7	4.1	3.6
Turkey	3.1	2.6	3.0	4.7
Vietnam	5.5	5.6	5.6	5.1
Developed comparator countries				
South Korea	4.4	6.3	4.3	2.8
Sweden	1.5	1.6	2.0	1.6
United States	1.5	2.1	1.0	1.5

Source: World Development Indicators, 2020. Annual GDP growth per capita, calculated based on per capita GDP in 2010 dollars.

Table 9-3: Trends in the breakdown of employment and added-value (%)

	Agriculture			Industry			Services		
	1991	2018	Growth	1991	2018	Growth	1991	2018	Growth
Share of employment (%)									
North Africa									
Algeria	23.95	10.02	-58%	25.39	30.81	21%	50.65	59.17	17%
Egypt	39.29	24.35	-38%	21.34	27.16	27%	39.37	48.49	23%
Libya	24.46	18.43	-25%	29.26	22.92	-22%	46.28	58.65	27%
Mauritania	63.13	52.06	-18%	11.83	12.72	7%	25.03	35.23	41%
Morocco	47.46	35.25	-26%	20.14	21.70	8%	32.41	43.04	33%
Sudan	53.29	40.11	-25%	11.55	16.74	45%	35.16	43.16	23%
Tunisia	23.36	13.34	-43%	30.37	32.72	8%	46.27	53.94	17%
Middle-income comparator countries									
China	59.70	26.10	-56%	21.40	28.19	32%	18.90	45.71	142%
India	62.56	43.33	-31%	15.72	24.95	59%	21.72	31.72	46%
Turkey	47.81	18.43	-61%	20.16	26.66	32%	32.04	54.90	71%

	Agriculture			Industry			Services		
	1991	2018	Growth	1991	2018	Growth	1991	2018	Growth
Share of employment (%)									
Poland	25.57	9.62	-62%	36.19	31.82	-12%	38.24	58.56	53%
Vietnam	70.71	38.60	-45%	10.13	26.82	165%	19.17	34.58	80%
High-income comparator countries									
Sweden	3.85	1.70	-56%	26.33	18.15	-31%	69.82	80.15	15%
South Korea	14.61	5.00	-66%	36.82	25.20	-32%	48.57	69.80	44%
United States	1.90	1.37	-28%	26.02	19.87	-24%	72.07	78.76	9%
Share of value added (%)									
Algeria	11.11	11.98	8%	45.36	39.60	-13%	37.86	43.99	16%
Egypt	16.99	11.23	-34%	32.13	35.08	9%	48.67	51.36	6%
Libya	5.19	1.85	-64%	65.83	77.54	18%	no data	no data	no data
Mauritania	34.69	25.92	-25%	22.33	26.08	17%	35.45	40.23	13%
Morocco	17.50	12.26	-30%	26.02	25.92	0%	44.22	50.01	13%
Sudan	40.18	31.47	-22%	12.13	2.38	-80%	43.87	49.50	13%
Tunisia	16.72	10.37	-38%	28.98	22.69	-22%	41.82	59.08	41%
Middle-income comparator countries									
China	24.03	7.19	-70%	41.49	40.65	-2%	34.48	52.16	51%
India	27.33	14.60	-47%	26.44	26.75	1%	37.79	49.13	30%
Poland	5.54	2.11	-62%	33.24	28.62	-14%	49.41	56.80	15%
Turkey	15.25	5.82	-62%	31.54	29.47	-7%	49.69	54.26	9%
Vietnam	40.49	14.68	-64%	23.79	34.23	44%	35.72	41.12	15%
High-income comparator countries									
Sweden	3.24	1.38	-58%	25.25	22.56	-11%	57.73	64.69	12%
South Korea	6.82	1.98	-71%	36.49	35.12	-4%	47.45	53.56	13%
United States	1.34	0.92	-31%	23.13	18.21	-21%	71.81	77.37	8%

Source: Development Indicators, World Bank

Table 9-4: Diversification and exports concentration

	Export Diversification index				Export Concentration index			
	1995	2005	2015	2017	1995	2005	2015	2017
North Africa								
Algeria	0.82	0.81	0.78	0.79	0.52	0.59	0.49	0.48
Egypt	0.70	0.61	0.57	0.58	0.31	0.23	0.14	0.15
Libya	0.82	0.82	0.80	0.83	0.76	0.83	0.61	0.74
Mauritania	0.83	0.84	0.86	0.87	0.53	0.55	0.36	0.37
Morocco	0.73	0.67	0.67	0.66	0.17	0.16	0.17	0.17
Sudan	0.78	0.81	0.84	0.85	0.30	0.60	0.42	0.48
Tunisia	0.68	0.60	0.52	0.52	0.21	0.18	0.14	0.14

	Export Diversification index				Export Concentration index			
	1995	2005	2015	2017	1995	2005	2015	2017
North Africa	0.77	0.74	0.72	0.73	0.40	0.45	0.33	0.36
Middle-income comparator countries								
China	0.48	0.46	0.42	0.41	0.07	0.11	0.10	0.10
India	0.58	0.54	0.43	0.45	0.14	0.13	0.12	0.12
Indonesia	0.60	0.49	0.55	0.56	0.14	0.13	0.14	0.14
Malaysia	0.52	0.47	0.44	0.44	0.18	0.19	0.17	0.19
Poland	0.49	0.44	0.37	0.38	0.08	0.08	0.07	0.06
Turkey	0.63	0.53	0.43	0.44	0.11	0.09	0.07	0.08
Vietnam	0.67	0.64	0.57	0.55	0.20	0.23	0.19	0.18
High-income comparator countries								
South Korea.	0.41	0.44	0.44	0.43	0.15	0.16	0.15	0.18
Sweden	0.43	0.37	0.35	0.35	0.13	0.12	0.09	0.09
United States	0.27	0.27	0.25	0.24	0.07	0.09	0.10	0.10

Source: UNCTAD

Table 9-5 Sector-specific relative productivity trends

	Industry/Agriculture		Services/Agriculture		Industry/Services	
	1991	2018	1991	2018	1991	2018
Algeria	6.9	1.6	1.7	0.8	4.0	2.0
Egypt	3.7	2.2	2.6	1.8	1.4	1.2
Mauritania	7.6	6.9	2.2	3.2	3.5	2.1
Morocco	3.6	3.1	3.9	3.3	0.9	0.9
Sudan	2.2	2.7	2.2	1.5	1.0	1.9
Tunisia	2.1	1.1	2.4	1.7	0.9	0.6
Middle-income comparator countries						
China	3.1	6.0	4.5	3.7	0.7	1.6
India	3.6	3.8	3.4	5.1	1.1	0.7
Malaysia	1.8	1.9	0.8	1.2	2.2	1.6
Poland	4.3	5.4	4.6	5.6	0.9	1.0
Turkey	3.9	2.7	5.9	2.6	0.7	1.0
Vietnam	5.4	3.6	4.8	3.0	1.1	1.2

Source: As calculated by the authors based on World Development Indicators, 2020.

Table 9-6: Changes in value-added per worker

	Agriculture			Industry			Services		
	1991	2018	Growth rate	1991	2018	Growth rate	1991	2018	Growth rate
Algeria	5,272	19,275	266%	36,513	29,921	-18%	9,069	14,642	61%
Egypt	2,791	5,704	104%	10,284	12,552	22%	7,143	10,491	47%
Mauritania	1,757	1,928	10%	13,381	13,227	-1%	3,825	6,191	62%
Morocco	2,620	4,048	54%	9,508	12,393	30%	10,305	13,265	29%
Sudan	2,793	5,240	88%	6,185	14,204	130%	6,030	7,653	27%
Tunisia	4,596	9,806	113%	9,712	10,433	7%	11,146	16,697	50%
North Africa	3,305	7,667	106%	14,264	15,455	28%	7,920	11,490	46%
Middle-income comparator countries									
China	714	3,935	451%	2,244	23,554	950%	3,179	14,657	361%
India	839	1,875	123%	2,984	7,100	138%	2,823	9,636	241%
Malaysia	11,394	18,850	65%	19,970	35,823	79%	8,992	21,908	144%
Poland	4,271	6,190	45%	18,448	33,251	80%	19,503	34,760	78%
Turkey	5,549	16,018	189%	21,648	42,571	97%	32,537	42,231	30%
Vietnam	438	1,249	185%	2,370	4,463	88%	2,094	3,773	80%
High-income comparator countries									
South Korea	6,314	18,432	192%	18,034	71,197	295%	23,154	38,520	66%
Sweden	39,043	103,751	166%	56,554	139,926	147%	63,134	94,432	50%
United States	49,834	79,536	60%	72,798	103,431	42%	84,365	106,100	26%

Note: The shares of employment and value added per worker are derived directly from the World Development Indicators, 2020. The Share of value added is computed by the value added per worker times the number of workers per sector, divided by the total value added. The figures for 1991 are: 1999 for Algeria, 1995 for Poland, 2000 for Tunisia. The data for the United States cover the period 1997-2017.

Table 9-7 Youth unemployment rate per educational attainment

	Less than basic	Basic	Intermediate	Advanced
Egypt (2018)	6.52	7.01	26.35	63.67
Mauritania (2017)	6.22	27.01	56.17	28.97
Morocco (2012)	4.07	16.54	46.97	
Sudan (2011)	20.25	31.79	46.36	73.38
Tunisia (2015)	29.31	26.12	34.30	60.77
<hr/>				
India (2018)	10.33	16.49	31.06	48.41
Indonesia (2019)	7.25	8.75	16.26	18.70
Malaysia (2016)	8.07	6.17	10.99	16.56
Poland (2019)		10.67	9.95	8.54
Turkey (2019)	18.08	19.98	27.89	35.02
Vietnam (2019)	4.89	5.37	7.13	16.15

	Less than basic	Basic	Intermediate	Advanced
South Korea (2019)		6.97	10.20	9.88
Sweden (2019)		35.29	11.87	11.03
United States (2019)	6.19	15.52	9.13	4.91

Notes: Unemployment rate acc. to gender, age and level of education (%) / age (aggregate brackets): 15-24 / Education (aggregate levels) - ILO STATISTICS.

Table 9-8: Trends in the average number of years of education

	1980	2010	Increase
1. Botswana	3.12	9.56	6.44
2. Germany	5.61	11.82	6.21
3. Iran	3.34	8.59	5.25
4. Algeria	3.06	8.3	5.24
5. United Arab Emirates	3.88	9.12	5.23
6. Gabon	3.33	8.35	5.02
7. Brazil	2.77	7.54	4.77
8. Bahrain	4.92	9.59	4.67
9. Jordan	4.58	9.23	4.65
10. Lybia	3.26	7.85	4.59
11. France	5.96	10.53	4.58
12. Malaysia	5.69	10.14	4.46
13. Bolivia	5.47	9.91	4.44
14. Egypt	2.65	7.08	4.43
15. El Salvador	3.58	7.97	4.39
16. Mexico	4.89	9.11	4.22
17. Spain	6.17	10.38	4.22
18. Saudi Arabia	4.38	8.48	4.1
19. Tunisia	3.25	7.32	4.07
20. Latvia	6.69	10.6	3.91

Source: Calculated from the Barro-Lee (2010, version 1.2) dataset, based on average total years of educational attainment for the population aged 15 years and over. Based on Campante and Chor (2012)

Table 9-9: Employment rate and labour force participation rate

	Penetration rate		Employment rate	
	1991	2018	1991	2018
Algeria	44.44	41.3	35.4	36.4
Egypt	46.66	48.1	42.3	40.9
Libya	45.85	52.38	35.0	40.5
Mauritania	50.93	46.26	46.3	41.5
Morocco	50.25	45.35	42.8	41.32
Sudan	50.17	47.15	42.6	40.28
Tunisia	48.87	46.46	41.1	39.15
North Africa	48.2	46.7	40.8	40.0
China	79.05	68.72	77.19	65.57
India	58.6	51.93	55.2	46.79
Malaysia	62.2	64.6	59.82	62.04
Poland	61.64	56.86	54.18	54.82
Turkey	56.44	52.52	51.81	47.16
Vietnam	77.18	77.43	75.36	76.0
South Korea	60.33	62.97	58.87	60.53
Sweden	66.98	64.32	64.81	60.43
United States	65.07	62.02	60.64	59.88

Source: ILO

Table 9-10: Development of the financial system

Depth of financial institutions	Accessibility of financial institutions	Efficiency of financial institutions	Depth of financial markets	Access to financial markets	Efficiency of financial markets
0.07	0.1	0.84	0	0	0
0.1	0.11	0.83	0.15	0.36	0.32
0.1	0.15	0.7	0	0	0
0.02	0.14	0.59	0.03	0	0
0.43	0.4	0.72	0.22	0.5	0.07
0.04	0.06	0.61	0	0	0
0.2	0.36	0.79	0.09	0.01	0.11
0.5	0.49	0.84	0.7	0.24	1
0.29	0.27	0.58	0.59	0.2	0.54
0.21	0.56	0.61	0.34	0.34	1
0.82	0.33	0.83	0.86	0.71	0.32
0.3	0.65	0.79	0.23	0.45	0.36
0.33	0.15	0.82	0.1	0.01	0.35

Source: IMF, Financial development index

Table 9-11 Level of technological content of exports (as a % of total exports)

	Low	Average	High	Total
Algeria	0.1%	0.2%	2.6%	2.9%
Egypt	4.5%	5.5%	19.9%	29.9%
Libya	2.0%	0.2%	2.2%	4.4%
Mauritania	0.6%	2.4%	12.0%	15.0%
Morocco	1.4%	26.5%	23.1%	51.0%
Sudan	0.1%	0.2%	1.4%	1.7%
Tunisia	4.5%	31.0%	18.3%	53.8%
North Africa	1.9%	9.4%	11.4%	22.7%
Emerging comparator countries				
China	10.3%	25.3%	36.4%	72.0%
India	8.6%	15.4%	22.3%	46.3%
Malaysia	3.2%	11.9%	47.3%	62.4%
Poland	10.7%	34.5%	18.8%	64.0%
Turkey	13.1%	32.5%	10.9%	56.5%
Vietnam	4.8%	9.8%	36.8%	51.4%
Developed comparator countries				
South Korea	10.3%	27.2%	46.7%	84.2%
Sweden	8.0%	34.7%	20.3%	63.0%
United States	4.2%	24.3%	29.8%	58.3%

Source: UNIDO

Table 9-12: Breakdown of jobs as per the vulnerability of sectors to the pandemic

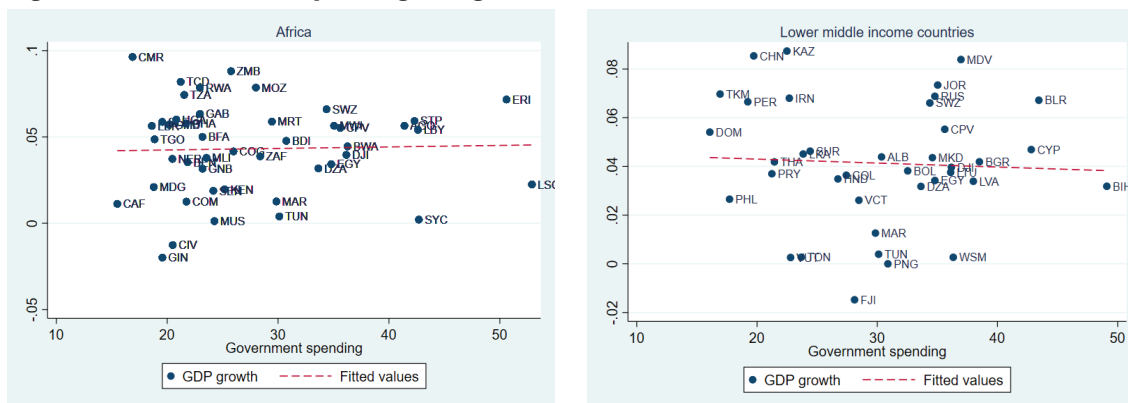
Sector	Impact	Share in employment (%)						
		Algeria	Egypt	Libya	Morocco	Mauritania	Sudan	Tunisia
Education	Weak	10.31	7.93	7.75	3.9	3.5	4.72	8.21
Human health and social work activities		3.56	2.96	3.76	1.06	1.5	1.96	3.01
Public administration and defense; mandatory social security	Weak	15.81	6	11.3	5.05	2.72	5.47	9.99
Production and distribution of electricity, gas and water	Weak	1.76	1.49	0.74	0.39	0.47	0.24	0.66
Agriculture; forestry and fishing	Low - medium	9.86	23.79	18.91	34.69	51.27	39.94	13.03
Construction	Medium	17.03	13.65	10.98	10.11	3.37	6.35	12.19
Finance and insurance	Medium	0.66	0.66	1.25	0.93	0.49	0.33	0.97
Mining and quarrying	Medium	1.56	0.15	1.46	0.69	1.01	1.58	0.61
Arts, entertainment and recreation and other services	Medium-High	2.98	4.11	3.96	6.19	6.42	1.24	3.33
Transportation; storage and communication	Medium-High	6.49	8.67	7.79	4.99	3.29	10.15	8.51
Accommodation and food services	High	2.16	2.81	1.44	3.1	1.93	1.08	4.17
Real estate; commercial and administrative activities	High	1.71	2.54	3.75	2.13	1.74	3.92	3.09
Manufacturing activities	High	10.39	12.4	8.73	10.52	8.09	8.04	19.09
Wholesale and retail trade; repair of motor vehicles and motorcycles	High	15.73	12.85	18.16	16.26	14.21	14.96	13.14

Source: calculation based on ILO data, 2020

Table 9-13: Development of ICTs and connectivity

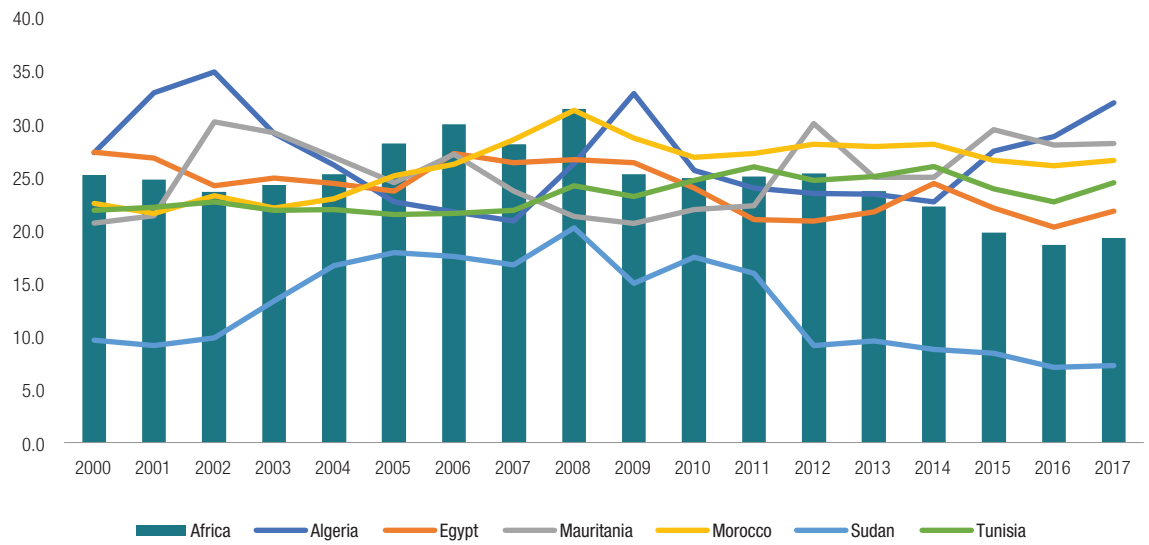
	Internet Development Index	Networked Readiness Index	Mobile Connectivity Index 2016	Inclusive Internet Index
Algeria	4.7	3	51.6	56.7 (74th)
Egypt	4.6	3.8	54.2	62 (65th)
Libya	4.1		53.6	
Mauritania	2.3	2.5	33.6	
Morocco	4.8	3.6	57.7	65.5 (59th)
Sudan	2.6		38.9	43.7 (91st)
Tunisia	4.8	4.1	60.3	
North Africa	4.0	3.4	50.0	
Emerging comparator countries				
China	5.6	4.1	74.3	75.1 (36th)
India	3	3.9	55.6	71.7 (46th)
Malaysia	6.4	4.8	67.4	75.4 (35th)
Poland	6.9	4.2	75.8	82.3 (11th)
Turkey	6.1	4.1	65.6	71.7 (46th)
Vietnam	4.4	3.7	65	71 (50th)
Developed comparator countries				
South Korea	8.9	5.5	78.3	84 (6 th)
Sweden	8.4	5.9	82.9	86 (1er)
United States	8.2	5.6	80.7	85.4 (3 rd)

Source: See Appendix. The score (out of 100) of the “Internet Inclusiveness” index is shown, along with country ranking.

Figure 9-1: Government spending and growth

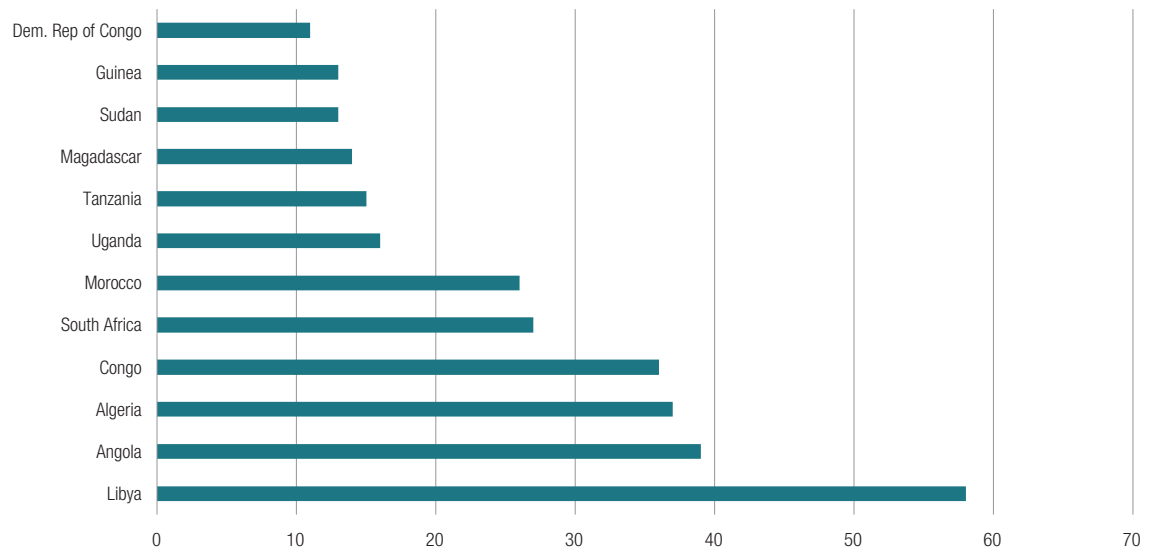
Source: Based on author's calculation, IMF data for government spending and real GDP from the World Development Indicators. Public expenditure and growth are averaged over the period 2000-2017.

Figure 9-2: Public spending trends (% of GDP)

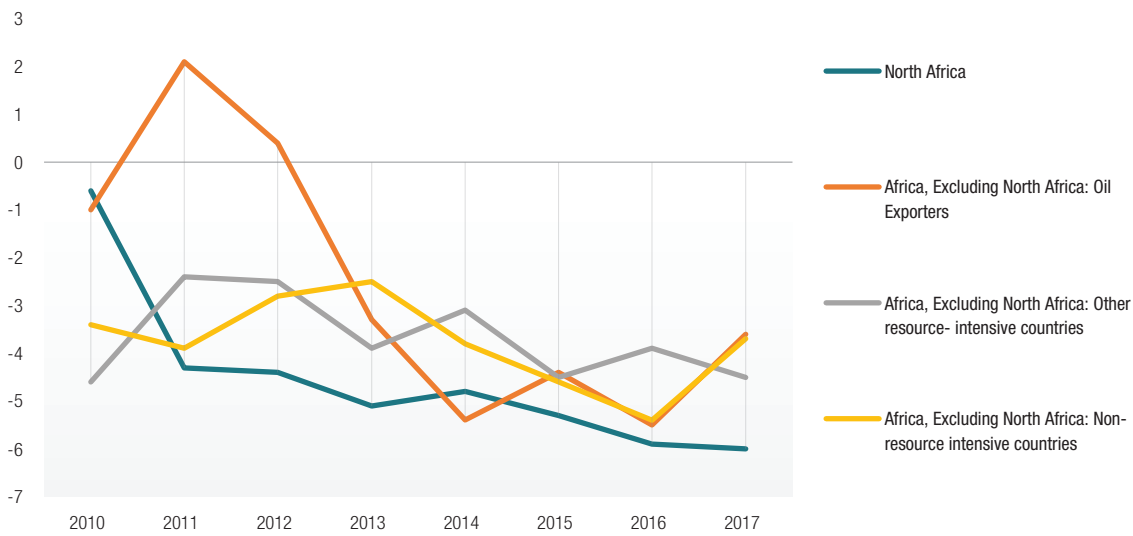


Source: Finance ministries, IMF and ERA 2019

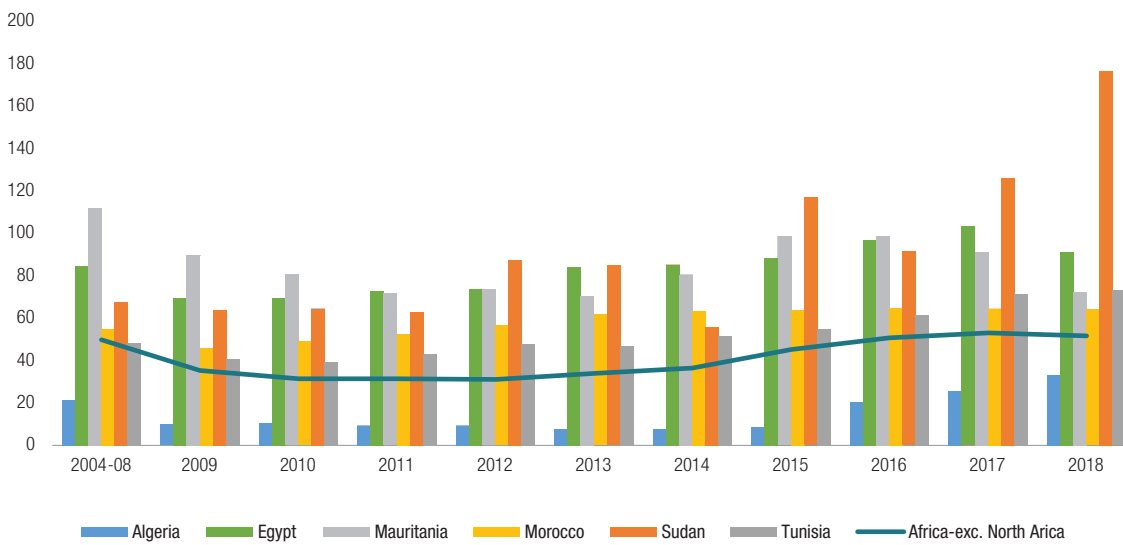
Figure 9-3: Countries with highest and lowest public revenues (% of GDP)



Source: ERA 2019. Figures represent the average values over the period 2000-2018

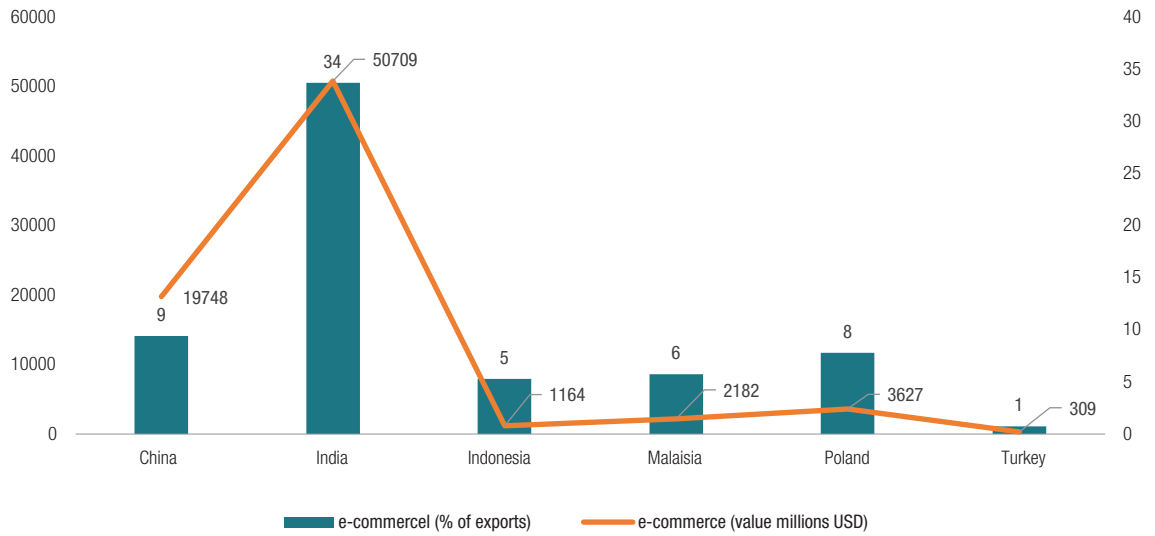
Figure 9-4: Budget deficit (% of GDP)

Source: ERA 2019. All data are median values

Figure 9-5: Public debt (% of GDP)

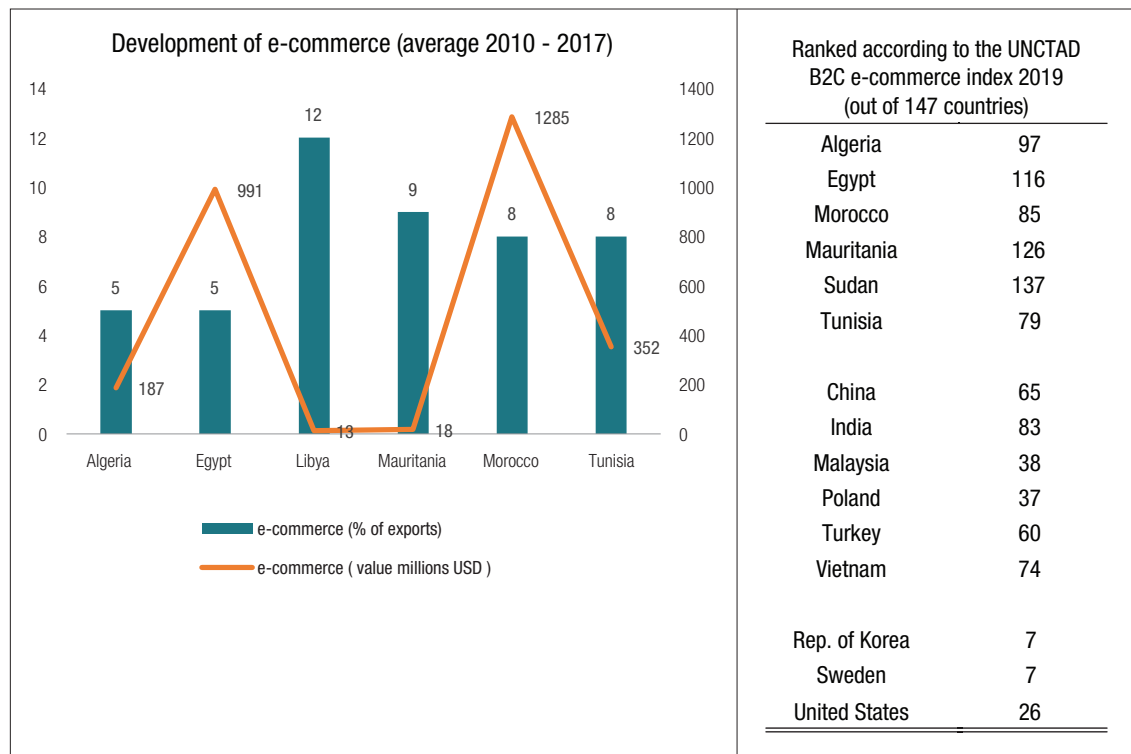
Source: IMF. For Africa, median values

Figure 9-6: Development of e-commerce (average for the period 2010-2017), comparator countries



Source: UNCTAD

Figure 9-7: E-commerce



Source: UNCTAD

9.2 Description of ICT indices

2016 Mobile Connectivity Index: The Mobile Connectivity Index measures the performance of 165 countries against the key enablers of mobile internet adoption. Its aim is to support the efforts of the mobile industry, governments and the international community as a whole to achieve the ambition of universal access to the Internet. Each country is scored on a scale of 0 to 100 for a range of indicators; a higher score reflects superior performance in the provision of mobile Internet connectivity. This web-based tool makes it possible to explore the data used in the Mobile Connectivity Index and benchmark countries across a range of metrics. Source: GSMA

The Technology Achievement Index (TAI) is a composite index capturing how well countries participate in the network age. TAI is part of the 2001 Human Development Index, initially developed by Desai et al. It reflects the capacity of countries to develop and spread technology and enhance human skills. TAI assesses the technological performance of countries and rates them based on their technological achievements. It does not, however, measure the overall extent of their technological development (Nasir et al. 2011). It targets the technological performance of countries according to their capacity to create and use technology. The countries included in the TAI index are broken down in four sub-groups called Leaders (TAI > 0.5), Potential Leaders (TAI = 0.35-0.49), Dynamic Adopters (TAI = 0.20-0.34) and Marginalized (TAI < 0.20). Source: Desai et al (2002), Measuring the Technology

Achievement Index: Comparison and Ranking of Countries, Journal of Economics, Finance and Accounting, 2016.

The 2016 Networked Readiness Index measures how well an economy uses ICTs to drive competitiveness and improve well-being. Data is collected from international agencies such as the International Telecommunications Union, UNESCO, other United Nations Agencies and the World Bank. Other indicators come from the World Economic Forum's Executive Opinion Survey, completed by more than 14,000 business leaders from more than 140 countries. Source: World Economic Forum, 2016.

Global Innovation Index. Annual ranking of the world's countries based on their capacity and success to innovate. GII is published by Cornell University, INSEAD and the World Intellectual Property Organization, in partnership with other organizations and institutions, using both subjective and objective data from various sources, including the International Telecommunications Union, the World Bank and the World Economic Forum. Source: Global Innovation Index <https://www.globalinnovationindex.org>

The 2019 Inclusive Internet Index commissioned by Facebook and conducted by the Economist Intelligence Unit, seeks to measure the extent to which the Internet is not only accessible and affordable, but also relevant to all, allowing usage that enables positive social and economic outcomes at the individual and group level. Source: The Economist Intelligence Unit ; <https://theinclusiveinternet.eiu.com/>

The Information and Communication Technology (ICT) Development Index.

A synthetic index published by the United Nations International Telecommunication Union using globally agreed indicators. As such, it is a valuable tool for benchmarking the most important indicators used to “measure” the Information Society. Source: Desai et al (2002), *Measuring the Technology Achievement Index: Comparison and Ranking Of Countries*, Journal of Economics, Finance and Accounting, 2016.

Competitive Industrial Performance (CIP) index.

The index rates the countries’ production capacity, intensity of industrialization and impact on the world market as key components of industrial performance. Source: <https://stat.unido.org/database>

9.3 Construction of the vulnerability score

This section gives a detailed description of the construction methodology of the Pandemic Vulnerability Index (PVI) Dashboard.

9.3.1 How to develop a vulnerability score?

A very large number of methodological approaches can be contemplated to construct a Pandemic Vulnerability Index (PVI) Dashboard for North African countries. This report proposes a scoring method directly inspired from the one used by the Financial Stability

Board (FSB) and the Basel Committee on Banking Supervision (BCBS). Actually, many parallels exist between the notion of pandemic risk and the notion of systemic risk, source of the previous global crisis in 2008, which warrant such an approach.

Broadly speaking, systemic risk may be defined as the risk that the entire financial system might be under stress, impaired or in crisis, and that it could lead to serious consequences for the real economy. In essence, systemic risk is a global risk to which all financial institutions of a national or international financial system are vulnerable. Incidentally, one of the authoritative articles in the academic literature on the subject (Greenwood, Landier and Thesmar (2015)) has adopted the terminology of banks that are “vulnerable” to systemic risk. Exactly the same concept applies to the risk of a pandemic: this is a global risk to which all countries in the global economy are vulnerable depending on their own degree of vulnerability. For the record, according to the definition proposed by the World Health Organization (WHO), a pandemic is an epidemic⁸ with global spread. It is precisely this degree of vulnerability to this global risk by countries, particularly North African, which we seek to identify through a measure of pandemic risk.

In the financial sector, measures of systemic risk are used by international institutions in charge of regulation and macro-prudential supervision. The mac-

⁸ An epidemic involves the rapid development and spread of a contagious disease across humans over a given geographic area (region, country, etc.). Conversely, a pandemic is an epidemic that pervades the whole population of a continent, if not the entire world. WHO classified the Covid-19 epidemic as a pandemic on March 11, 2020, after the number of infected countries exceeded 100.

ro-prudential policy is aimed at curbing systemic risk through the implementation of regulations covering the national or international financial system as a whole, in contrast to so-called micro-prudential regulations, whose aim is to ensure the sustainability of financial institutions taken separately. In this context, among other things, the systemic risk scores make it possible to identify systemically important financial institutions (SIFIs) and banking institutions designated as global systemically important banks (G-SIBs). Upon identification, these institutions are subjected to special prudential regulations. Here again, an analogy can be made with the risk of a pandemic. In a similar way, we suggest developing a pandemic risk score which can be used to benchmark countries against each other and, where needed, identify the most vulnerable countries.

In addition, systemic risk and pandemic risk share similarities with regard to their onset and propagation mechanisms. In the current financial context, Benoit et al. (2017) distinguish between different channels of systemic risk taking, i.e. between the mechanisms driving financial institutions to assume both significant and correlated challenges. They also describe contagion mechanisms, i.e. how losses may spread from one part of the financial system to another. Next, they investigate the amplification mechanisms whereby minor shocks may have substantial impacts on the financial system. This heuristic classification (onset, propagation and amplification) may be almost symmetrically applied to the pandemic risk. The only difference lies in the onset, which, is in the case of a pandemic risk, exogenous by definition.

Finally, as with systemic risk, pandemic risk may be considered as a concept that is “difficult to define, but easy to recognize once you see it”. One reason for this difficulty is that both risks are inherently protean in nature. As an example, the systemic risk may relate to the size of financial institutions, with the largest banks putting the stability of the financial system at risk in case of bankruptcy (*Too-Big-to Fail paradigm*). Another possible definition is the pattern of interconnections between financial institutions: banks most interconnected to each other (cross-holdings, loans, etc.) making the financial system more vulnerable in case of failure (*Too-Interconnected-to-Fail paradigm*). Or, it can be defined by the specific role of certain institutions in the organization of given financial markets with a criterion of non-substitutability. Similarly, in its human, social and economic dimensions, the risk of a pandemic can be defined in many ways. One can, for example, imagine a vision of health vulnerability focusing on a country’s or region’s ability to mobilize medical resources and enforce health regulations intended to stem the spread of an epidemic or pandemic. But the notion of vulnerability may just as well refer to an economic dimension highlighting the brittleness of a country’s economic structures following an exogenous shock of this kind. Finally, vulnerability can also refer to structural, social and institutional factors susceptible to compound the human, economic and social consequences of an epidemic.

This difficulty in defining unambiguously the notions of systemic risk and pandemic risk is behind the wide range of statistical methods likely to be used to measure

such risks. In their review of the literature, Bisias et al. (2012) had already identified 30+ systemic risk metrics less than four years after the financial crisis. It is safe to assume that in the future there will be as many metrics for the pandemic risk. The advantage however is that it is now possible to draw on the experience gained from systemic risk measures and to leverage this experience for the assessment of pandemic risk.

Of all systemic financial risk metrics, particularly noteworthy is the one currently adopted by the Basel Committee on Banking Supervision (BCBS) and the Financial Stability Board (FSB). This systemic risk score has been used every year in November since 2012 to identify systemically important financial institutions. The systemic risk rating methodology is straightforward and intuitive (BCBS 2013 and 2014). The score covers information derived from twelve indicators in five major vulnerability categories: size, interconnectedness, substitutability, complexity, and cross-border activity. A score is then computed for each of these five categories based on the aggregation of a set of associated indicators. These scores are expressed in terms of “market share” and base points. For example, if a bank scores 100 in the “size” category, this means that its size (as measured by its total assets, for instance) equals 1% of the total assets of the 119 large international banks used in the sample. Using the category-based scores, the Basel Committee constructs a systemic risk

score for each bank within the sample. Of note: to avoid discriminating in favor of a given facet of systemic risk, the Basel Committee uses a simple equally-weighted average of scores from all categories. Financial institutions scoring above the threshold of 130 base points will be considered global systemically important banks (G-SIBs) and will be subject, among other things, to regulatory⁹ capital surcharges.

These systemic risk scores carry many benefits: simple to analyze by public decision-makers and totally transparent in their construction, so that arbitrary methodological choices are kept to a minimum. They also avoid choosing one or the other of the different facets of systemic risk, thereby making it easier to pick up on weak signals. They do not require the implementation of any sophisticated econometric technique. They are fully reproducible and usable on a regular basis (annual frequency in the case of the Basel Committee). They also make it possible to classify international financial institutions according to their vulnerability to systemic risk.

Given the large number of similarities between pandemic risk and systemic risk on the one hand, and the advantages resulting from the scores currently being used by international institutions on the other hand, we suggest constructing a Pandemic Vulnerability Index (PVI) Dashboard for North African countries taking the same approach used by the Basel Committee for scoring systemic risk.

⁹ Note also that there are similar methodologies for computing systemic risk scores by insurance companies (International Association of Insurance Supervisors, IAIS (2013)) and by other financial institutions (non-bank, non-insurance). See Financial Stability Board - International Organization of Securities Commissions (FSB-IOSCO 2015).

9.3.2 Score construction methodology

Formally, each country indexed by $i = 1, \dots, n$ is characterized by a set of m indicators (or statistics) clustered within categories indexed by $k = 1, \dots, K$. In the following section, we will consider a set of $K = 8$ categories bringing together a total of $m = 52$ indicators. Each category comprises a variable number of indicators making it possible to best capture its progress. Where m_k is the number of indicators considered for the category K , where by definition $m = \sum_{k=1}^K m_k$.

Each category is paired with a score, where $x_{i,k}$ is the score of the category k measured for country i . This score is reached by the aggregation of the m_k indicators of this category. Note $\tilde{X}_{i,j,k}$ the indicator $j = 1, \dots, m_k$ of the category k . To avoid giving too much importance to some indicators over others in the calculation of the score by category according to their variances, all indicator values are standardized. Where $X_{i,j,k} = \tilde{X}_{i,j,k} / \sqrt{\text{var}_i(\tilde{X}_{i,j,k})}$ is the standardized indicator. Finally, by convention, all indicators have a positive effect on vulnerability. For indicators with a negative impact, an inverse transformation of the type $1/(1 + X_{i,j,k})$ was applied (before the standardization), thereby avoiding problems of null values.

The score of the category k for the country i is therefore equal to:

$$x_{i,k} = \frac{1}{m_k} \sum_{j=1}^{m_k} \frac{X_{i,j,k}}{\sum_{i=1}^n X_{i,j,k}} \times 10\,000$$

Standardization through the sum over all countries of the value of the indi-

cators $\sum_{i=1}^n X_{i,j,k}$ is an arbitrary choice. In the framework of the systemic risk score, the Basel Committee on Banking Supervision and the Financial Stability Board justify this choice by interpreting the ratio $X_{i,j,k} / \sum_{i=1}^n X_{i,j,k}$ as the share of the bank i in the « market » of the indicator j . This « market share » is expressed as a percentage. Multiplying¹⁰ it by **10 000** leads to an interpretation using base points (Bps). Understandably, when considering the pandemic risk score, interpretation based on “market share” becomes less relevant. However, the fact remains that this standardization makes it possible to compare the performance of country i for a certain indicator j relative to the sum (or in an equivalent way, the average) of the values measured for that indicator by all the countries in the sample. In this way, it retains its full relevance. Interestingly, other standardizations could have been used here. A priori, no criterion makes it possible to prejudge the relative relevance of these different standardizations. However, the one selected offers the benefit of being used by various international organizations in the same context as that of the pandemic risk.

Using the category-based scores, it is possible to work out the aggregated score. The vulnerability score of country i , marked S_i , is then defined as the weighted sum of those obtained by this country in the K categories. Formally, the pandemic risk score is then defined by

$$S_i = \sum_{j=1}^K \omega_k \times x_{i,k}$$

¹⁰ By construction, the sum of the scores for all countries is standardized, i.e. $\sum_{i=1}^n x_{i,k} = 10000$.

where ω_k refers to the weight of the category k in the aggregate score. As part of systemic risk analysis, the Basel Committee and the Financial Stability Board have determined to treat each category with equal weight by deciding that $\omega_k = 1/K$. This is based on the rationale that when faced with a multifaceted risk, it is best not to overweight any one vulnerability so that the weak signals of risk can be picked up on. A similar logic will be used here, whereby an equally weighted sum of the category scores is utilized to define the aggregated vulnerability score to the pandemic risk.

Finally, to avoid any influence of extreme values on the aggregated score, we have set maximum¹¹ values on the aggregated score by category. Thus, if we rate cap_k the threshold value for the score of category k , the aggregate score of the pandemic risk of country ii becomes:

$$S_i = \sum_{j=1}^K \omega_k \times \min(x_{i,k}, cap_k)$$

In the following section, we have chosen a single maximum value for all the categories, $cap_k = cap$, set at **400**. A series of robustness exercises indicate that the choice of this value has little impact on country rankings, since in no instance does a country ever surpass maximum values in several categories at the same time.

9.4 List of indicators considered in the vulnerability score

The list of indicators used to construct the vulnerability score is shown in Table 9-10.

Table 9-14. List of the indicators and the categories used in the score

Categories	Indicators
Spread of virus	Percentage of cumulative cases among the population
	Growth rate of cumulative cases
	Covid-19 lethality rate (number of deaths/number of cases)
	Mortality ratio (number of deaths/population)
Health vulnerabilities	Urban density
	Population density
	Percentage of population aged 65+
	Prevalence of chronic diseases (diabetes, cancer, HIV)
Economic vulnerability of the population	Mortality rate associated to these diseases
	Rate of poor workers
	Poverty rate among the population
	Self-employment ratio

¹¹ By the same token, under the systemic risk score, the Basel Committee on Banking Supervision and the Financial Stability Board assign a maximum value to the “substitutability” category score.

Categories	Indicators
	Percentage of employments in the risk sectors
	Total unemployment rate
	Youth unemployment rate
	Female unemployment rate
	Labour force participation rate
	Gini index of income distribution
	Gender-specific Gini index of income distribution
	Illiteracy rate
	Share of imported food
	Share of social coverage expenditure in GDP
Healthcare provision capacity	Number of hospital beds per 1,000 inhabitants
	Number of doctors per 1,000 inhabitants
	Share of health expenditure in GDP
	Health system performance indicator
Economic structure	Diversification of production
	Export diversification (products)
	Geographical diversification of exports
	Technological content of exports
	Economic complexity index
	Value added share of services
State capacities	Tax ratio and social contribution as a % of GDP
	Tax revenue ratio excl. natural resources
	Fiscal deficit-to-GDP ratio
	External debt as a % of GDP
	Debt of the central government as a percentage of the GDP
	Debt service as a % of GDP
Adaptive capacity	Internet (access, infrastructures)
	Financial inclusion indicator
	Global Innovation Index
	Share of enterprises adopting digital transformation
	Human capital index
	Index of Economic Freedom
	Competitiveness Index
	New business density
	Ease of entrepreneurship index

Categories	Indicators
Governance	Government effectiveness index
	Bureaucratic quality index
	Corruption control index
	Rule of law index
	Civil liability index

9.5 Global vulnerability score properties

Table 9-11 lists the 20 countries most vulnerable to the risk of a pandemic according to our indicator. Countries identified as the most vulnerable are those where the epidemic proved to be the most severe (typically Belgium, Italy and Spain), those heavily affected by the economic impact of the pandemic (Nigeria), or those whose governance structures and health capacities are seriously deteriorated (Afghanistan, Madagascar, etc.), for whom the consequences of the pandemic may be feared, but whom until now have often been little affected ex-post by the crisis, both humanly and economically. These results indicate that a vulnerability score is not to be analyzed as a predictor of economic or hu-

man consequences of a hazard. Rather, it represents a punctual assessment of the vulnerabilities likely to contribute to the onset or exacerbation of the consequences of such hazard. But then again, there is no certainty about whether or not this hazard will actually occur, nor about its magnitude. To put it another way, the analysis of vulnerability involves looking at the factors and mechanisms facilitating the spread of a hazard and the emergence of adverse consequences, and is in no way an analysis of the impetus behind these effects.

Conversely, Table 9-12 outlines the 20 countries least vulnerable to a pandemic risk. These are mainly Western European, Baltic, Asian or Pacific Rim countries. The country identified as least vulnerable to the risk of an epidemic is New

Table 9-15: List of the most vulnerable countries within the meaning of the vulnerability score

Rank	Country	Score	Rank	Country	Score
1	Madagascar	135	11	Sudan	96
2	Mali	130	12	Mozambique	94
3	Afghanistan	130	13	Guinea	93
4	Liberia	128	14	Angola	93
5	Cameroon	117	15	Thailand	93
6	Mongolia	116	16	Yemen	90
7	Nigeria	101	17	Italy	89
8	Singapore	101	18	Haiti	89
9	Belgium	97	19	Nicaragua	88
10	Sierra Leone	96	20	Comoros	87

Source: Vulnerability scores as calculated by the authors.

Table 9-14: The least vulnerable countries in the sense of the vulnerability score

Rank	Country	Score	Rank	Country	Score
149	New Zealand	40	139	Finland	48
148	Slovak Rep.	44	138	Denmark	49
147	Tcheck Rep	45	137	Malaysia	50
146	Norway	45	136	Vietnam	50
145	South Korea	46	135	Slovenia	50
144	Estonia	47	134	Autriche	50
143	Poland	47	133	Island	51
142	Lituania	47	132	Israel	52
141	Latvia	47	131	Germany	53
140	China	47	130	Fiji	53

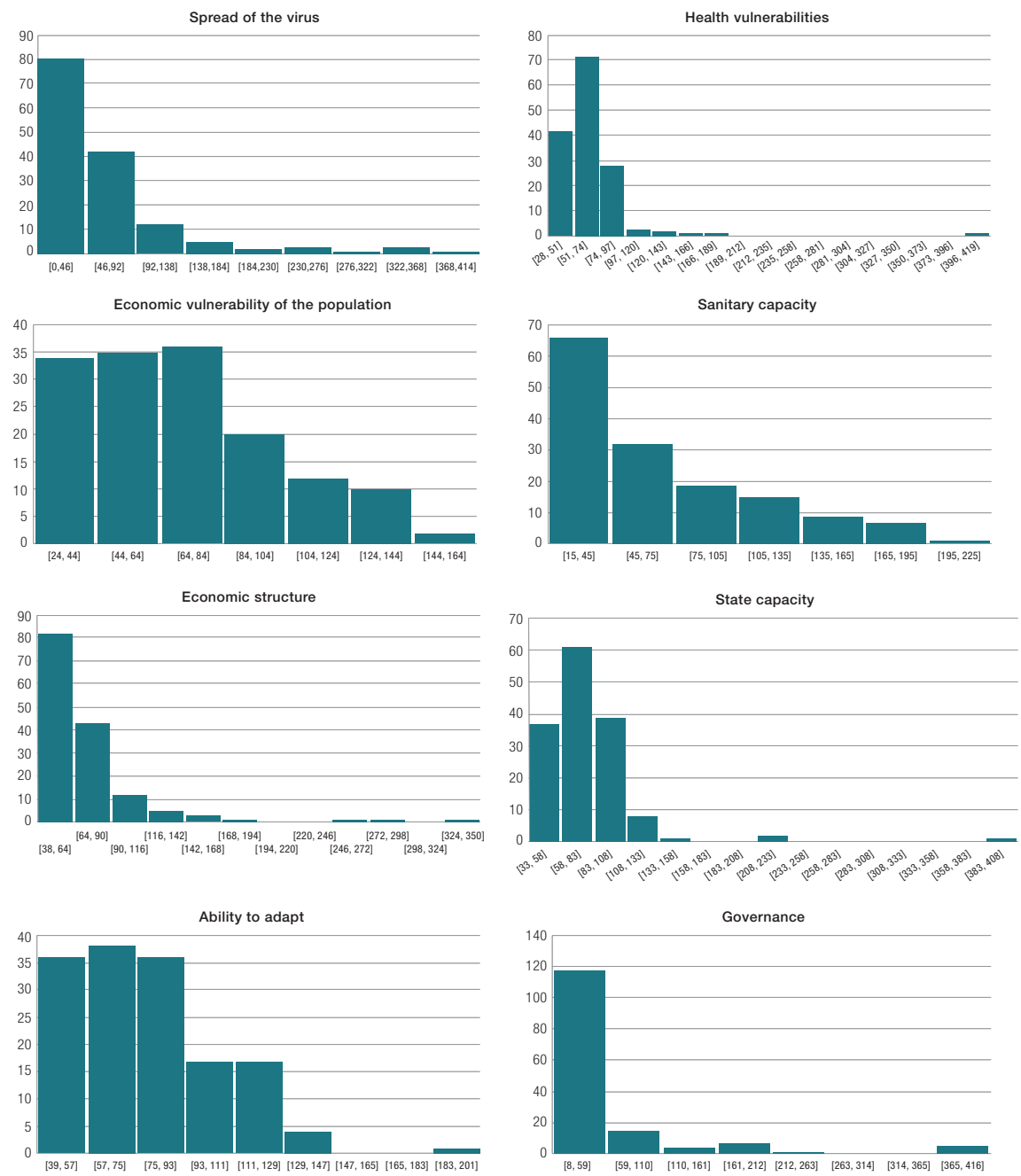
Source: Vulnerability scores derived from authors' own calculations.

Zealand. Note that no North or South American country is among the least vulnerable countries.

Figure 9-8 illustrates the score distribution by category across all countries in the sample. The scores with the most concentrated distribution fall into the “Adaptive capacity”, “Economic vulnerability of the population”, and “Health vulnerabilities” categories, with respective standard deviations of 27%, 31%, and 35%. In contrast, the most widely dis-

persed scores fall into the “Governance” and “Spread of virus” categories, with standard deviations of 77% and 70%. A check is also made to ensure that very few scores are actually truncated by the maximum value, i.e. equal to 400. Note also that the distributions of these scores are fairly smooth. Only governance score tends to follow a bimodal distribution, with a set of countries with good governance and a more limited set of countries, whose mode of governance leaves them highly vulnerable.

Figure 9-8: Breakdown of scores by category



Source: Vulnerability scores by category as calculated by the authors. Histograms were calculated for all 149 countries in the sample.