SUDAN

Country Economic Memorandum

Realizing the Potential for Diversified Development

WORLD BANK GROUP

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LIST OF ABBREVIATIONS

AAAID	Arab Authority for Agricultural Investment and Development
ARC	Agriculture Research Corporation
ARRC	Animal Resources Research Corporation
ASM	Artisanal and Small Scale Mining
bn	billion
bpd	barrels per day
CBOS	Central Bank of Sudan
CBS	Central Bank of Sudan
CGE	*Computable General Equilibrium*
COMESA	Common Market for Eastern and Southern Africa
CPC	Cotton Public Corporation
DB	Doing Business
DSA	Debt Sustainability Study
EIA	US Energy Information Administration
EOR	Enhanced Oil Recovery
FDI	Foreign Direct Investment
fed	feddan
GAB	Gum Arabic Board
GAC	Gum Arabic Company
GAFTA	Greater Arab Free Trade Area
GDP	Gross Domestic Product
GNDI	Gross National Disposable Income
GOS	Government of Sudan
GRSS	Government of the Republic of South Sudan
ha	hectare
HIPC	Highly Indebted Poor Countries
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
MAMS	Maquette for MDG Simulations
MDTF	Multi Donor Trust Fund
mn	million
NBHS	National Benchmark Household Survey
OFAC	US Office for Foreign Asset Control
RCA	Revealed Comparative Advantage
RER	Real Exchange Rate
SAM	Social Accounting Matrix
SCCL	Sudan Cotton Company Ltd
SDG	Sudanese Guinea a.k.a. Sudanese Pound
SDN	Sudan
SSA	Sub-Saharan Africa
SSD	South Sudan
SUD	Sudan
TFA	Transitional Financing Agreement
TFP	Total Factor Productivity
TTEA	*Technology Transfer and Extension Administration*
VA	Value-added
VAT	Value Added Tax
WDI	World Development Indicators

SUMMARY OF FINDINGS AND POLICY CONCLUSIONS

From 1999 to 2011 Sudan had a period where it benefited from extensive discoveries of natural wealth through oil. During the "oil economy" economic growth exceeded the historical average of 4.9 and reached 6.1 percent on average per year. Likewise, oil revenues rapidly became the main source of public revenues and, at its peak, contributed more than 50 percent of total revenues. Relatively stable macroeconomic management during the oil economy led to a rise in the savings rate, initially through increases in private savings, followed by an increase in public savings in the 2000s.

But the oil economy had also clear symptoms of Dutch Disease. Agriculture suffered from neglect, and there were urgent calls to invest natural resource rents into economic diversification efforts. Given overreliance on oil and an uncertain political situation vis-à-vis South Sudan, the 2009 Sudan Country Economic Memorandum encouraged private sector-led growth to drive a more diversified economy, particularly through a revival of the agriculture sector. The 2009 CEM then proposed a set of interdependent steps to overcome the single reliance on natural resources. The work called for developing and maintaining the necessary enabling environment for growth, specifically macroeconomic stability and effective fiscal management. The report also highlighted the need to implement policies aimed at improving the investment climate. A key identified need was to increase returns in the agriculture sector, whose productivity levels had declined over the oil boom years.

The heyday of the oil economy ended abruptly in 2011, and economic diversification is at center stage again; the signs of natural resource rents have changed. The secession of South Sudan triggered a negative natural resource shock that requires economic and fiscal adjustment. If the authorities were to allow a market-based exchange rate adjustment this would lead to a "reverse" Dutch Disease situation, where non-natural resource sectors such as agriculture could gain competitiveness. However, this "reverse" Dutch Disease scenario is being challenged by high inflation rates, a key symptom of the post-secession Sudan, and to a lesser extent by the recent expansion of gold production and exports.

Current Economic Context

Sudan is still suffering from the economic and fiscal effects that were a result of the secession of South Sudan in 2011. With the secession, the country lost about 75 percent of its revenues and most of its predominant economic activity: crude oil exports. But growth for 2014 was 3.1 percent and shows some continuation of a recovery that started in 2013. Growth in 2015 is expected to be around 3.5 percent. In the short-term, gold production and exports along with an improving trade of agriculture products, especially livestock, are driving this recovery, but the medium-term outlook remains uncertain.

Sudan's post-secession adjustment was primarily managed via the fiscal side. Rising deficits were countered through fiscal austerity and central bank financing. The latter had a significant impact on inflation, which was further fueled by significant exchange rate adjustments in 2012 and 2013. Two subsequent rounds of nominal adjustments with a combined nominal depreciation of 100 percent pushed the exchange rate to 5.7 SDG/US$ in 2013

thereby increasing the import bill and further fueling inflation.

Sudan's fiscal position has improved in 2014 reflecting fiscal reforms measures introduced in 2013. This is important as it created fiscal space within which the government was able to cut down central bank financing of the government (0.4 percent of GDP in 2014 vs. 0.7 percent in 2013). Sudan's overall deficit was lowered to 1.2 percent of GDP in 2014 compared to 2.1 and 3.7 percent in 2013 and 2012, respectively. Key reforms to achieve this included a cut in oil subsidies in Sudan and efforts to increase tax revenue.

One of the key symptoms of the 2011 secession shock, the Sudanese inflation rate has significantly increased since 2011. It has been over 30 percent since 2012 (annual CPI rate, period average). In 2014 it reached its preliminary annual high at about 37 percent, though it declined from a peak of 47 percent in July 2014 to 25 percent in December 2014. Declining food inflation is compensated for by an increase in core inflation, which indicates the still-existing monetary impact on overall inflation, as well as increased inflation expectations.

The current account deficit was still large in 2014. But it narrowed to 6.9 percent of GDP from 8.7 percent in 2013 and 9.2 percent in 2012. The narrowing account is a reflection of a gold-driven increase in exports and fiscal consolidation efforts that lower the import bill. Exports covered 65 percent of imports in 2014 compared to 54 percent in 2013.

The short-term growth outlook is set on recovery mode, albeit on a modest level. An anticipated good agriculture harvest and further increasing livestock exports contribute to positive growth, and robust gold exports will support the continuing recovery with about 3.5 percent growth in 2015. But gold may be a temporary phenomenon only and, given its primarily artisanal nature, has only limited effect on the economy at large. The analysis in this CEM argues that in a base scenario to 2030 growth will be around 4.1 percent, which can be potentially driven higher through stronger agriculture productivity growth and/or a normalization of Sudan's relations with the rest of the world.

The impact of falling global oil prices is likely to be insignificant. Post-secession Sudan is no longer a large net exporter of crude oil. In fact, Sudan's crude net oil exports fell from US$8 billion in 2011 to as low as US$ 0.4 billion in 2013. Looking at oil and oil-related products together, Sudan is already a net oil importer.

Sudan's economic outlook hinges significantly on improvements in domestic and regional political environments. The political environment with the rest of the world has improved somewhat over the past year with progress on a national dialogue to rein-in conflicts within Sudan. But uncertainty associated with the conflict in neighboring South Sudan and about oil transit fees remains high. More recently, Sudanese Banks have experienced a breakdown in their correspondence relations with foreign banks as a result of de facto tightened U.S sanctions against Sudan. As a result, Sudan's trade activities have been adversely affected and the shortage of foreign exchange has worsened.

Conflict, Governance, Poverty, and Debt: Sudan's Long-Term Challenges

Sudan has been in conflict for most of its history since independence. This conflict arises out of non-inclusive institutions with limited effectiveness and often-disputed legitimacy across Sudan, and has resulted in depressed development outcomes. While the defining conflict between the northern and southern regions was largely resolved by the secession of the latter to form the Republic of South Sudan in July 2011, tensions still remain. Several other conflicts with varied histories persist in different stages of intensity, stalemate, or resolution. Weak institutions at both national and subnational levels are unable to resolve most conflicts, often resulting in violence. Violent conflict, especially rebellion against the center and armed response by the state, is a direct contributor to the extreme

poverty in Sudan's conflict-affected areas. Security concerns continue to inordinately shape economic and fiscal choices made by the government resulting in detrimental development outcomes and perpetuating weak institutions for public goods provision.

Sudan presents institutional discontinuities across its various regions, which is reflected in its regional economic imbalances and its geography of conflict. At the center, Sudan has institutions that enforce compliance and execute core state functions of providing security, commanding fiscal mechanisms, and delivering services. However, state presence and effectiveness diminishes further outside Khartoum and is out-rightly contested in many peripheral areas. As with political power, the economy is centered in Khartoum and proximate riverine states giving rise to significant inequality between the center and periphery, and historically between riverine and hinterland communities.

Development and poverty indicators starkly mark the resulting inequality. While Sudan boasts a GNI per capita of US$1693 (2013) its poverty rate is 46.5 percent. In fact, poverty ranges from 26 percent in Khartoum state to 62.7 percent in Darfur, based on 2009 data. The incidence of poverty in urban areas, particularly Khartoum, is significantly lower than that of the rural areas. Rural areas are more than two and half times as poor as the capital and almost twice as poor as the rest of the urban areas. While rural areas account for a little over 60 percent of the Sudanese population, they account for almost for 80 percent of Sudan's poor. For the rural population, any poverty reduction strategy needs to build on agricultural growth, while at the same time looking into the creation of off-farm employment opportunities there.

The rapid expansion of gold mining has generated a variety of harmful impacts that will further complicate development in rural areas. Aerial images bear witness to the dramatic impacts of gold rushes with closely spaced excavations over extensive areas and shanty town-type development to support the influx of people. There is widespread use of bulldozers to excavate topsoil to expose gold bearing rocks with little or no reclamation of land as mining plays out. There appears to be little attention to safety hazards, exemplified by the depth to which some excavations are dug and minimal use of support structures. Furthermore, rudimentary health precautions are taken at mining sites and processing centers, where water and hygiene conditions are poor and do not appear to be subject to routine monitoring and inspection.

Yet, Sudan holds tremendous potential, much of it unrealized due to long-running conflict and governance challenges. Some of this potential was realized in earlier decades, (including during early industrialization) in large scale irrigation in support of food and export crop agriculture, and in investments from recent natural resources discoveries. Once the largest country in Africa, even in its diminished state Sudan holds the potential to be an economic powerhouse. It sits at the crossroads of sub-Saharan Africa and the Middle East, with fertile lands and abundant livestock, and some remaining natural resources (oil and gold), which make it the third largest economy in North Africa (after Egypt and Morocco) and the largest economy in the greater eastern Africa region. The consolidation of peace in Sudan has the potential to positively impact peace and development in the region, especially in the Nile River Basin, South Sudan, and the Sahel.

From an economic perspective, Sudan's ongoing debt crisis that dates back to the 1980s is truly unsustainable. Sudan's debt crisis in the 1980s started with the Government's inability to service its debt service obligations, which in turn led to an unprecedented increase in arrears. This is a key feature of Sudan's striking debt burden up to the present, where 85 percent of Sudan's debt is in arrears. Both domestic and external causes for the debt crisis are widely recognized (Rahman 1995; and Ahmed 2008), including the global recessions of the 1970s and 80s due to the oil price shocks, an overvalued exchange rate and insufficient debt management capabilities within the government.

Sudan's external debt stands at about US$45 billion (79 percent of GDP) as of end-2013, of which 85 percent was in arrears. The large majority of the debt is public and publicly guaranteed debt (valued at US$43.4 billion, of which 88 percent in arrears), mainly owed to bilateral creditors and almost equally divided between Paris Club and non-Paris Club creditors (37 vs. 36 percent of the total). Only a small fraction is commercial debt owed to suppliers (US$1.6 billion). Sudan is also in arrears with multilateral creditors, including the WB, the IMF, and the AfDB.

As a result, current external public borrowing is very limited mainly due to Sudan's inability to access international financial means. Total contracting of external debt has remained below 1 percent of GDP per year since 2011. Given economic and financial sanctions as well as the fact that Sudan is in arrears with most creditors, the country has effectively been cut off from external financing sources. The government currently can only contract new debt with a limited number of still-disbursing multilateral and non-Paris Club bilateral creditors such as China. Some US$152 million of new debt (0.2 percent of GDP) was contracted in the first half of 2014, of which $147 million is on non-concessional terms (which is well within the annual non-concessional borrowing limit of US$600 million prescribed by the government's Staff Monitored Program with the IMF: IMF 2014a). There has not been any new private external debt in decades.

Relief to Sudan's external debt crisis will be critical. Normalization with the rest of the world and debt relief would not only mean that Sudan could potentially access significant external assistance resources, but also a bettering in Sudan's terms of trade and potential to explore currently closed external markets. But the envisioned HIPC debt relief process is slow and requires renewed emphasis of the Government on reaching out to creditors, normalizing relations with international financial institutions, and continuing to establish a track record of cooperation with the IMF on policies and payments.

Institutions Important for Growth and Diversification in Sudan

The CEM starts out with a series of simulations and a review of recent key literature on growth and diversification with the aim of defining a suitable approach for growth and diversification for Sudan. Using projections to 2030, an analysis of economic scenarios sets the stage and highlights some key aspects of potential policy changes. The analysis employs MAMS, a simulation model of the CGE (Computable General Equilibrium) type developed at the World Bank for medium- and long-run policy analysis. The base scenario matches economic developments anticipated by the Sudan Country Team of the World Bank and in recent reports from the IMF; it highlights the difficulties of creating an economic structure without heavy reliance on resource exports, including the need for real exchange rate depreciation to induce expansion of the production of tradables for exports and replacement of imports, resulting in a slowdown in consumption and investment growth.

The sectoral structure of Sudan's economy shows the growing importance of agriculture, less importance of extractives, and relative stability of other sectors (manufacturing, services) by 2030. The simulations also show that the strongest growth rates are from sectors that are capable of producing internationally competitive tradables. Simulations suggest that in the absence of dominant resource-based exports, growth must be centered on sectors producing tradables that are exported and/or replace imports. Therefore a sectoral focus of this CEM is to examine agriculture and trade of goods and services as a means to grow the endowments base of the country.

The non-base scenarios point to the beneficial effects of agricultural productivity growth. In addition, the role of agriculture would likely become more prominent in a setting with a supportive, depreciated real exchange rate. Simulations of normalization (represented by improved terms of trade,

debt forgiveness, and more foreign aid) suggest that it would have positive effects on macro indicators, boosting Sudan's integration with the world economy, improving household welfare, reducing poverty, and facilitating Sudan's structural transformation.

The second part of the analysis attempts to identify a suitable growth and diversification strategy for Sudan and looks at the 2008 Growth report (World Bank 2008a) in search of "ingredients for growth." It finds that Sudan's performance vis-à-vis the "ingredients of growth" is mixed and between 2000 and 2011 and heavily dependent on the effects of the oil economy. The same section also explores the question on how to achieve "pro-poor" growth. It finds that, given that poverty in Sudan is deep and largely a rural phenomenon, the agriculture sector is crucial for efforts to reduce poverty.

Looking at other economies that were successful in their diversification efforts shows that they were able to broaden their endowments base by maximizing a triad of institutions to deliver services that ultimately increase productivity. This triad includes the abilities to manage natural resource rents, to provide public services, and to regulate economic activity and foster a business-enabling environment (World Bank 2014e). Looking at Sudan, there are important weaknesses in all the three areas, often complicated by conflict and fragility, sometimes through uncertain assignments of responsibilities in an ever more decentralizing public administration. Overall, this analysis finds there is much scope to improve the effectiveness of these institutions to lay the groundwork for a more diverse endowment base, and ultimately, a more diversified economy.

The *ability to manage natural resource rents* refers to the ability to pursue overall stabilizing macroeconomic policies of which stable fiscal management is key, sometimes achieved with stabilization funds for natural resource rents. For Sudan, the CEM finds that the Government's ability to manage natural resource rents is limited; yet, natural resources have also declined in importance to fiscal revenues. Still, more effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues.

At its peak during the oil economy between 1999 and 2011, oil revenues contributed more than 50 percent of total fiscal revenues. This situation ended abruptly in 2011 and oil revenues are expected to fall to around 10 percent of total revenues over the next five years. In addition to oil revenues from Sudanese domestic production, fees of South Sudanese oil flowing through Sudan's oil infrastructure and time-bound proceeds of the transitional financing agreement (TFA) between the two countries are expected. More effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues. During the pre-secession period Sudan had some experience in utilizing an oil revenue stabilization account (ORSA)—a failed attempt to smooth expenditure. After two years of balanced budgets in 2010 and 2011, a significant deficit opened up in 2012.

Financing the budget deficit is now one of the key challenges in post-secession Sudan, but options for foreign financing of the budget deficit are limited. Given the constrained financing options for Sudan it will be important to mobilize more domestic resources for productive use, most notably domestic savings to support investment. But Sudan's national savings fell to a low of 8.5 percent of Gross National Disposable Income (GNDI) in 2012, the lowest level since 1999. Stable macroeconomic management in the late 1990s and 2000s, and the oil economy led to a rise in the savings rate. But with the secession Sudan's private and public savings fell sharply. It is well-known that domestic savings matter because they fund investment, which in turn lead to higher economic activity and growth. But it matters even more as tapping into foreign savings is not a real option in today's Sudan where FDI is scarce and portfolio investments are close to being impossible given Sudan's isolated status in the world financial system.

The *ability to provide public services* relates to the ability of governments to invest into the human capital of the younger generation and to build infrastructure that can be used for forward-looking economic activities in the long-term. Sudan's ability to provide public services is a constraint. Historically, GDP growth in Sudan was rarely driven by enhancements in total factor productivity, which would indicate a rising role of human capital formation in the growth process. And human capital formation depends on the effective provision of services. In that regard, Sudan has undergone a process of decentralization that assigned basic service provision to subnational levels. Since fiscal decentralization is lagging behind, however, states do not have the ability to live up to their responsibilities and outcomes, for instance, for education are both low and with a large variability across states. Finally, conflict, governance, and debt are all complicating factors for government to effectively deliver services.

Sudan has had a period of one decade with positive real economic growth rates driven by oil GDP since the discovery in 1999. High productivity is crucial for sustaining high growth, yet in Sudan total factor productivity has been low or even negative in the majority of years since oil was discovered. The secession of South Sudan signifies the latest structural break in the economy that is due the loss of the majority of oil reserves and related fiscal revenues. The sectoral decomposition of GDP growth suggests that, historically, the major driver of growth in Sudan was and now still is the service sector. From the expenditure side of GDP in Sudan it is clear that domestic consumption (public and private) has been the major driver of GDP growth over the past decade and the role of investment was rather modest.

Sudan has undertaken political decentralization reforms since the early 1990s with the aim to transition the responsibility for basic service delivery to the subnational, state level. Decentralization has devolved a number of key responsibilities to the sub-national governments; particularly vis-à-vis publicly funded pro-poor activities. A sound revenue assignment system is an essential pre-condition for successful fiscal decentralization. Since resource disparities exists across the states of Sudan, the primary component of successful fiscal decentralization is a more equitable and transparent system of intergovernmental resource allocation across different levels of government. Fiscal decentralization has brought considerable extra resources to the States and substantially increased overall per capita social spending over the past ten years. Yet, the observed increase in social spending has not translated into a more balanced distribution of resources by the government to address inequality across states and reduce poverty gaps. Ultimately, the weaknesses in public service provision in Sudan stem from poor prioritization of spending and an inadequate focus on results.

Conflict, governance, and debt are all complicating factors for government to effectively deliver services. Sudan has been in conflict for most of its independence history. The secession of South Sudan solved the key conflict in Sudan, but not all conflict has been eliminated; tensions continue and are expected to persist in the foreseeable future. In most regions of Sudan, conflict over access to natural resources between pastoralists, agro-pastoralists and settled farmers is endemic and also contributes to regional conflict, such as in the Sahel. Weak governance and accountability have contributed to fragility and conflict, including between the center and periphery. At the same time, conflict and fragility contribute to the plethora of governance challenges in Sudan. Fragility and conflict in Sudan is also driven by corruption, further reinforcing barriers to investment and equitable growth that would provide opportunities to citizens. Intrinsic to issues of allocation and management of resources and the need for greater transparency and accountability are the broader issues of the transformation of the state by providing for more participation of citizens and communities in decisions. Sudan's prospects for service

delivery and poverty reduction are also hampered by its huge stock of external debt, most of which is in arrears, with the implication that Sudan is cut off from much needed official development assistance.

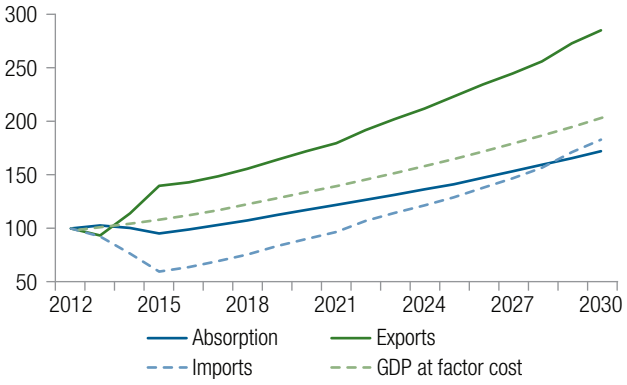
The *ability to regulate economic activities* refers to the Government's capabilities to establish and nurture a business-enabling environment. Since 2008 Sudan has experienced a slight deterioration in the business-enabling environment; the country lags behind the comparators in getting credit and protecting investors, resulting in a lower rank for ease of doing business. Sudan ranked at 170 for getting credit and 157 for protecting investors in the Doing Business indicators (2014). When it comes to starting a business, Sudan's performance is similar to the comparator countries. Sudan ranked at 131 for starting business while Kenya was at 134 and Ethiopia at 166, respectively. The difficulties to run a business in Sudan lie more in the lack of support to investors and business people than administrative procedure. The strength of investor protection index is relatively low at 3.3 out of 10. For a country with sea access, Sudan has a relatively low ranking on the trade facilitation component of the Doing Business indicators (Figures S.17). The Doing Business (2014) ranking for Sudan (155th) on trading across borders is closer to the ones for landlocked countries and slightly worse than the regional average for Sub-Saharan Africa (SSA) (141). Landlocked countries, such as Uganda and Ethiopia in the comparators, often have more penalties than non-landlocked ones in trading across borders (Alvis et al. 2010). Sudan, with relatively good port infrastructure, does not appear to be taking full advantage of its geographic location. It is notable that the cost to import is close to the price for the neighboring comparator landlocked countries.

Economic and financial sanctions imposed on Sudan since the late 1990s complicate the Government's ability to regulate economic activities. The United States imposed economic sanctions on Sudan in 1997. Over the years, the trade sanctions have been relaxed. The United States now exports a variety of goods to Sudan subject to a regime of export controls related to military or dual-use goods. The largest, yet most difficult to assess impact of the sanctions regime on Sudan is transmitted through the financial system. Financial sanctions create difficulties for non-US companies in trading with Sudan, partly due to the fact that U.S. dollar transactions are routed through the U.S., and partly due to the fact that many non-U.S. banks have very significant dealings with the U.S. and want to avoid the appearance of being involved in trade with Sudan. Sanctions have also a direct impact on the real economy through restrictions on sourcing of inputs and replacement parts. But the absolute level of real economy impact of sanctions remains unknown. For instance, Sudan's non-oil exports are concentrated in a small number of markets, but this is likely not solely a consequence of economic sanctions against Sudan. In fact, it looks as if Sudan is isolated even within Africa. However, sanctions have exacerbated the isolation through increasing the difficulty in settling cross-border payments, which affects trade with all partners including their African neighbors. Yet, there is reason and evidence to believe that a normalization of relations with the rest of the world, including a lifting of economic sanctions, could promote export diversification.

In sum, the CEM finds that there is a case for Sudan to approach growth through diversification from two angles: the production and the endowment base, both of which rely on the effective utilization of key institutions. Taken together the direct and indirect approach define a coherent way for Sudan to diversify that takes into consideration the current and future sectoral structure of the economy, existing sectoral policies of the Government, as well as the need for long-term institution building as a foundation for diversification through broadening the national endowment base.

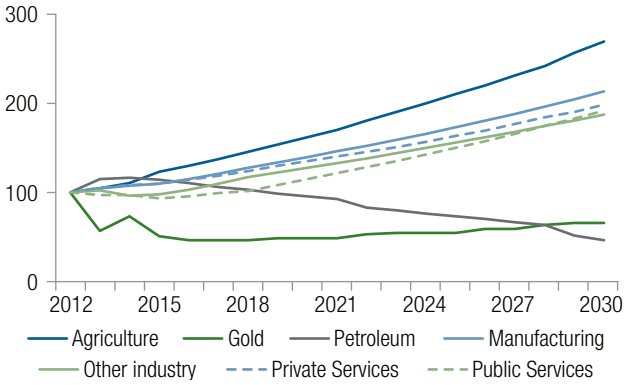
This analysis therefore uses a sectoral focus and looks at agriculture as sources for diversification, but also makes the case that trading of goods and services—especially of the higher value-added kind—could be a means to grow

FIGURE S.01: Base Simulation: Selected Macro Indicators (Index; 2012 = 100)



Source: World Bank staff own calculations using the MAMS Sudan Model.

FIGURE S.02: Base Simulation: Aggregated Sector GDP (Index; 2012 = 100)



Source: World Bank staff own calculations using the MAMS Sudan Model.

the endowment base of the country. It is from this framework that the remainder of this CEM unfolds with a detailed analysis of agriculture and trade of goods and services, and concludes with an analysis of the extractive sectors (oil, gold) in search of fiscal support for the diversification agenda of the future.

Pathways to the Future: Economic and Sectoral Scenarios to 2030

Looking forward, a base scenario simulation suggests that the most likely growth outcome over the next 15 years is that Sudan's economy will grow at around 4 percent annually. GDP at factor cost growth is above the growth rates for absorption (the sum of private and government consumption and investment) and private final demands (private [or household] consumption and private investment) due to export growth in excess of import growth, driven by real exchange rate depreciation (Figure S.01). Among macro items, only government investment grows more rapidly than GDP, a reflection of that it starts at a very low level. This structural adjustment is needed to put an end to unsustainable foreign government borrowing, particularly at the backdrop of a projected decline in gold export prices.

The shares of exports and gross national savings in GDP are projected to increase significantly from 2012 to 2030. In spite of moderate import growth and low foreign borrowing, the import and foreign debt GDP shares both increase; this is due to expected exchange rate depreciation. In the government budget, a comparison between GDP shares data for 2012 and 2030 indicates that the receipt shares for taxes and domestic transfers increase while both foreign and domestic borrowing decline; on the spending side, investment increases strongly while subsidies (to petroleum products) decline, reflecting a projected policy change. In the balance of payments, the GDP shares in 2030 compared to 2012 are boosted by exchange rate depreciation; among outflows, the main change is expected to be higher imports while, among inflows, the main changes are increases for exports and private transfers while borrowing and FDI are lower.

The sectoral structure of Sudan's economy shows a growing importance of agriculture, a decline in the importance of extractives, and relative stability of other sectors (manufacturing, services) by 2030 (Figure S.02). The main sectoral changes by 2030 include:

- *Increased prominence for the agricultural sector*: its shares in exports, value-added, and

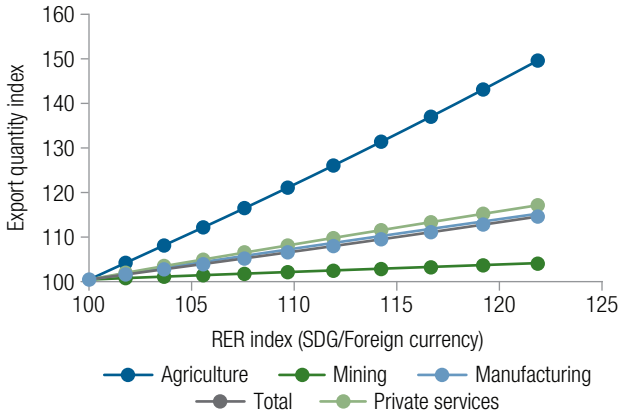
employment all increase (most dramatically for exports) while its share in total imports falls and imports meet a smaller share of domestic demand for agricultural products;

- *Reduced importance for extractives*, especially in exports but also in value added and employment, combined with increased reliance on imports to meet domestic demands; and
- *Relatively small changes in other sectors*, even though manufacturing and private services both become slightly more open, with increased shares in total exports and imports, larger shares of output going to exports, and imports meeting larger shares of domestic demand.

Two main alternative scenarios are tested for Sudan's economy, addressing (i) the potential role of agriculture as the economy enters an era in which oil only will play a marginal role, with gold only partially making up for this loss; and (ii) the effects of a potential normalization of relations with the outside world. Accordingly, the non-base scenarios are divided into two groups. (1) The first focuses on issues related to the responses of the economy to policies leading to stronger TFP growth for crop agriculture and depreciation of the real exchange rate. (2) The second group addresses channels through which normalized foreign relations may influence the economy: improved terms of trade (via higher export prices and lower import prices as Sudan's access to markets improves), increased aid, and debt relief.

During the oil boom, Sudan's real exchange rate appreciated, penalizing production of non-oil tradables, a phenomenon commonly known as "Dutch disease," but this is now being reversed. Unless major new natural resources are uncovered and exploited, Sudan will in the future reverse this trend, as indicated by the sector pattern of growth for the base scenario, including above-average growth for agriculture. In this new external environment, the prospects for high payoffs from policies supporting agricultural growth are better.

FIGURE S.03: Real Exchange Rate and Export Quantity (index Base = 100)



Source: World Bank staff own calculations using the MAMS Sudan Model.

The simulation confirms the importance of the real exchange rate as a factor that works for or against export growth, especially in agriculture. Figure S.03 shows a positive and near-linear relationship between the real exchange rate and export quantities (both total and sectoral); in the background, the maximum depreciation, at almost 22 percent, is associated with an addition to foreign reserves corresponding to close to 6 percent of GDP. According to the simulation results, the elasticities of real exports with respect to the real exchange rate are around 0.7 for manufacturing, private services, and total exports but much higher (around 2.1) for agriculture. These findings are consistent with the observed downturn for the agricultural sector during the period of oil boom and suggest that real depreciation should facilitate stronger export performance.

Simulating an increase in agriculture productivity by 2 percent (Crop+) shows a very strong effect on economic growth and poverty reduction. An increase in agriculture productivity by 2 percent per year would increase GDP growth by almost one percentage point from 4.1 in the base scenario to 5 percent by year to 2030. In addition, Crop+ would increase household consumption and reduce the headcount poverty rate to 29.4 percent in 2030 compared to 38.4 percent in the base scenario (Figure S.04).

Another simulation of the "normalization" of relations with the rest of the world points to similar, yet slightly lower positive economic effects than Crop+. Simulations capture effects via three channels, initially introduced separately—improved terms of trade (the simulation TofT+), increased aid (Aid+), and foreign debt relief (Debt-)—and subsequently combined in one simulation (Normal). The welfare impact of normalization is positive and increased household consumption would lower poverty by about 7 percentage points in 2030 compared to the base scenario. Normalization translates into a 16 percent increase in real household per-capita consumption in 2030, with the strongest impact from improved terms of trade, followed by debt relief and increased aid. The increases in household consumption bring about a 7 percentage point reduction in poverty in 2030 compared to the base scenario (Figure S.04).

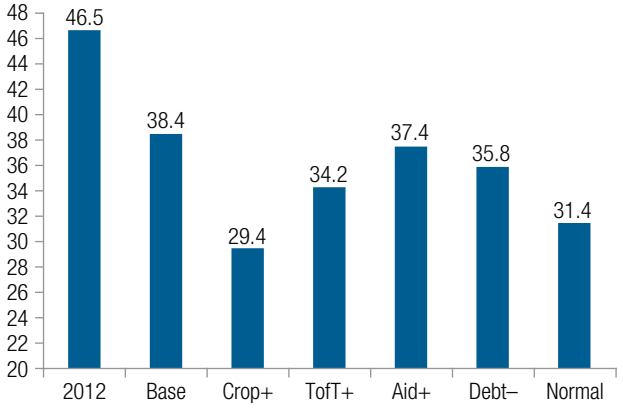
Looking Back to Shape the Future

To find promising areas of focus for Sudan, this analysis compares Sudan with successful other countries, which were analyzed and described in the 2008 Growth Report (World Bank 2008a).

Sudan's performance vis-à-vis the "ingredients of growth" is mixed and between 2000 and 2011 heavily dependent on the effects of the oil economy. The advent of oil brought about significant changes in the economy mainly over the past 10 to 15 years, which were often reversed in the most recent period since 2011 due to the secession of South Sudan. Those changes are particularly pronounced in the areas of investments and savings, the export sector, FDI inflows, price stability, and, ultimately on GDP growth (Table S.01).

Yet, there are patterns of policies and economic variables that explain some of the past performance of the Sudanese economy.

FIGURE S.04: Poverty Rate in 2012 and Various Scenarios



Source: World Bank staff own calculations using the MAMS Sudan Model.

No lasting structural change

The long-term historical growth performance shows that Sudan has undergone three distinctive economic periods since 1989, but lacks lasting structural change. The *first* period can be distinguished from 1989 to 1997 when the average GDP growth reached 4.9 percent and was driven mainly by labor and total factor productivity growth. This was a period of experimenting with economic reforms and liberalization of the economy. The *second* period can be noted from 1998 to 2007. As a result of the advent of oil, the average economic growth increased by 1.2 percentage points, reaching an average rate of growth of 6.1 percent. Typical for this period is that physical capital became the major driver of economic activity, whereas the contribution of labor and TFP significantly decreased. This is a reflection of intensified capital investments in the country fueled from the oil economy and satisfied through both domestic sources and FDI.

The latest and *third* period in the economy started in 2008 and is coined by negative TFP growth. This period includes the 2011 secession that is associated with the loss of the majority of oil reserves and related fiscal revenues. Declining growth rates of this period was driven by a decline in physical capital and the negative contribution of the TFP growth (Figure S.05). This is not surprising as investment in oil-related activities fell with the

Table S.01: Sudan's Performance Vis-à-Vis the Ingredients of Growth

Growth "ingredients" from the Growth Report	Sudan's historical record
High levels of investment ≥ 25% of GDP and savings between 20–25% of GDP	Average level of gross investment during the period 1980–2012 is 18.8% and during the period 2000–2012 is 25.7% of GDP. Average gross fixed capital formation during the period 1980–2012 is 15.3% of GDP and average during the period 2000–2012 is 21.2% of GDP. Average level of gross savings for the period 1980–2012 is 13.4% of GDP and during the period 2000–2011 is 23.4%. Post-secession savings rates are in single digits and too low to drive and match investments.
Technology, knowledge and know-how transfer (requires FDI)	Average level of FDIs for the period 1980–2011 is 3.3% of GDP, for the period 2000–2012 is 7.8% of GDP. FDI in post-secession Sudan is negligible.
Supporting competition and structural change	The World Bank Investment Climate Assessment of 2009 suggests a poor functioning of markets to allocate resources in the economy. This is primarily due to tight controls through the state in procurement processes, financial markets, and land markets (World Bank 2009b).
Labor market support	The formal labor market is tightly controlled, preventing the efficient match of supply and demand, and giving rise to informal, unregulated labor markets (World Bank 2009b).
Export promotion and exchange rate policy	Average level of exports of goods and services for the period 1980–2011 is 10.5%, for the period 2000–2012 is 16.9%. Official nominal exchange rate depreciated sharply in 2012 and there is a parallel exchange rate market.
Financial sector development and openness	Private credit-to-GDP ratio average for the period 1980–2012 is 11.8%, for the period 2000–2012 is 12.9%.
Macroeconomic stability	Average annual inflation for the period 1980–2012 is 40.2%, for the period 2000–2012 is 12.3%. The inflation is volatile during the recent period 2008–2012. Budget deficit is narrowing from 7.1% of GDP in 2008 to 5% in 2012. External public debt is growing rapidly from 60.2% of GDP in 2008 to 79% of GDP in 2013.

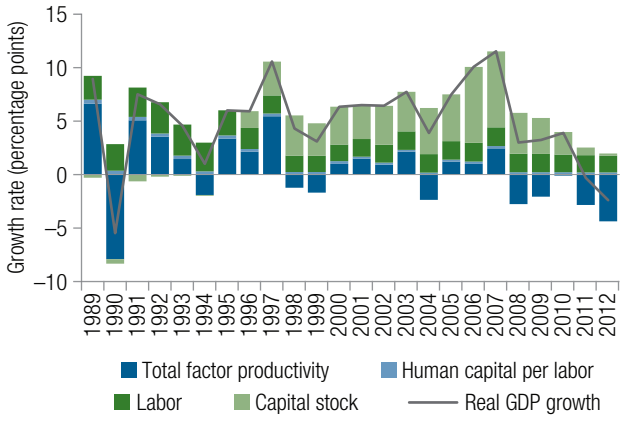
Source: World Bank (2008a); and World Bank staff own calculations, based on data from the WDI and IMF, and the analysis of World Bank 2009b.

secession, FDI declined, and overall economic sentiment declined. The severity of the contraction can be explained by the importance of physical capital and TFP in Sudan's economic development prior to 2008.

Successful economic development has typically been accompanied by structural transformation, in which manufacturing and industry's share of output and employment rises at the expense of agriculture (McMillan and Rodrik, 2011). Manufacturing and industry typically display higher productivity, higher wages, and faster rates of technology adoption, but Sudan's challenge is to find ways to grow these sectors, and particularly to shift younger and more educated workers into higher productivity jobs.

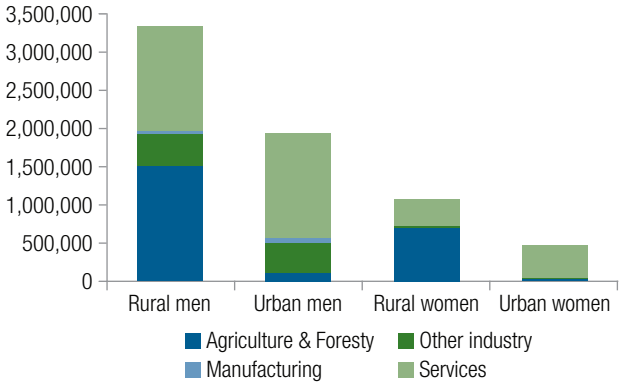
However in Sudan the agriculture and services sectors yet account for the vast majority of employment in Sudan, with manufacturing providing an almost negligible number of jobs (Figure S.06). This is even though both wages and labor productivity are much higher in industry and manufacturing than in agriculture. The sector that employs most people in the economy—agriculture—is also the sector that

FIGURE S.05: Growth Decomposition of Production Factors in Sudan, 1989–2012



Source: World Bank staff own calculations, based on data from World Bank World Development Indicators (WDI).

FIGURE S.06: Employment by Sector



Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).

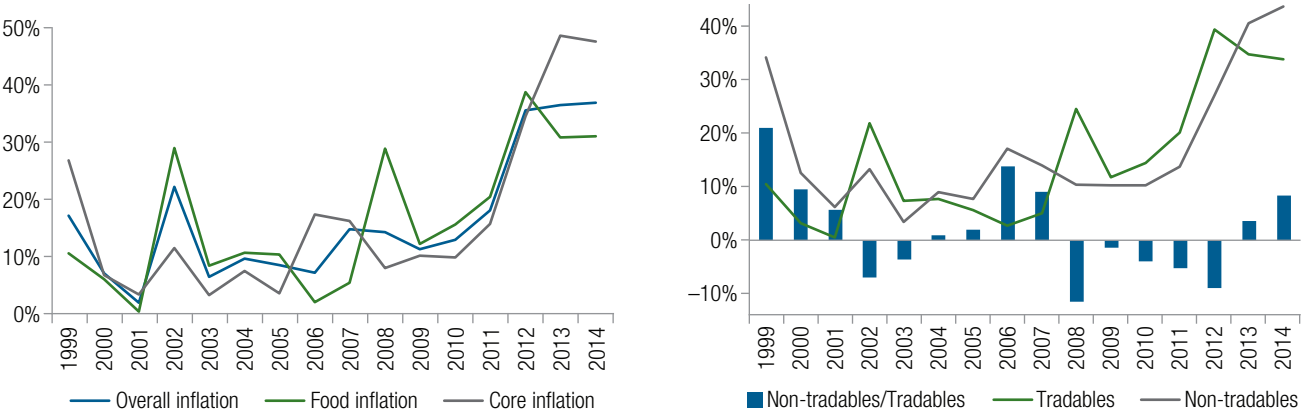
employs most people without education. Almost two in three workers in this sector have no education and less than one in fifty has post-secondary education. Workers in the remaining three sectors—manufacturing, non-manufacturing industry, and services—have relatively similar levels of education.

High and volatile inflation

Inflation in Sudan has had a history of high rates and increased volatility since the 1980s. Since the advent of the oil economy in 1999, average annual inflation in Sudan has been around or above 10 percent with the exception of the 2003 to 2006 period. The persistently high inflation was also accompanied by high volatility. As one of the key symptoms of the 2011 secession shock the Sudanese inflation rate has significantly increased since 2011, and has been over 30 percent since 2012 (annual CPI rate, period average) (Figure S.07). Analyzed with monthly frequency, inflation was even higher over certain periods (exceeding 40 percent) such as in the second half of 2012 and the first quarter of 2013 when inflation reached a monthly peak of 47.9 percent in March 2013, after which the price level growth started to decelerate. There was another peak of inflation at 46.8 percent in July 2014, which relaxed to 25.7 percent in December 2014.

A major driver of the upsurge inflation since 2011 was the approach to monetize the budget deficit by the Central Bank of Sudan through granting direct loans to the government. This resulted in rapid monetary expansion that triggered growth of prices. Another significant measure that contributed to an upsurge in inflation since June 2012 was the adoption of a reform package that resulted in steep devaluation of the official nominal exchange rate, an increase in taxes, and the gradual elimination of fuel subsidies. All of these measures resulted in price increases, especially the announced elimination of subsidies of petroleum products. The latter affected expectations about higher prices

FIGURE S.07: Average Annual Inflation in Sudan, 1999–2014



Source: World Bank staff own calculations, based on data from CBOS 2014; IMF 2013; and World Bank World Development Indicators (WDI).

for petroleum products in the near future that had spillover effects on the other prices in the economy.

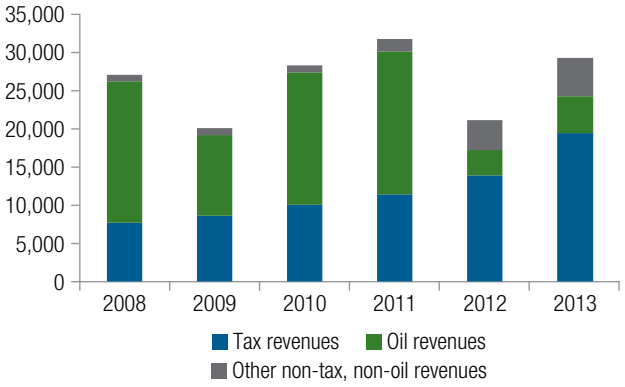
Weak natural resource management, budget deficits and low savings

During the oil economy in Sudan oil revenues rapidly became the main source of public revenues and contributed more than 50 percent total revenues at its peak, but this situation ended abruptly in 2011. With the secession of South Sudan came a substantial loss of oil revenues and the share of oil to total revenues declined from 59 percent in 2011 to 16 percent in 2012 (Figure 1.3.1). Even though they increased significantly, tax and non-tax-non-oil revenues could not compensate for this massive shock in the decline of oil revenues; overall revenues declined by 33.5 percent between 2011 and 2012. During the pre-secession period Sudan had some experience in utilizing a so-called oil revenue stabilization account (ORSA), a failed attempt to smooth expenditure (Box 1.1).

Oil revenues are expected to fall to around 10 percent of total revenues over the next five years. At the same time, the ability of the government to generate fiscal revenues from the gold sector will be rather limited, primarily due to the nature of gold mining that is first and foremost artisanal in Sudan. Only if Sudan succeeds in establishing a modern industrial mining sector will there be the real possibility for relevant fiscal revenues from the gold sector. This is a medium- to long-term endeavor however, and Chapter 5 will provide an assessment of these prospects.

In addition to oil revenue from Sudanese domestic production, fees of South Sudanese oil flowing through Sudan's oil infrastructure and time-bound proceeds of the transitional financing agreement (TFA) between the two countries are expected. Chapter 5 will estimate that those additional oil-related funds are in the order of 10 to 20 percent of total revenues until 2016. Under the Bi-Lateral Agreements South

FIGURE S.08: Fiscal Revenues and Composition (SDG mn)



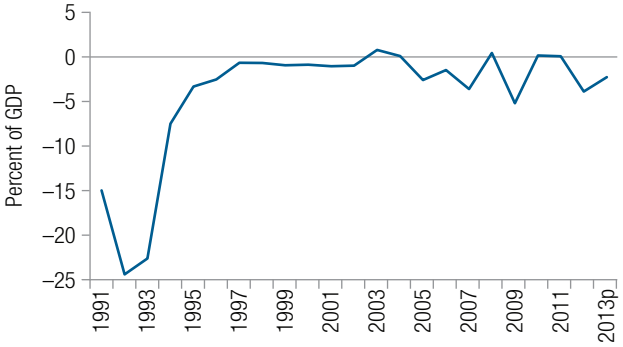
Source: World Bank staff own calculations, based on data from IMF 2013; and World Bank World Development Indicators (WDI).

Sudan is required to pay US$15.00 per barrel up to a maximum of US$3.028 billion as a Transitional Financial Arrangement (TFA). The TFA period ends in December 2016. In addition, the ongoing civil conflict in South Sudan puts significant uncertainty on the payment of the TFA obligations.

More effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues. This observation was made in the 2009 CEM; yet it is still an issue in today's Sudan. The current practice of government is to include into their medium-term plans expectations that successful exploration will add to production. This substantially increases the government's forecast for oil revenues over the medium-term with a high risk of not being able to meet those targets. A similar issue is observable in the mining sector, where production figures are unclear and may also reflect smuggled in and old gold.

Sudan's budget has consistently been in deficit since 1991 and only occasionally reached surplus during the oil economy (Figure S.09). During the oil economy oil revenues rapidly became the main source of public revenues and contributed more than 50 percent total revenues at its peak, but this situation ended abruptly in 2011. With the secession of

FIGURE S.09: Overall Budget Deficit, 1991–2013



Source: World Bank staff own calculations, based on data from World Bank World Development Indicators (WDI).

South Sudan came a substantial loss of oil revenues and the share of oil to total revenues declined from 59 percent in 2011 to 16 percent in 2012. Even though they increased significantly, tax and non-tax-non-oil revenues could not compensate for this massive shock in decline of oil revenues, and overall revenues declined by 33.5 percent between 2011 and 2012.

After two years of balanced budgets in 2010 and 2011, a significant deficit opened up in 2012, but was narrowed again in 2013. Even though a reduction of total expenditures was achieved 2012 the decline in expenditure could not keep pace with the decline in revenues. The budget deficit shot up from virtually zero (–0.2 percent of GDP) to 3.8 percent deficit in 2012. Much more, in 2013 the expenditure side expanded again in real terms, but with a recovery of GDP growth from negative to positive territory in 2013, expenditure as percent of GDP decreased. As a result, the deficit narrowed from 3.8 percent of GDP in 2012 to 2.3 percent in 2013. The gradual elimination of oil subsidies starting in September 2013 manifested this consolidation effort and the 2014 deficit is expected to further decline.

Financing the budget deficit is one of the key challenges in post-secession Sudan, and options for foreign financing of the budget deficit are limited given Sudan's debt crisis. So far, the dominant source of financing has been through monetization in the aftermath of the secession. Given its serious negative repercussions, however, monetization is not sustainable in the long term; it leads to an upsurge in inflation, an impairment of monetary transmission mechanisms, crowding out of credit to the private sector, real exchange rate appreciation, and worsening foreign trade competitiveness. At the same time, the effects of the Sudanese debt crisis, paired with the financial and economic sanctions imposed on the country, have effectively cut Sudan off from the international financial system.

Given the constrained foreign financing options for Sudan it would be important to mobilize more domestic resources for productive use, most notably domestic savings to support investment. But Sudan's savings rate is low. Sudan's national savings fell to a low of 8.5 percent of Gross National Disposable Income (GNDI) in 2012, the lowest level since 1999. Stable macroeconomic management in the late 1990s and 2000s, and the oil economy led to a rise in the savings rate. In the initial phase of this trend, private savings started to rise towards the end of the 1990s, followed by an increase in public savings in the 2000s. The exact opposite happened in 2011 with the loss of three-quarters of oil revenue and the subsequent macroeconomic and fiscal crisis that hit the Sudanese economy after the secession. Against this backdrop, Sudan's private and public savings fell sharply.

Domestic savings matter for Sudan's economic transition from a largely oil-dependent towards a more diversified and sustained growth and development mode. There are two important points related to domestic savings. First, there is the well-known relationship between savings and investment, where savings fund investment, which in turn leads to higher economic activity and growth. International evidence suggests this positive correlation. Second, Sudan is not interlinked with the international financial system and hence economic actors have very limited opportunities to finance investment through external sources. Together, the lack of access to foreign savings urges post-secession

Sudan to raise its savings rate beyond pre-secession levels to finance investment for growth.

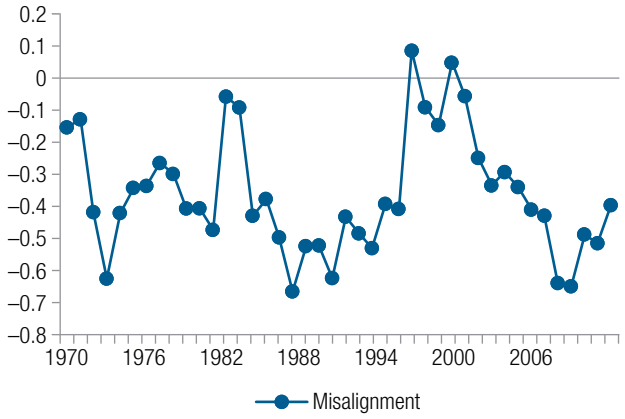
Long history of overvalued real exchange rate (RER)

Sudan's RER has been greatly overvalued over most of the past 40 years. From 1970 to the present, there are only two years when the RER is undervalued (Figure S.10). For the rest of years, the RER is greatly overvalued, by as much as 65 percent in 2008. In 2010 and 2011 the overvaluation reduced to 50 percent and 40 percent—still very significant numbers. The overvaluation may have slightly eased in the years 2012 and 2013 where the nominal exchange rate devalued by almost 100 percent (Figure S.11). But the positive RER effects of this nominal depreciation, were again eaten up by persistently high inflation rates of 35.1, 36.3 and 37.4 percent in 2012, 2013, and 2014, respectively.

The historical overvaluation is consistent with the gaps observed between official nominal exchange rates and black market exchange rates. If one was to consider the black market exchange rate as a *de facto* market-driven equilibrium value of the nominal exchange rate, the official nominal exchange rate was overvalued to the tune of 50 to 70 percent in 2010 and 2011. Given data constraints, there is no measure of RER Misalignment for Sudan after 2011. However, based on the gap between the official and the black market rates, and given the historical relationship between the two that reflects the RER Misalignment Index, it is likely that the extent of RER overvaluation remained at a similar level in between 2012 and 2014. Such an overvaluation pattern identified through the misalignment index is consistent with other estimates. For instance, the IMF Article IV in 2014 estimated that the Sudan real exchange rate was about 40 percent overvalued in 2014 (IMF 2014c).

A more competitive real exchange rate could support export and output growth. Sudan's real exchange rate overvaluation of the 2000s is similar

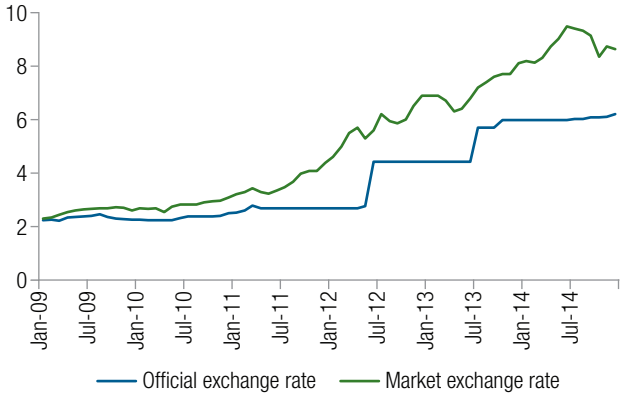
FIGURE S.10: Sudan's RER Misalignment



Source: World Bank staff own calculations, based on data from PENN World Tables.
Note: Undervaluation zone is above 0.

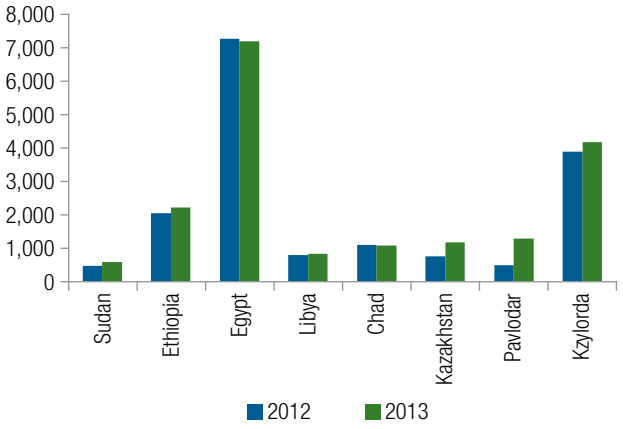
to other African oil exporting countries, most of which experience Dutch-disease-like symptoms. Empirical evidence presented in this analysis suggests that a 10 percent lower real exchange rate could raise economic growth by 0.9 percentage points in Sudan. Given data constraints the relationship between the exchange rate and export growth in Sudan cannot be confirmed with the same methodology, but an undervalued RER is expected to contribute to export growth similar to what is observed across all countries considered (separate work on economic scenarios, presented later in this summary, shows an elasticity of 0.7 between real

FIGURE S.11: Sudan's Official and Market Exchange Rate (SDG/USD)



Source: CBOS; and World Bank World Development Indicators (WDI).

FIGURE S.12: Sudan's Wheat Yields in Perspective



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; the Sudan Ministry of Agriculture and Irrigation; and selected World Bank Agriculture Country Reports.

exchange rate depreciation and export growth). In fact, given that Sudan's exports of non-natural resource and agriculture products comprise mainly low-value, raw and unprocessed products, which compete primarily on prices, the historic and current RER overvaluation was and is a major inhibiting factor for export development in the country. But there are macro-economic trade-offs of devaluation, e.g., its tendency to increase import prices and thus contribute to inflation, so any changes in the exchange rate may need to be accompanied by adjustments in the macroeconomic policy mix.

Extremely low productivity in agriculture

The story of agriculture in Sudan is, by and large, a story of low productivity. Low crop yields are associated with low fertilizer usage in the country. In 2009 the average fertilizer use per hectare of cropland was 7.3 kg, which ranked Sudan at 129 among 155 countries, far behind Ethiopia, Sudan's poorer neighbor. To illustrate, sorghum and millet yields are low and generally on a downward trend, yet more so in the rain-fed production areas than in irrigated regimes, where yields are more stable or have slightly increased over the past decade. Wheat, (a crop not natural to Sudan, but production is encouraged by the government) has yields that are among the lowest in the world, if not the lowest (Figure S.12). Similar developments are seen in the main oil seeds—groundnut and sesame. Two notable exceptions to the decreasing production and yield trends are gum arabic and cotton, which has seen a renaissance over the past years with very strong production particularly in 2013.

Livestock production is strong and rising, but under pressure of losing land for pastoral land use. Livestock are raised in almost all parts of Sudan, but mostly concentrated in western Sudan (Kordofan and Darfur states) and owned primarily by nomadic tribes. Contrary to commonly held belief, the rationale for pastoral livestock is less grounded in satisfying basic needs, such as searching for water to drink, and more due to the unique economic benefits of engaging in pastoral production. The superiority of pastoral livestock in Sudan appears to be that pastoralists consistently use natural resources more intensively and hence are able to produce more livestock products per unit of land area than any other form of livestock production.

Very concentrated export markets

The export basket of Sudan is very concentrated, as shown the large shares of its top three and five export products, but the degree of product concentration decreases when looking at non-oil exports. Even though these measures have tended to decrease after the split of the country, especially in the case of the top three products, the figures still evidence a severe dependence of Sudan upon few commodities. However, the degree of product concentration decreases considerably when only non-fuel products are considered. This implies that after the loss of South Sudan, the country may have been forced into a path of higher product diversification that could work to its advantage in future. Even though the share of the top three and five non-oil products have increased after the loss of South

Sudan, they are still relatively low. However the number of products, which always had been low, had shown mild increase between 2006 and 2011, but fell again after the split of the country.

The lack of product diversification of Sudan also stands out when compared to peer countries, as evidenced by its comparatively much higher Herfindahl-Hirschman index.[1] Furthermore, the index has increased in recent years, while in many of its comparators it has actually decreased. This points out to a comparatively disadvantaged position, both static and dynamic. Figure S.13 presents the index comparing Sudan and some comparator countries.

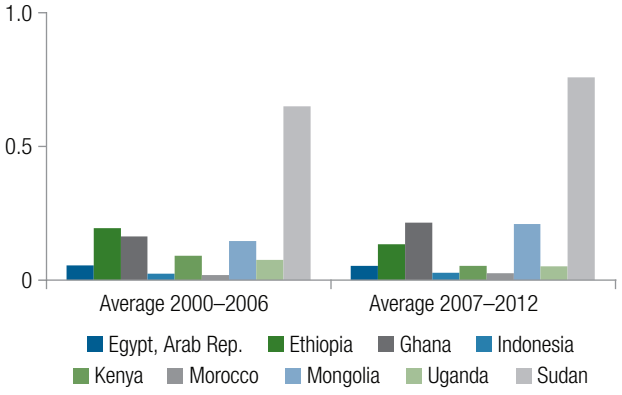
Yet, Sudan has significant market power in global export markets for gum arabic and sesame seeds. Sudan's power in global markets for gum arabic and sesame seeds allude to its role of being a price setter in those areas globally. In regional markets Sudan plays a similar role for sheep and sheep meat, and on an emerging basis in waste and scrap of primary cells.

It is noteworthy that the role of sanctions in export concentration is not clearly evident. In fact, it looks like that Sudan is isolated even within Africa. However, sanctions have exacerbated the isolation through increasing the difficulty in settling cross-border payments, which affects trade with all partners including their African neighbors. (World Bank 2014e).

Agriculture and Livestock are Key for Economic Diversification in Sudan

All signs point to agriculture as the key sector for diversification in the medium- to long-term. Agriculture is clearly underperforming and simulations show that growth in agricultural productivity could have a very strong impact on raising economic growth and reducing poverty. At the same time, there is a clear opportunity to raise productivity given the extremely low yields currently observed in Sudan. Fertilizer usage will be instrumental in that effort, but so is the role of the exchange rate. Additionally, Sudan has a few agricultural export products with global or regional market power, which could be used as basis for an agriculture diversification strategy and to explore agro-processing as a next step towards light manufacturing.

FIGURE S.13: Herfindahl-Hirschman Index at the Products Level, Sudan and Selected Countries



Source: World Bank staff own calculations, based on data used from UN Comtrade.

But there are striking examples of policy inconsistencies in the agricultural sector that prevent the sector from unfolding to its full potential. Examples identified in the study include the policies to promote self-sufficiency in wheat; centralized marketing of agricultural products; livestock, land tenure, and land policies; and the inability to stop the decline of the Gezira scheme.

Mistaken belief about food-security and wheat self-sufficiency

Over much of the past decade, common discussions about food security in Sudan have conflated the concept that wheat self-sufficiency adds to food security. However, the reality is that the two

[1] The Herfindahl-Hirschman index is calculated as the sum of the squared market shares for all products.Higher values indicate increasing concentration, with a maximum score of 1.0 when there is a single product.

do not have much to do with each other. Other country examples are illustrative: *First*, Jordan produces virtually no grain at all, and yet has a high degree of food security, due to a substantial volume of modern storage (silos) distributed around the country, and efficient and transparent procurement of grain from the cheapest sources on the world market. *Second*, Indonesia has long considered itself food insecure, despite the fact that it is the third largest producer in the world of its staple grain (43 million tons of rice).

Sudan consumers have changed their taste in grain and shifted emphasis to wheat, a process that will continue and grain consumption patterns may be significantly different again over the next decade. This gradual shift is taking place from the traditional dryland crops of sorghum and millet to wheat. In 2001 grain consumption per capita was 140 kg: 90 kg of sorghum, 10 kg of millet, and 40 kg of wheat. Now it is closer to 96 kg of sorghum (plus about 10 percent for animal feed) and 54 kg of wheat. Consumers continue to change their taste (and demand) and grain consumption patterns may be significantly different again over the next decade. Assuming that the change in preference of the population is permanent, changing the cropping pattern will be a long gradual process, and indeed may only be partial. So the shift in production will not provide increased security for perhaps 10 years, and perhaps never in total.

Sudan is today more secure in wheat than in sorghum and millet. So food security does not reflect the fact that the wheat stocks are mainly imported, and the sorghum and millet mainly produced in-country. The greater part of current modern storage available now in Sudan is for wheat, not for sorghum and millet. In fact, current storage is usually either attached to flour mills or owned by flour millers at Port Sudan. As a consequence, current wheat storage capabilities exceed millet and sorghum and are in the range of two months of wheat consumption. Yet, since the wheat stores are fully private and are dedicated to the milling of flour for the various companies whose strategic storage is limited. Still, these stores represent the equivalent of over two months of current consumption. Compare this with the government's stores of sorghum and millet, which only represent 20 days of consumption of those two commodities. Much more, they are all in the far eastern part of the country, whereas consumption is mainly in the west. Box 3.4 develops a proposal to establish state-level modern grain storage in Sudan.

Yet, the government encourages domestic production for wheat even though there is no comparative advantage for its production in Sudan, which needs more seasonality than most of country provides. This is why Sudan's average yield is half of Chad's, one quarter that of Ethiopia, and 1/14 that of Egypt. Sugarcane is somewhat different, in that some areas of Sudan have achieved good yields in international terms. But sugarcane is the second highest water-consuming field crop in the world, after rice. Meanwhile, Sudan's irrigation schemes are deteriorating rapidly, and the largest, Gezira, is almost to the point of collapse in terms of delivering water. Sudanese farmers know this, and they have turned against sugar as decisively as they have turned against wheat. As for government support of wheat production, this study follows World Bank (2015b) in its recommendation to first shift the focus of subsidies on domestically produced wheat and then, second, to gradually reduce the extent of subsidies on domestic production.

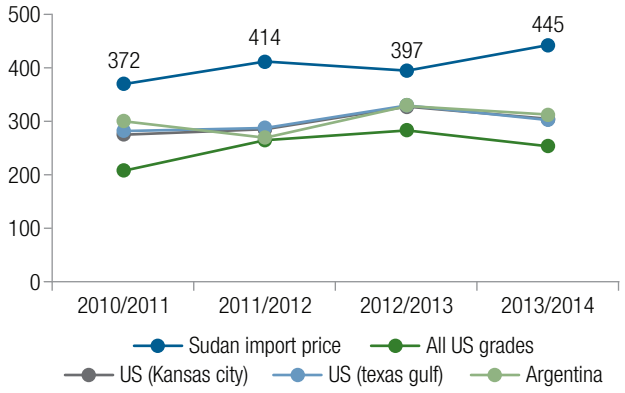
At the very same time that the government subsidizes wheat imports, Sudan also pays too high a price for wheat imports; indeed, there are indications that by changing the import sources the government could significantly reduce the price paid. Wheat imports are being carried out primarily through flourmill companies, for examples SAYGA, Weita, and Seen. The main exporting countries of wheat to Sudan are now Australia, Canada, Germany, and more recently India. The cost of wheat imports could be significantly reduced if Sudan imports wheat from other cheaper sources such as Argentina, Russia, Kazakhstan and the U.S. (Figure S.14).

Centralized marketing of agriculture products

For decades export marketing of gum arabic was under the sole responsibility of the monopolized Gum Arabic Company. From 1969 to 2009 the Gum Arabic Company (GAC) had the sole concession to export raw gum arabic. The main role of the GAC was to preserve and monitor the quality of raw gum arabic exported and to support producers with production and extension services. The GAC had implemented a floor price system for gum at buying centers (auctions). However, the monopoly of the GAC in gum arabic trade was widely regarded as the main reason behind the deterioration of gum arabic production and export in Sudan. Over many years, the low prices paid to producers (about 10–15 percent of export price) accompanied by poor support services led farmers to cultivate crops other than gum arabic. The GAC also faced administrative problems that led to inadequate international promotion and marketing of gum arabic. In addition there were other factors outside the company such as low involvement of banks in the gum arabic trade, multiplied fees and taxes, and lack of strategic stocks.

In a bold move by the government a 2009 liberalized the gum arabic trade and removed the concession that granted monopolistic power to the GAC, affecting the marketing and export of raw gum arabic. The floor price system was also suspended. Meanwhile, a decision was made to establish the Gum Arabic Board (GAB) to coordinate reform measures and support the revival efforts of the gum arabic sector. The main objectives of the GAB were somewhat similar to the former GAC, but without monopoly power or concession. Since then, GAB is responsible for promotion of gum arabic export, opening new markets, providing finance services and quality control. The adopted reform measures have had positive impacts on improvement of production, prices, and income of gum producers as many taxes and charges imposed on gum arabic have been abolished (about 13 out of the 18 taxes and charges) (World Bank, 2013c).

FIGURE S.14: Sudan's Wheat Import Price in Perspective (USD/ton)

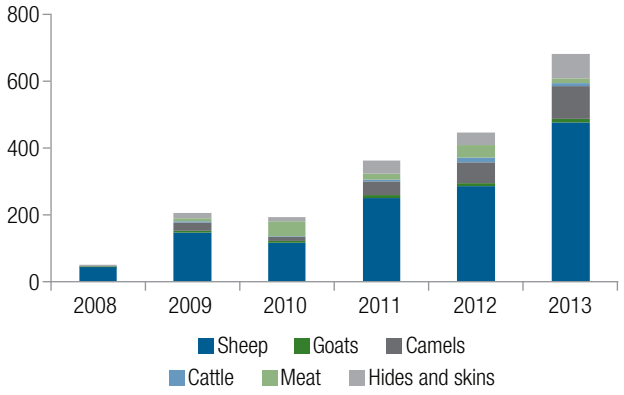


Source: World Bank staff own calculations, based on data from the Sudan Ministry of Agriculture and Irrigation; and the United States Department of Agriculture (USDA).

Similar to the marketing of gum arabic, cotton marketing was in the sole hands of one state-owned entity, the Cotton Public Corporation (CPC), for many decades. CPC was established in 1970 to undertake marketing of all cotton produced in Sudan. In 1986 CPC was closed and the Sudan Cotton Company Ltd (SCCL) was formed. In 1993 the ownership structure of SCCL was changed to let some private influence in, but the Government remained in charge. The then-new mixed shareholders were made up of the Ministry of Finance, cotton farmer groups from the Gezira, Rahadf, and New Halfa irrigation schemes, the Sudan Pension Fund, and the Farmers' Commercial Bank.

But the role of central marketing in cotton exports is declining and the influence of market pricing has become stronger since 2011. Almost all cotton grown under irrigation over the last 35 years has been sold on the world market by the SCCL or its predecessors. This marketing mechanism meant that prices received by cotton farmers in irrigated schemes were usually one uniform price for each variety, after costs of handling, ginning, and marketing had been subtracted. But pricing policies have now changed and cotton producers are paid

FIGURE S.15: Livestock Export Value by Subsectors (USD mn)



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; and the Sudan Ministry of Livestock and Fisheries.

on delivery at the "farm gate" according to grade and type of cotton. There were two triggers for this policy change: the deterioration of cotton production and the changing environment of production relations especially in the Gezira Scheme. At the same time, the infrastructure of the cotton industry is largely diminished, e.g., the number of spinning factories is estimated to be 15 only five of which are working, and there are 17 textile factories, only one or two of them are working.

Livestock, land tenure and land policy

Livestock exports have rapidly become an important part of Sudan's foreign trade and reached a total export volume in excess of US$670 million per year in 2013. Figure S.15 summarizes Sudan's recent export values of livestock products. There was more than a tenfold increase by 2013 compared with 2008 (which, however, was an outlier year due to an imposed export ban and quarantine measures). Live sheep exports dominate the picture, representing more than 70 percent of livestock export. Next in importance are the export of live camels and hides and skins, which are about 14 and 10 percent, respectively, of livestock export. Meat exports fluctuate greatly, which is largely a reflection of the inability of Sudanese meat to compete with other suppliers especially to the Gulf region, due to high cost, lack of modern export facilities, quality considerations, and unsustainable supply.[2]

Contrary to commonly held belief, **the rationale for pastoral livestock is less grounded in satisfying basic needs, such as searching for water to drink, and more due to the unique economic benefits of engaging in pastoral production.** The superiority of pastoral livestock in Sudan appears to be that pastoralists consistently use natural resources more intensively and hence are able to produce more livestock products per unit of land area. Later studies replicated similar findings to the ones reported by Wilson and Clarke (1976) for Sudan and the rest of Africa. Superiority of pastoralists over sedentary farming may be due to the constant optimization by experienced herders of the pasture forage their herds graze. Behnke (2012) found that fenced pastures south of Nyala (now in South Darfur) lost 75 percent of their feed value (largely due to consumption by termites and loss of digestible protein due to volatilization) if left ungrazed from September to the end of the dry season in May. Similar findings are available for Mali, Ethiopia, Kenya, Botswana, Zimbabwe, and Uganda. As a result, pastoralists consistently use natural resources more intensively and produce more livestock products per unit of land area than do sedentary farmers, indeed even commercial ranchers.

Given the unique performance of the livestock sector in Sudan and the fact that pastoralism is so successful, there is surprisingly little policy attention on the sector. This is important in part due to the interlinked issues of land tenure and land policy (Box 3.1), which need to be solved to sustain pastoral livestock production into the future. But there are also other issues, such as inherent volatility of the sector and the real possibility for

[2] No cold or frozen meat is exported from Sudan because of inadequate abattoirs, and handling and transport facilities for chilled meat. Small assignments of whole carcasses of sheep and goats and quarter carcasses of beef are exported through special arrangement between exporters and importers.

it to be negatively affected by droughts and diseases. Hence there is a need for more policy focus on a better, forward-looking management of the sector (World Bank, 2015b).

In fact, the major problem of pastoralism today is the loss of rangeland to mechanized dryland and irrigated farming. A study in Gedaref State (Babikir 2011) reported that grazing lands reduced from 78.5 percent of the State's total area in 1941 (28,250 km^2), to 18.6 percent in 2002 (6,700 km^2). Meanwhile the mechanized farming sector in the State increased by 725 percent in the same period, from 3,150 km^2 in 1941 to 26,000 km^2 in 2002. In other areas, center pivot irrigated farming is used. The old tradition of allowing herds to graze crop residues, while they simultaneously fertilized the land, is now increasingly forgotten, in fact impossible. Instead, farmers sell their residues for cash and clashes between pastoralists and farmers are now much more common than ever before.

Inability to stop the decline of the Gezira scheme

The Gezira Scheme is commonly regarded as the centerpiece of Sudan's agriculture but it is at the verge of collapse. The Gezira scheme was once the pride of Sudan, given the enormous size of the irrigation system (900,000 ha), close to both the capital (and metropolis) of an arid country (Khartoum), and its major port (Port Sudan). With its 90 years of history, three million inhabitants, and certain natural advantages (much of the scheme could be irrigated by gravity with proper infrastructure maintenance), it is obviously the heart of Sudan's agriculture.

Over the years, Gezira's natural advantages encouraged many unsustainable policy shortcuts that eventually only contributed to the scheme's decline. Some of those policies stretch back to the colonial days, in areas as diverse as repeated abrogation of landholders' rights, command cropping plans, exploitation of farmers' interests, skimping on spending both for routine maintenance (e.g., silt removal), and redesign of works to reduce maintenance needs. Most of those needs have accumulated in recent years to the point of virtual collapse of the scheme's irrigation and drainage functions.

In 2014 the head of Gezira's Board of Directors resigned, while the President of Sudan has publicly declared the failure of the scheme. Almost all of the scheme's staff, which once numbered 10,000, have been terminated and portable assets sold off. To turn around its fortune, and to avoid a major loss to Sudan and its agriculture sector in particular, it would seem wise to design and implement a technical feasibility study of rehabilitating Gezira, including an initial benefit-cost analysis of rehabilitation of the scheme. Rehabilitating the scheme would no doubt be a large project, since it would have to compensate for decades of deferred maintenance.

It may be too early to provide any details of a rehabilitation program, there are a number of priorities emerging from the analysis in this study. On the *engineering* side, rehabilitation seems to require mechanized or hydraulic silt exclusion mechanisms at the inlets from the Nile. From an *organizational* perspective any rehabilitation would have to consider the following principles: (1) *Land tenure*: Secure (and transferable) land tenure would have to be assured to all farmers in the scheme, with no differentiation based on when ancestors joined the scheme. (2) *Allow farmers free choice of crops:* Experience shows that farmers know best what crop to use to maximize yields and income. (3) *Principle of cost recovery:* Real cost recovery would have to be agreed by all farmers. Box 3.2 makes a case for the rehabilitation of the Gezira scheme and suggests starting with an in-depth feasibility study.

Seize the Opportunity: Align Consistent Policies for Economic Development

Reconsider exchange rate policies

This analysis finds that a more competitive real exchange rate could support export and output

growth and would have a particularly large effect on the agriculture sector. Empirical evidence presented in this analysis suggests that a 10 percent lower real exchange rate could raise economic growth by 0.9 percentage points in Sudan. Likewise, an undervalued RER is expected to contribute to export growth and this report found an elasticity of 0.7 between real exchange rate depreciation and export growth. Also noteworthy is that the impact of exchange rate adjustments is particularly pronounced in the agriculture sector.

There are two approaches toward large exchange rate adjustments: big bang vs. gradual. The first approach is to do a one-off devaluation. However, a problem of a large sudden devaluation is that will bring about economic disruptions, for instance to trade and debt services, and inflation. And in a way Sudan already tried the approach twice, in 2012 and 2013, with limited success thus far. The second approach is to devalue gradually and credibly. The upside to this approach is that the economy will only have to deal with incremental changes. The downside is that the depreciation expectations would put pressure on the central bank to devalue earlier than planned. For this reason, credibility is key. Given the ever-changing black market rate and the earlier attempts in 2012 and 2013, gradual but ongoing devaluation may be the approach of choice for Sudan.

In the medium- to long-term, and after the official and black market exchange rates have been successfully unified, the question arises for what exchange rate regime may serve the country best. The choices are between pegged and flexible exchange rates, and a case could be made for the former for the following reasons: (1) A pegged exchange rate provides stability that is needed for the export sector. This is especially important if the country would like to promote exports. (2) A peg provides an inflation anchor. Developing countries with low technical and institutional capability often choose to peg their exchange rate as a way to anchor inflation expectation. Sudan may not be an exception to this. (3) A slightly undervalued and rather fixed exchange rate will help the government to accumulate foreign reserves to bolster the exchange rate regime and protect against economic volatility.

Finally, a crawling peg arrangement may be the preferred choice for a pegged exchange rate regime as it combines the advantages of a peg but can also avoid real appreciation. A hard peg (i.e. fixed exchange rate) runs the risk of real appreciation if domestic inflation is high. When the nominal exchange rate is fixed, an increasing domestic price level means that the dollar price of the domestic goods is more expensive compared to the foreign goods—an RER appreciation. With a crawling peg, the nominal exchange rate is allowed to gradually devalue if domestic inflation is high. Since Sudan's inflation is rather high in the post-secession world, a crawling peg may be the preferred arrangement.

Facilitate a stable and low inflation rate

A major driver of recent high inflation is to be found in the practice to monetize parts of the budget deficit through the central bank. Given its serious negative repercussions, however, monetization is not sustainable in the long term; it leads to an upsurge in inflation, an impairment of monetary transmission mechanisms, crowding out of credit to the private sector, real exchange rate appreciation, and worsening foreign trade competitiveness through appreciating the real exchange rate. The monetization practice hence should be urgently reconsidered, especially as core inflation is on the rise, which signals increasing inflation expectations.

Improve the management of natural resource rents

More effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues. The

current practice of government to include into their medium-term plans expectations that successful exploration will add to production should be rethought. This practice substantially increases the government's forecast for oil revenues over the medium-term with a high risk of not being able to meet those targets. A similar issue is observable in the mining sector, where production figures are unclear and may also reflect smuggled in and old gold. It is imperative for natural resource management to have a sound medium-term outlook on natural resource revenues including those from domestic oil, fees, TFA, and gold mining.

Reviving agriculture and building an emerging light manufacturing sector will require investment—public and private—in infrastructure. It is thus imperative for Sudan to raise its gross national savings rate beyond the pre-secession levels. Low savings imply lower availability of funds for productive investment which could transform the Sudanese economy from a highly oil-dependent one to a more diversified one. Given that the secession of South Sudan is a permanent shock to the Sudanese economy there is a real urgency to support the transition to a more diversified economy through higher levels of national savings.

Stable macroeconomic management with low inflation and positive real interest rates is crucial for raising both private and public savings rates. The loss of revenues from oil after 2011 directly lowered public saving. At the same time, the monetization of the budget deficit and a weakening local currency led to skyrocketing inflation. Private savings immediately responded to this situation and lowered their holdings. Because international evidence suggests that the Ricardian equivalence holds only partially (public savings only partially crowd out private saving), policy makers could stimulate national savings by raising public saving. But not in the current fiscal situation where Sudan finds itself. Going forward efforts are needed to facilitate the build-up of private savings rates through lower inflation.

In addition, the high youth dependency ratio has a negative influence on the savings rates in Sudan. Reducing the *effective* youth dependency ratio through job creation is an important supportive factor for higher savings rates. Since most of the young workers start their career in the informal sector, providing job opportunities in the informal sector is a key in reducing youth unemployment. As the youth dependency ratio is a critical determinant of private saving, reducing *effective* youth dependency ratio through job creation in the informal sector holds tremendous potential for enhancing saving. To provide job opportunities for the youth, labor market policy would need to be specific to increase the capacity of the informal sector.

Increase agriculture productivity

Agriculture inputs: Availability and access to agricultural inputs is largely considered one of the main factors affecting productivity, profitability, and competitiveness of agricultural production. The supply of agricultural inputs in Sudan is organized mainly through the Agriculture Bank of Sudan (ABS) and the private sector. The import of fertilizers, tractors, and jute and sacks constitute the major part of imported input value for agriculture inputs, but while increasing, levels are too low to make a significant difference. Improved seed technology is essential for bridging the gap between yields in demonstration trials and farmers' fields. Agricultural research, which is under the responsibility of the central government, has been underfunded for decades. The allocation of resources across various lines of research is primarily a policy decision. The Agricultural Research Corporation (ARC) is the principal research arm of the government on agriculture, in addition to the universities. Agricultural extension services in Sudan are provided by the government through the Ministry of Agriculture and Irrigation and the Ministry of Livestock and Fisheries. The Technology Transfer and Extension Administration

(TTEA) is the responsible technical body for agriculture extension services. But the government delivery of Livestock and Fishery extension services do not appear to be contributing to significant increases in productivity. Looking forward, there is a need to better involve the private sector in delivering extension services.

One of the main inhibiting factors on the production side of crops is the very low level of fertilizer applications. In 2009 the average fertilizer use per hectare of cropland was 7.3 kg, which ranked Sudan at 129 among 155 countries. In the same year, Ethiopia, Sudan's poorer neighbor, used 17 kg (ranking 115). Available statistics indicate that Sudan used as much as 80 kg/ha in the mid-1970s, and 70 kg/ha in the 1980s. While it is not entirely clear how the low fertilizer usage came about, it is clear that the decline in agriculture is associated to fertilizer usage. Raising the bar of agriculture again in Sudan, hence, requires efforts to stimulate fertilizer usage. All hindrances to fertilizer import and distribution, for whatever reasons, need to be lifted, and indeed current policy needs to be replaced by government encouragement (and possible subsidization at first) of fertilizer usage in order to restart this basic ingredient of modern agriculture; without increased fertilizer usage yields of wheat and every other crop will remain at unacceptable levels.

FIGURE S.16: Sudanese Products with Larger World Market Shares, 2013

Source: World Bank staff own calculations, based on data used from UN Comtrade.

Learning from successful reforms in agriculture markets: gum arabic and cotton production and trade saw significant increases after the relaxation of centralized marketing. In each case the Government had instituted monopolized marketing structures in the past (monopsonies) in the form of parastatal companies. As is often the case with such companies, paying farmers less and less for their products (independent of the world price) seems an easy path to profitability, until the farmers stop harvesting or even planting their crops. That this happened can be seen in low yields of not only both gum arabic and cotton, but also many other agriculture products. As the monopsonies were eventually relaxed and competition provided, prices received by farmers increased substantially, and with them so did areas cropped and especially yields. Cotton yields tripled nation nationwide in one year (2010/11), and in three years increased by 5 1/2 times—with no improvements in irrigation or varieties. Such remarkable increases in agricultural yields show that poor agriculture performance is a product of low fertilizer usage, weak varieties due to often local breeds of seeds, but also, and possibly most importantly a lack of incentives for the producers.

Sudan has significant market power in global export markets and regional markets in two product groups each. Sudan's power in global markets for gum arabic and sesame seeds allude to its role of being a price setter in those areas globally. In regional markets Sudan plays a similar role for sheep and sheep meat, and on an emerging basis in waste and scrap of primary cells (Figure S.16).

First steps towards agro-processing: gum arabic could lead the way and show how to combine success in raw material trade with increasing value-addition through the development of processing capabilities. In order to do so, there is a need to understand current constraints to processing products, and how to maximize value addition

through combining processing solutions with smart variations in producing the raw materials. Since value addition would have to come through companies and activities carried out by the private sector, it is also important to look at broader business environment constraints to facilitate a shift towards more value addition.

While Sudan is the largest producer of gum arabic in the world, it has no significant added value processing, a phenomenon observable in most producing countries (World Bank, 2015a). Hence, a core objective of the sector in Sudan is to increase the level of value addition at origin and to increase the share of value-enhanced gum arabic products in the overall gum arabic trade from Sudan. This would lead to improved returns and hence increases in the price paid to producers for the raw material.

The goal for gum arabic value addition should be to reach a level in Sudan that can produce spray dried material with high and defined levels of functionality, particularly in emulsions and encapsulation (World Bank, 2015a). The possibility to add functionality is important, as margins are still not large for bulk sales of a standard processed spray dried gum arabic. Higher margins are created through the production of spray dried material with high and defined levels of functionality, particularly in emulsions and encapsulation. World Bank (2015a) argues that this requires management and development of the raw material supply chain to improve the quality of the crude gum related to functionality, and to put in place a traceability system to allow maintenance of the identity and integrity of batches of crude gum selected for, and defined by, their particular quality attributes.

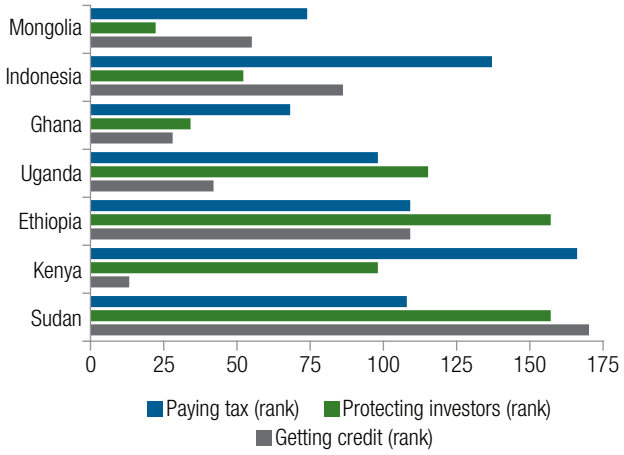
A strategy to increase the level of value addition through the development of spray drying capacity must therefore also address the development of raw material quality and the supply chain. This will also address the perceived quality problems with kibbled and powdered material that result in current low levels of demand for these products and the basic value addition that they offer, and provide a basis on which to build increased sales and value addition. Development of the supply chain will also directly address the issues raised by the overseas processors, and so help secure the overall gum arabic trade and Sudan's dominant place in the trade (World Bank, 2015a).

Address broader business environment constraints

Broader business environment constraints would have to be tackled to facilitate the development of an agro-processing and light manufacturing sector since the business environment in Sudan remains challenging. The 2014 Doing Business (DB) report ranks Sudan 149 out of 189 economies, ranking it marginally lower in comparison with some of its regional neighbors (Kenya 129, Uganda, 132, and Ethiopia at 125). Enabling Sudan to benefit more fully from the export and growth opportunities offered by both the regional and global economy requires: improving the business environment; facilitating trade and regional integration within the Common Market for Eastern and Southern Africa (COMESA) and the Greater Arab Free Trade Area (GAFTA); making credit more available and affordable, especially to smallholders'; and addressing the skills gap. Governance and accountability problems also need to be addressed. Enhancing policy certainty and predictability requires the reduction and removal of the legal and regulatory hurdles to business.

Since 2008 Sudan has experienced a slight deterioration in the business enabling environment; the country l**ags behind the comparators in getting credit and protecting investors, resulting in the lower rank for the ease of doing business** (Figure S.17). Sudan ranked at 170 for getting credit and 157 for protecting investors in the Doing Business (World Bank 2014c). When it comes to starting a business, Sudan's performance is similar to the comparator countries. Sudan ranked at 131

FIGURE S.17: Doing Business 2014: Ranking by Component, Sudan and Selected Countries

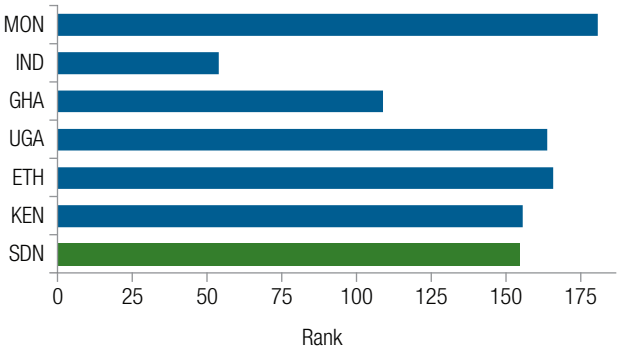


Source: World Bank staff own calculations, based on data from Doing Business (various years).

for starting business while Kenya was at 134 and Ethiopia at 166, respectively. The difficulties to running a business in Sudan lie more in the lack of support to investors and business people than administrative procedure. The strength of investor protection index is relatively low at 3.3 out of 10.

For a country with sea access Sudan has a relatively low ranking on the trade facilitation component of Doing Business indicators

FIGURE S.18: Trading Across Borders Indicator 2014, Sudan and Selected Countries



Source: World Bank staff own calculations, based on data from Doing Business (2014).

(Figure S.18). The Doing Business (2014) ranking for Sudan (155th) on trading across borders is closer to the ones for landlocked countries and slightly worse than the regional average for Sub-Saharan Africa (SSA) (141). Landlocked countries, such as Uganda and Ethiopia in the comparators, often have more penalties than non-landlocked ones in trading across borders (Alvis et al. 2010). Sudan, with relatively good port infrastructure, does not appear to be taking full advantage of its geographic location. It is notable that the cost to import is close to the price for the neighboring comparator landlocked countries.

Build human capital and increase female labor force participation to support structural change

There has not yet been a shift in employment from agriculture and services towards manufacturing, and there is a real lack of an educated work force to allow for effective diversification into new and higher value-added product areas. Half of the population in Sudan has never attended a formal school and only a tiny portion has some post-secondary education. Only 15.8 percent of the population have at most secondary school education, and only 3.8 percent have some post-secondary education. Not surprisingly, education levels are substantially lower in rural than urban areas and substantially lower for women than men (Chapter 2.A). Increasing education levels across all age levels would hence be an important long-term contribution to broaden the human capital endowment in support of diversification of the economy.

But higher education levels in younger cohorts represent an opportunity for Sudan to shift employment into more productive sectors. Older parts of the population have lower education than younger parts and the gender gap in education is smaller in younger cohorts than in older ones. Individuals aged 20–29 have substantially

higher levels of education: one in ten has some post-secondary education and a further one in three has some secondary education. Yet, at present younger workers are no more likely to work in industry, manufacturing, or services than their older compatriots, indicating that there is no capitalization on this opportunity (Chapter 2.A). By creating a more vibrant business environment the Government could build the basis for thriving businesses in higher value-added segments of the economy, which then could increase demand for younger, better-educated members of the work force.

Labor force non-participation is far higher for women than men. Many women are engaged in home production and there appears to be some variance in whether they self-report this as work. Looking at employment and labor force participation for five-year age cohorts shows that non-participation for females rises sharply across cohorts. This pattern may reflect a life-cycle explanation in which many women complete education and do not transition into the formal labor force. It may also reflect a cohort explanation in which younger women are obtaining more education than their predecessors and will go on to enter the labor force. These explanations cannot be separately tested until additional waves of household survey data become available. But the same pattern is not visible for men, most of whom are either in schooling or in the labor force. Younger men are slightly more likely than older men to be neither studying nor in the labor force

The overwhelming majority of women that are labor force non-participating report that they are full-time homemakers or housewives, which is not an uncommon reporting. But there is a high number of discouraged job seekers that show labor force non-participation. This pool of untapped potential workers represents both a challenge and opportunity for Sudan. Almost 750,000 working-age respondents are not employed, not studying, and report that they perceive job search as useless. This accounts for a large majority of non-participation by men and by women who are not homemakers. The pattern is visible for both men and women and in both rural and urban areas. Discouragement is concentrated amongst respondents below median age, in line with a global phenomenon of falling youth labor market engagement.

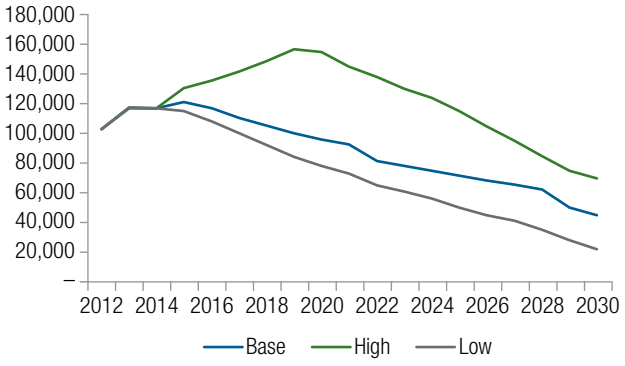
Utilize remaining natural resource wealth for agricultural revival

Remaining natural resources in Sudan are likely to provide some limited time-bound support to the efforts for diversification, but to consider the transient character of natural resources in the post-2011 Sudan is prudent.

The oil projections to 2030, for instance, provide a good example (Figure S.19). Certainly the level will lower over the next one or two decades, and more significantly in the base case considered in this analysis, which is significantly lower than the Government's own projections (equivalent to the high case). In either case, it seems inevitable that oil production will decrease to below 100,000 bpd, but the question is whether this will happen now or in three, five or ten years

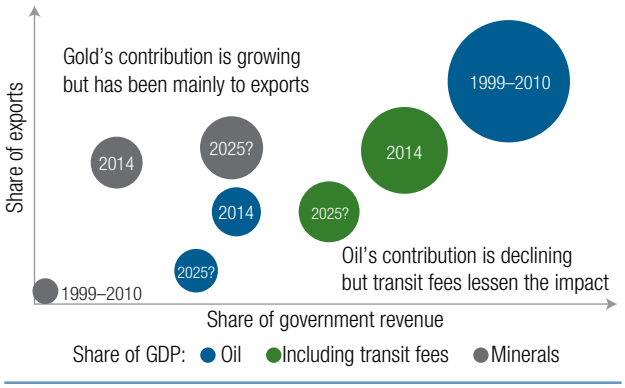
The outlook for gold is slightly more optimistic, and Sudan is projected to produce

FIGURE S.19: Projected Domestic Crude Oil Production, Bpd



Source: World Bank staff own calculations, based on data from Sudan Ministry of Petroleum 2014; IMF 2014c; and Wood Mackenzie 2013.

FIGURE S.20: Contribution of Natural Resources to Sudan's Economy



Source: World Bank staff own visualization.

between 18 to 28 tons annually over the next five years—worth about US$750–US$1,130 million annually. The traditional sector will continue to be the source of most gold produced in this period, although the ability to sustain this contribution beyond this five-year period is increasingly doubtful. A more likely pattern is that industrial mining will become the main source of domestically mined gold after 2020. It is unlikely that production after 2020 would be significantly higher than 18 to 28 tones estimated for the next five years.

The diminishing effects of both oil and gold on Sudan over the next 10 to 15 years are obvious. Figure S.20 provides a summary of the natural resource wealth analysis and shows how the contribution of the both oil and gold to Sudan's economy might evolve in the medium term. The red large circle shows the effects of the oil economy where oil was both a driver for exports and Government revenues. This is likely to shift towards the lower left side over the next 10 years. Even in the high case scenario for oil production this evolution is merely slowed rather than changed. The same would be true of a higher oil price environment, however, at least in the short term the oil price is unlikely to provide much support.

The constrained outlook for exports and revenues from domestic oil production places the spotlight on fees that the Government obtains for the handling of South Sudanese transit oil. The analysis shows that this now has become at least as, if not more, important than the domestic oil sector in terms of exports (almost all South Sudanese oil is presently exported) and government revenues. In Figure S.20 this manifests as the red-line circle that is somewhat between the oil position of 1999/2010 and 2025. Under present arrangements, the GOS obtains fees from South Sudanese oil transportation through Sudan at levels that yield a considerable fiscal surplus (after meeting tariffs charged by the operators of processing and transportation facilities in Sudan). Moreover, this source of fiscal revenues is not linked to oil prices, so it is largely protected from the present oil price uncertainties.

Notwithstanding the fiscal benefits obtained from transit fees, these arrangements can only be expected to be transitory. The time-bound character is manifested in the fact that there are expiration dates of relevant agreements. At the same time, there are medium-term risks relating to i) an uncertain outlook for South Sudan's production rate (as well as uncertainty over TFA volumes if conflict in South Sudan persists for another year); and ii) the incentives created for South Sudan's oil to be used either domestically or exported via an alternative route. As a consequence, Figure S.20 shows the combined contribution of the oil sector diminishing over the medium term (to 2015) both in terms of exports and government revenues.

The Government's emphasis on promoting alternatives to the oil sector is well founded, and there have been early results in the form of the boom in gold exports. A policy of encouraging domestically produced gold to be exported officially so that foreign exchange could accrue to the Government seems to have had success, at least in the short term, even though a major driver of gold activity has been the gold price (Figure S.21) and the main supply response has been from the traditional mining sector, not the industrial mining sector. The main policy concerns about this strategy is

the length of time it will be sustainable in the face of lower gold prices and/or diminishing scope for exploitation of gold by traditional methods.

Traditional mining may, with sufficient support, provide a source of livelihood in rural areas that may have few other sources of economic support. Traditional mining can create direct, indirect, and induced demand for labor, goods, and services in areas where few alternatives exist. With sufficient mapping and resource evaluation it is likely possible to identify areas that are sufficiently rich in gold so that traditional mining could be sustained for more than a few years. Experience from around the world suggests that this planned approach is only likely to take place if traditional mining takes place on a formalized basis, since this provides a basis for miners to obtain legal title and hence finance.

Industrial mining may take some time to take off, however, such a development over the medium to long term would be more likely to provide a more balanced export and revenue contribution to the economy than traditional mining. The Government has made promotion of industrial mining a priority and taken a number of measures to encourage investment in mineral exploration. There are positive signs that the technical conditions on which industrial mining could develop are in place, backed by efforts of the Ministry of Mines to enhance the geological database. The mineral rich Arabian Nubian Shield straddles Sudan and several of its neighbors and has been host to mining activity over millennia owing to an abundance of accessible surface and near-surface deposits of gold and other valuable minerals. Large-scale gold and copper-gold mines developed in neighboring Egypt, Eritrea and Saudi Arabia provide reason for optimism. However, the degree to which Sudan has been explored using modern techniques to establish the viability of mechanized mining and to detect deeper lying deposits remains very limited.

Overall, the contribution of mining to Sudan's economy over the medium term could be positive, however, the scale of the sector is very unlikely to rival that of the oil sector in its heyday and its fiscal impact may be substantially lower. These considerations are reflected in Figure S.19 by the modest increase indicated in export contribution and low increase indicated in the contribution to government revenues. There are numerous scenarios that could unfold, including much less positive ones, in which a lower gold price environment coupled with continuing constraints on financing of major mineral projects means that the recent gold mining boom wanes. Any sustained program of reforms to make the industrial mining sector more competitive and to strengthen regulatory institutions would require strong leadership and probably external support to enhance institutional capability and effectiveness.

Any more thorough evaluation of the contribution of the mining sector to economic development in Sudan would have to take into account negative externalities such as harmful environmental and social impacts. At this stage, impacts of this kind arise mainly in the context of traditional gold mining, though adequate regulatory care will be needed to ensure that further development of the industrial mining sector does not generate an excessive environmental and social burden. There

FIGURE S.21: Export Volumes of Gold Correlated with the Price (Index 2004 = 100)

Source: World Bank staff own calculations, based on data from CBOS 2014; and Ministry of Mining and Natural Resources 2014;

is already evidence that traditional gold mining places the environment, as well as the health and safety of laborers and their dependents, at some risk, given its very rapid and widespread proliferation. It will be important for such risks to be managed carefully to ensure that a good balance is achieved between economic opportunity and environmental and social threat.

At the very least the remaining natural resource wealth available through oil and gold could be used to finance three of the more cost-intensive recommendations developed in this study. These were: (1) The rehabilitation of the Gezira scheme; (2) the establishment of the state-level grain storage; and (3) efforts to increase the education level of the population to increase the human capital endowment to support diversification.

Summing it All Up

The primary objective of this CEM is to support efforts by the Government of Sudan to transition towards a more diversified and "pro-poor" economy. Table S.02 summarizes the main findings and argues that there is an opportunity to better align more consistent policies for economic development.

Table S.02: Summary of Main Findings and Recommendations

Findings	Recommendations
No lasting structural change High and volatile inflation Weak resource management, budget deficits and low savings Long history of overvalued real exchange rate	***Remove exchange restrictions and enhance policy consistency*** • Unify official with black-market rate and maintain a neutral real exchange rate through low inflation • Lower budget deficits and lessen reliance on domestic deficit finance • Allow more resilient investment financing through higher domestic savings • Limit use of financial sector interventions for specific sector promotion ***Improve the management of natural resource rents*** • Establish a sound medium-term outlook on natural resource revenues • More effective volatility management
Extremely low productivity in agriculture	***Increase agriculture productivity through a set of key (policy) changes*** Agriculture policy changes • Rethink centralized marketing of agriculture products and learn from recent gum arabic and cotton experience, where centralized marketing channels were broken up. • Gradually decrease subsidy on domestic wheat production (capitalizing on the recent reform to abolish the preferential wheat exchange rate). • Diversify wheat imports to lower the wheat import bill. Agriculture investments • Promote fertilizer usage. • Establish modern state-level grain storage. • Prepare for rehabilitation of the Gezira scheme. • Strengthen agriculture extension services and better leverage the private sector. Pilot the move from agriculture to agro-processing • Pilot gum arabic spray-drying in combination with increasing the value of raw material. • Apply lessons from pilot for other successful raw exports such as sesame, cotton, and livestock.
Highly concentrated export markets	***Address broader business constraints to create space for structural transformation*** • Facilitate access to credit • Strengthen investor protection • Reduce cost to import ***Build human capital to support skills-intensive modern services and reduce spatial disparities*** • Increase education levels across all age levels to broaden the human capital endowment for a diverse economy • Increase labor force participation for women, which is far lower than for men.

To underpin the findings and recommendations described in this summary, the CEM analyzes Sudan's economy and its challenges in five interlinked chapters.

1. *What kind of growth and diversification suits Sudan?* This presents the economic and sectoral scenarios to 2030 to identify a sectoral focus for this analysis. It also contains a short *baseline* in the form of other country experiences in promoting growth and poverty reduction. The crucial role of institutions critical to diversifying the endowment base of an economy will be highlighted. Finally, some lessons are drawn for Sudan's way to grow and diversify its economy.
2. *Structural change and the role of the real exchange rate for exports and growth.* This chapter will first provide evidence from the labor market on the lack of structural change in the economy. Then it will show the role of the real exchange rate to promote exports and growth. The inflation rate is highlighted as a key variable to influence the level of the real exchange rate.
3. *Agriculture: key for economic diversification*: This chapter reviews agricultural production and yield trends, analysis how markets work in the sector and which products are traded most. It concludes with a description of agriculture support services.
4. *Building endowments through trade: goods and services.* Here trade patterns and goods export performance are reviewed to identify Sudan's main trading products and markets. The role of business services is analyzed and highlighted as another key element for diversification. The chapter concludes with an outlook about the potential for future (export) diversification.
5. *Natural resources: still important but not dominant anymore*: This chapter analysis both the oil and gold sectors in the country in two separate subchapters. It concludes with a combined fiscal and economic outlook of both.

1

WHAT KIND OF GROWTH AND DIVERSIFICATION SUITS SUDAN?

This beginning chapter of the CEM sets the stage for the analysis, and presents various approaches and lessons from other countries in relation to achieving economic growth through diversification. It starts out with presenting the results of a simulation model of the CGE (Computable General Equilibrium) type developed at the World Bank for medium- and long-term policy analysis. The model is used in two ways. First, to look at the sectoral structure of the economy now to 2030 to identify sectors of focus of the analysis. Simulations suggest that in the absence of dominant resource-based exports, growth must be centered on sectors producing tradables that are exported and/or that replace imports. Second, to present a series of alternative scenarios to show the impact of key changes in the economy such as increased TFP growth and the effects of normalization of Sudan's relations with the rest of the world that would, for instance, lead to an increase in Sudan's terms of trade and foreign aid. The non-base scenarios point to the beneficial effects of agricultural productivity growth, showing also that the role of agriculture would likely become more prominent in a setting with a supportive, depreciated real exchange rate

The second part of the analysis in this chapter looks at the 2008 Growth report to identify the "ingredients for growth" from the countries analyzed in 2008 (World Bank 2008a). It finds that Sudan's performance vis-à-vis the "ingredients of growth" is mixed, and between 2000 and 2011 was heavily dependent on the effects of the oil economy. The same section also explores the question on how to achieve "pro-poor" growth. It finds, given that poverty in Sudan is deep and largely a rural phenomenon, the agriculture sector is crucial for efforts to reduce poverty.

The third part of this first chapter looks at a recent report about "Diversified Development" (World Bank, 2014d), which argued that diversification of an economy should be perceived as the diversification of its endowments rather than the production base. The section then follows the analysis presented in World Bank (2014d) and looks, at the triad of institutions that was instrumental in other countries to diversify the endowment base. It finds that Sudan's ability to manage natural resource rents is limited; yet, natural resources have also declined in importance to fiscal revenues. Still, more effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues. The analysis also shows that Sudan's ability to provide public services is a constraint. Historically, GDP growth in Sudan was rarely driven by enhancements in total factor productivity, which would indicate a rising role of human capital formation in the growth process. And human capital formation depends on the effective provision of services. In that regard, Sudan has undergone a process of decentralization that assigned basic service provision to subnational levels. Since fiscal decentralization is lagging behind,

(continued on next page)

however, states do not have the ability to live up to their responsibilities and outcomes for instance for education are both low and with a large variability across states. In addition, conflict, governance and debt are all complicating factors for government to effectively deliver services. Finally, the government's ability to regulate economic activity is being assessed by looking at the business-enabling environment. This environment has stagnated or even slightly deteriorated since 2008, which is a key factor that holds back private activities in support of the Government's diversification agenda. The picture here is also being complicated by the economic and financial sanctions imposed on Sudan.

The chapter concludes that there is a case for Sudan to follow an approach to growth and diversification that pursues both diversification of the production base and of the endowment base. Agriculture is important for "pro-poor" growth and has also great potential to realize quick wins due to its extremely low productivity at present. Trade in goods and services can be seen as an important vehicle to broaden the endowment base and to connect Sudan with international production networks. But lack of skills and skills mismatches indicate that diversifying the human capital base with advances in education is important to support trade in manufactured goods and higher-value added business services. Finally, extractives are still important in Sudan, although they are no longer dominant; still, a good assessment of the potential is a prerequisite for sound future natural resource management.

A. Pathways to the Future: Economic and Sectoral Scenarios to 2030

This analysis develops a base scenario for Sudan designed to represent a central case for the evolution of Sudan's economy up to 2030, and compares this case to a set of alternative scenarios to show how development paths may differ under alternative assumptions. The analysis is important because it highlights the possible impact of key policy changes on the goal of economic development in Sudan. By construction, the base scenario matches the broad developments of the economy anticipated in recent World Bank and IMF reports (World Bank 2014a–g; and IMF 2014a–c). The non-base scenarios address domestic issues (agricultural productivity growth and the real exchange rate) and the effects of normalized relations with the rest of the world. Apart from standard macroeconomic indicators, the analysis also highlights the impact of alternative scenarios on sectoral developments.

Looking forward: The base scenario to 2030

The base scenario assumes that, for the period 2013 to 2030, annual growth in GDP at factor cost is at 4.1 percent. GDP at factor cost growth is above the growth rates for absorption (the sum of private and government consumption and investment) and private final demands (private [or household] consumption and private investment) due to export growth in excess of import growth, driven by real exchange rate depreciation. Among macro items, only government investment grows more rapidly than GDP, a reflection of the fact that it starts at a very low level. A change in sector structure is needed to put an end to unsustainable foreign government borrowing, particularly against the backdrop of a projected decline in gold export prices. Annex 1 has detailed results for the base scenario and other scenarios summarized in Tables 0.5–0.9 and 1.1.1–1.1.5.

Sudan switches from being a net exporter to net importer of oil in 2018–2019. As a result, the recent oil price decline and projected low price

level up to 2030 (compared to 2012) has a positive impact on Sudan's economy. GDP growth is primarily due to increased factor employment. In per capita terms, projected growth rates are around 2.2 percentage points lower (i.e. 1.9 percent), given projected annual population growth at this rate. The growth rates for employment and private per-capita consumption are still sufficient to reduce the unemployment and poverty rates, respectively.

The shares of exports and gross national savings in GDP will increase significantly from 2012 to 2030 (Annex 1, Table 0.6). In spite of moderate import growth and low foreign borrowing, the import and foreign debt GDP shares both increase due to exchange rate depreciation. In the government budget (Annex 1, Table 0.7), a comparison between GDP shares data for 2012 and 2030 indicates that the receipt shares for taxes and domestic transfers increase while both foreign and domestic borrowing decline; on the spending side, investment increases strongly while subsidies (for petroleum products) decline, reflecting a projected policy change. In the balance of payments (Annex 1, Table 0.8), the GDP shares in 2030 compared to 2012 are boosted by exchange rate depreciation; among outflows, the main change is higher imports while, among inflows, the main changes are increases for exports and private transfers, while borrowing and FDI are lower.

Looking at the components of domestic demand, public investment is projected to have the strongest initial and overall growth, albeit starting from a very low level. Figures 2.1.2 to 2.1.5 show the evolution over time for the level of real macro aggregates (at 2012 constant prices). While expansion in GDP at factor cost is relatively smooth, absorption initially declines when exports initially increase and imports contract to address external imbalances (Figures 2.1.2 and 2.1.3). All domestic final demands (private and public consumption and investment) decline in 2013 after which growth is positive during the rest of the period, with the strongest initial and over-all growth for public investment (which starts at merely 1.5 percent of GDP) (Figures 2.1.3 and 2.1.4).

Within production sectors, annual growth rates are close to 4 percent except for stronger growth for agriculture and negative growth for the mining sector (petroleum and gold).[3] Agriculture growth benefits most strongly from improved incentives due to exchange rate depreciation. On the other hand, the two mining sectors, petroleum and gold, show negative growth due to natural constraints of resource availability (Annex 1, Table 0.9). Over time, growth is also quite stable, initially relatively low for relatively non-traded sectors (public services and other industry) since they do not benefit from the improved incentives due to exchange rate depreciation (Figures 2.1.5 and 2.1.6).

The sectoral structure of Sudan's economy shows growing importance of agriculture, less importance of extractives, and relative stability of other sectors (manufacturing, services) by 2030. Annex 1, Table 0.10 compares 2012 data to simulated base results for 2030 in terms of sector shares in exports, value-added, employment, and imports as well as, for each sector, the output share destined for exports and the demand share met by imports. The main changes by 2030 include:

- *Increased prominence for the agricultural sector*: its shares in exports, value-added, and employment all increase (most dramatically for exports) while its share in total imports falls and imports meet a smaller share of domestic demand for agricultural products;
- *Reduced importance for extractives*, especially in exports but also in value added and employment, combined with increased reliance on imports to meet domestic demands; and

[3] These relatively uniform growth rates across sectors are in part due to scenario assumptions, including relatively uniform rates of productivity growth. The patterns of future deviations from these assumptions are difficult to predict.

- *Relatively small changes in other sectors*, even though manufacturing and private services both become slightly more open, with increased shares in total exports and imports, larger shares of output going to exports and imports meeting larger shares of domestic demand.

The simulations show the strongest growth rates for from sectors that are capable of producing internationally competitive tradables. While the simulations cannot provide an accurate and detailed picture of the future sector structure of Sudan's economy—such a picture would require knowledge about too many unknowns—it can highlight some of the main trends. Simulations suggest that in the absence of dominant resource-based exports, growth must be centered on sectors producing tradables that are exported and/or replace imports. It is therefore noteworthy that a sectoral focus of this CEM is to look at agriculture and trade of goods and services as a means to grow the endowments base of the country.

Assuming more optimistic extractive sector developments in the base scenario has only a marginal impact, further underlining the importance of the development of a non-extractive productive sector for tradables. In order to test the sensitivity of the results to the assumptions for the mining sector (including an early decline in oil production and declining gold export prices; see Figure 1.2.1), a more optimistic scenario (named Mining+) was tested. It is identical to the base except for that (i) gold export prices stay constant in real terms up to 2030 (instead of declining during the period 2016–2025 at an annual rate of 3 percent); and (ii) oil production follows the high case shown in Chapter 5. The results, which are summarized in Figures 1.2.2, 1.2.3, and 1.2.4, suggest that Mining+ would marginally raise the growth rates for GDP (+0.1 percent) and private consumption (+0.2 percent) and mitigate the required change in sector structure. Nevertheless, the effects would be quite marginal.

Looking forward: Alternative scenarios

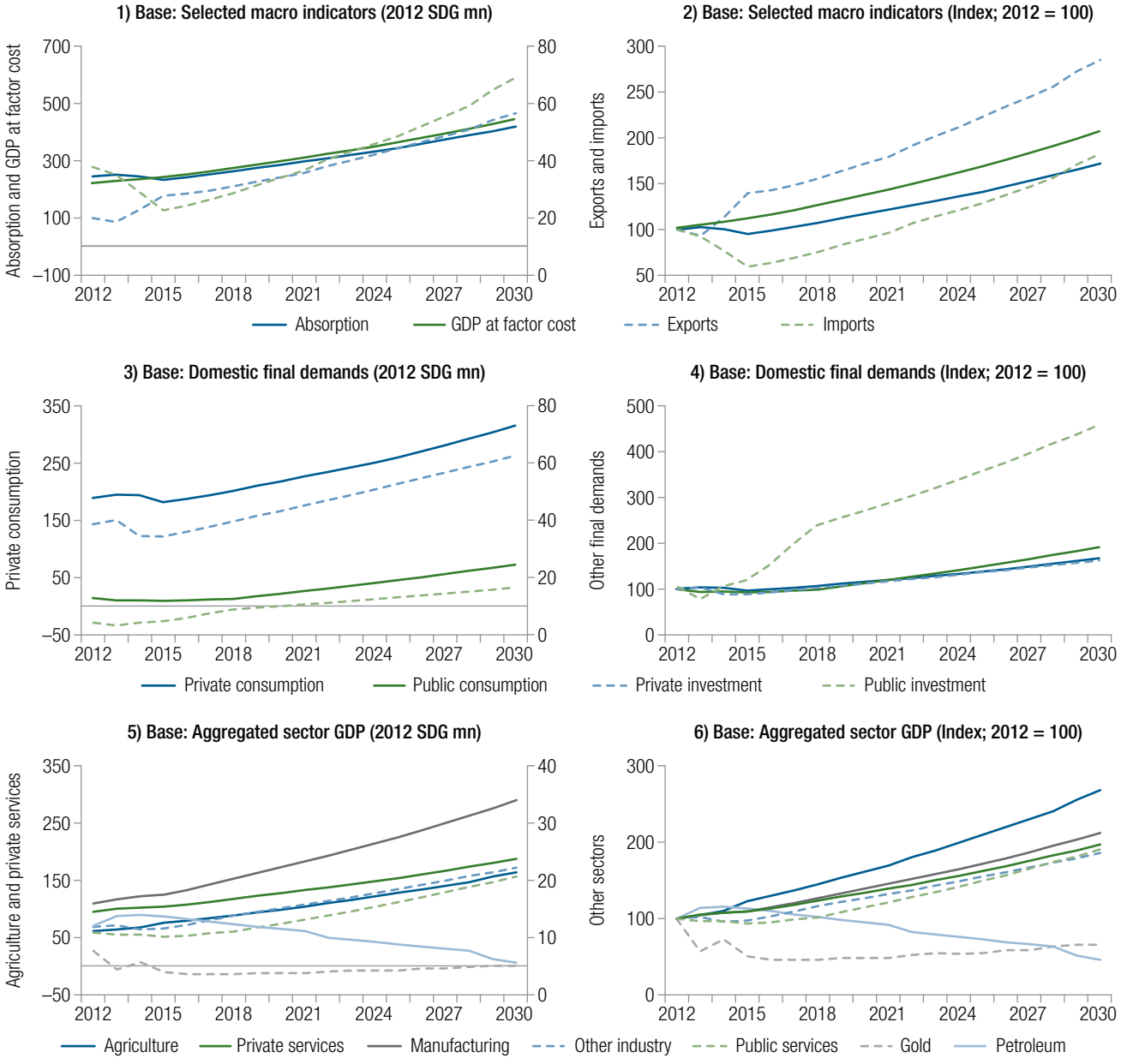
Two main alternatives scenarios are tested for Sudan's economy, addressing (i) the potential role of agriculture as the economy enters an era in which oil only will play a marginal role and only in part is replaced by gold; and (ii) the effects of a potential normalization of relations with the outside world. Accordingly, the non-base scenarios, defined in Annex 1, Table 0.4, are divided into two groups. (1) The first focuses on issues related to the responses of the economy to policies leading to stronger TFP growth for crop agriculture and depreciation of the real exchange rate. (2) The second group addresses channels through which normalized foreign relations may influence the economy: improved terms of trade (via higher export prices and lower import prices as Sudan's access to markets improves); increased aid; and debt relief.

During the oil boom, Sudan's real exchange rate appreciated, penalizing production of non-oil tradables, a phenomenon commonly known as "Dutch disease," but this is now being reversed. Unless major new natural resources are uncovered and exploited, Sudan will in the future reverse this trend, as indicated by the pattern of sectoral growth for the base scenario, including above average growth for agriculture. In this new external environment, the prospects for high payoffs from policies supporting agricultural growth are better.

Simulating increased TFP growth for crop agriculture (Crop+), stagnant private transfers (Rem–), and these two simulations combined (Crop+Rem–)

TFP growth has a strong positive impact and the decline in remittances a negative impact on GDP at factor cost, imports, and domestic final demands. The simulation combining the two predictably has a more muted effect (Figure 1.2.5). For all three simulations, exports are boosted due to stronger TFP growth for a major tradable sector (Crop+), improved export incentives due to

FIGURE 1.1: Model Base Scenarios: Selected Indicators, 2012 to 2030



Source: World Bank staff own calculations using the MAMS Sudan Model.

depreciation (Rem–), and both of these effects combined (Crop+Rem–). GDP growth, total and for most sectors, is positively affected by higher TFP growth for crops, also when it is combined with lower remittances (Figure 1.2.6).

Among individual sectors, crop agriculture gains most, not only when targeted but also when a decline in remittances leads to real depreciation. The other sectors that are most strongly affected—manufacturing, other industry, and private services—are influenced by domestic demand developments. Gold is the only sector that shrinks when agricultural productivity is boosted, a reflection of its export orientation and the worsening of export incentives. Also in terms of export growth, the agricultural sector gains under all three

simulations (Figure 1.2.7). Other tradables with export flexibility (livestock and gold) respond to major changes in the real exchange rate, contracting exports under Crop+, expanding them under Rem–, and with only minor changes under Crop+Rem–.

In sum, the simulation results suggest that agricultural TFP growth has a generally positive impact on macro indicators and sectoral growth. However, given that it leads to appreciation of the real exchange rate, it may discourage other exports.[4] Export growth across all relevant sectors is boosted by smaller foreign exchange inflows from a non-trade source (here with lower worker remittances as an example), but in this case the impact on other macro indicators and sector growth tends to be negative, with the exception of strongly export-oriented sectors. In the context of lower remittances, higher agricultural TFP growth mitigates or may even overcome (depending on its strength) the negative macro effects of the loss in remittances. Stronger agricultural TFP growth also has significant positive effects on poverty reduction and employment.

The simulation also points to the importance of the real exchange rate as a factor that works for or against export growth. This is consistent with the analysis presented in section 2.B of this report. In order to further explore this aspect, MAMS was used to run a set of hypothetical simulations for 2013 which simultaneously had the real exchange rate depreciate and additional foreign exchange reserves put aside by the financial system. Figure 1.2.8 shows a positive and near-linear relationship between the export quantities (both total and sectoral); in the background, the maximum depreciation, at almost 22 percent, is associated with an addition to foreign reserves corresponding to close to 6 percent of GDP. According to the simulation results, the elasticities of real exports with respect to the real exchange rate are around 0.7 for manufacturing, private services, and total exports but much higher (around 2.1) for agriculture. These findings are consistent with the observed downturn for the agricultural sector during the period of oil boom and suggest that real depreciation would be needed to facilitate stronger export performance.

Normalization of relations with the rest of the world

The "normalization" simulations capture effects via three channels, initially introduced separately—improved terms of trade (the simulation TofT+), increased aid (Aid+), and foreign debt relief (Debt-)—and subsequently combined in one simulation (Normal). Given that this quantification at best is highly approximate, the results should be viewed as input into thinking on these issues as opposed to offering precise impacts.

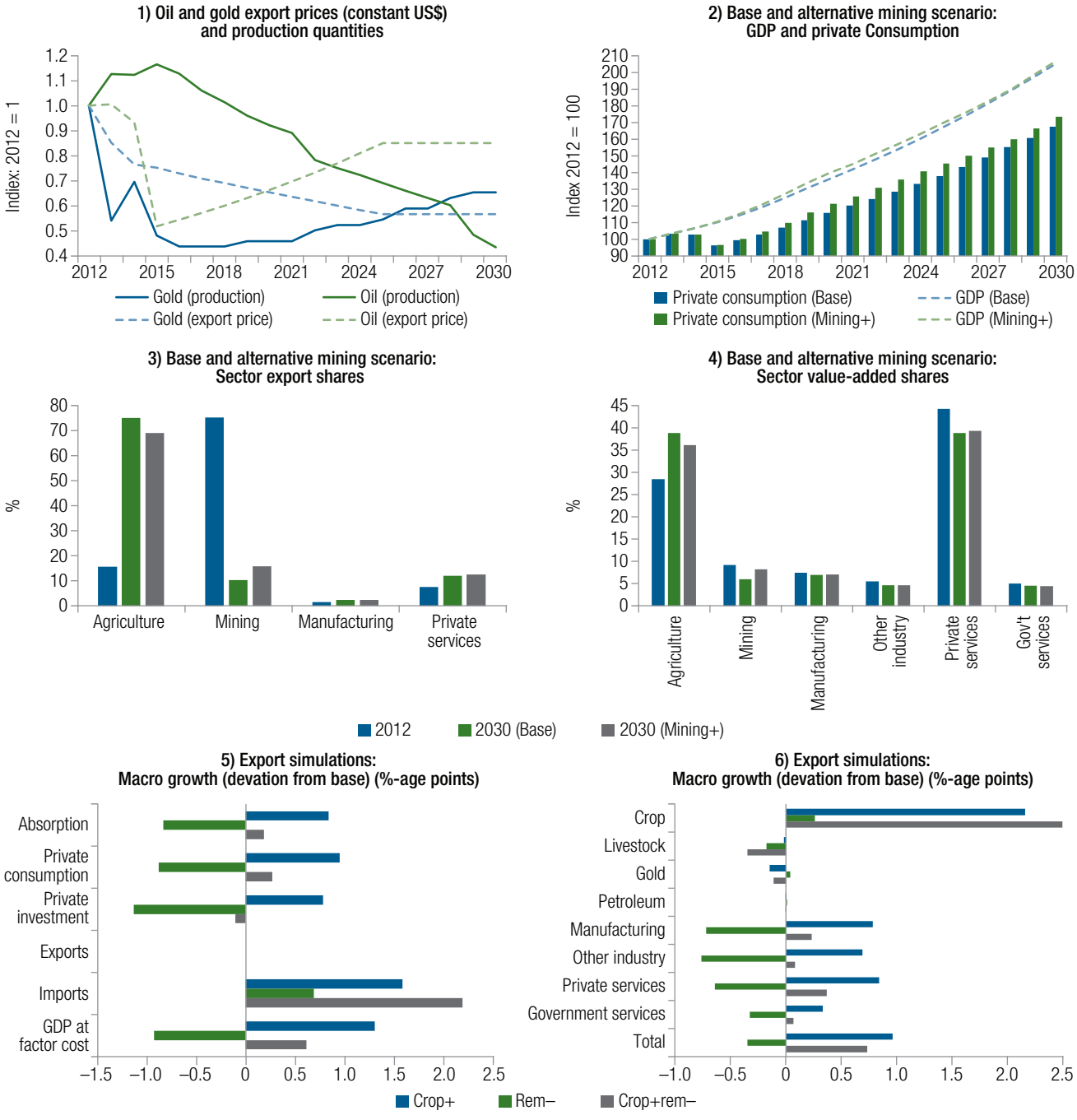
Normalization simulations show that terms-of-trade improvements (TofT+), raise GDP growth by 0.2 percentage points. In fact it has a more positive impact on absorption (increase by 0.4 percentage points), reflected in higher private consumption and investment; growth for government consumption and investment are kept unchanged (Figures 2.2.9 and 2.2.10).

Simulations also show that the 2030 unemployment and poverty rates would be significantly lower in the normalization scenario than for the base scenario. The government is able to reduce the tax rates and the tax intake (as share of GDP) given that higher growth generates higher revenues while two major spending items, government consumption and investment, are fixed in real terms, reducing financing needs relative to GDP.

The effects of increased aid are positive but modest. The effects of increased aid (Aid+) are positive but, at the envisaged levels additional grants and borrowing, very modest, raise most

[4] As an aside, for Sudan and other countries, different sources of foreign exchange earnings tend to compete for space in the basket of foreign exchange sources. The fact that after 1999 the expansion of Sudan's oil exports depressed exports from other sectors is an obvious example. However, this displacement effect is weaker if the expansion of exports for one sector is associated with expansion of foreign exchange *out*flows, for example due to the importation of intermediates or profit remittances (if the sector has significant foreign ownership) or if foreign exchange is set aside to add to foreign reserves.

FIGURE 1.2: Model Alternative Scenarios: Selected Indicators, 2012 to 2030



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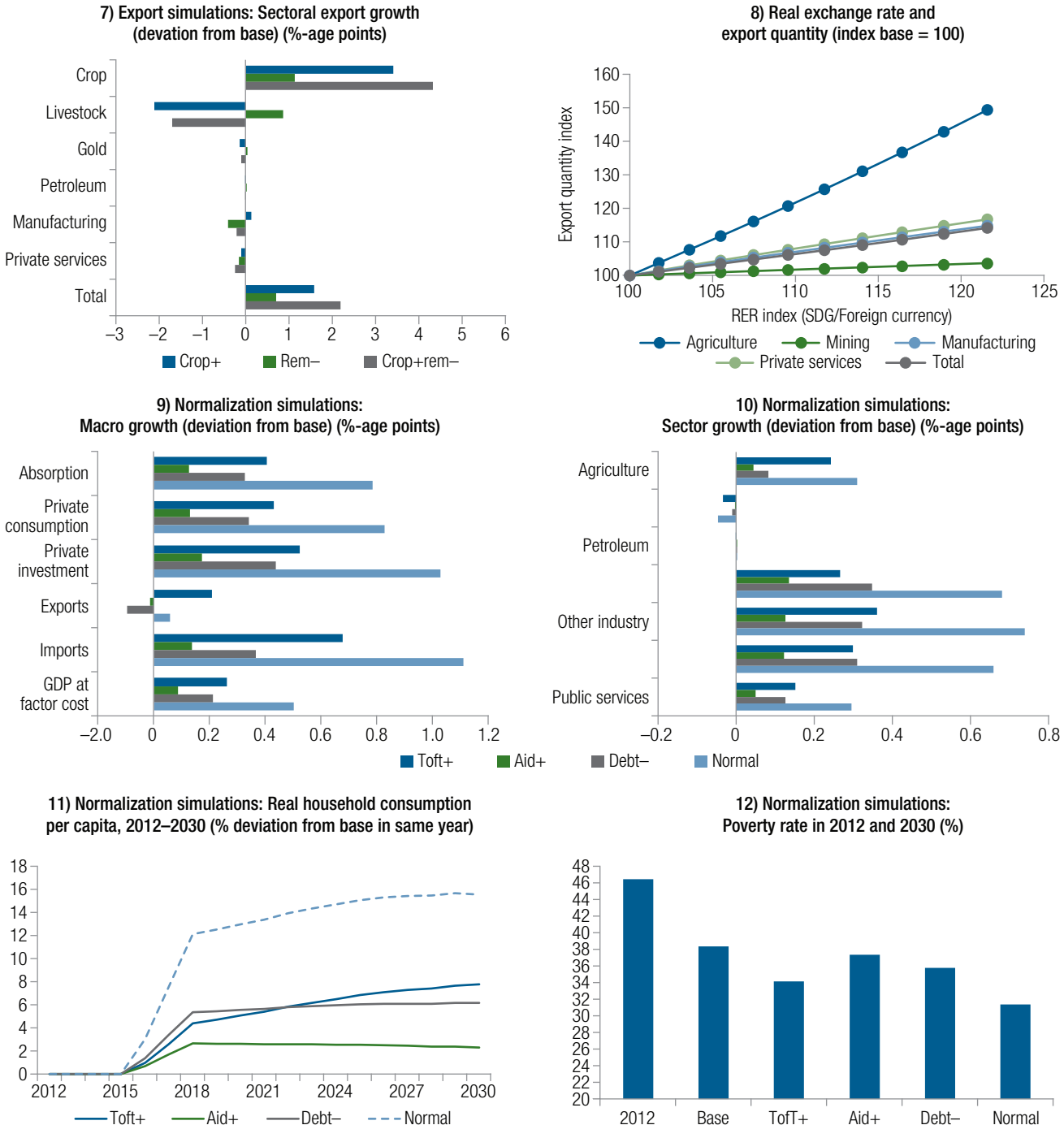
macro growth rates, including private demands (consumption and investment) and imports, by 0.1–0.2 percentage points (Figure 1.2.9). In the balance of payments, increased government inflows are used to raise the trade deficit and to pay additional interest.

Foreign debt relief has a strong impact, leading to declining export growth and accelerating

FIGURE 1.2: Model Alternative Scenarios: Selected Indicators, 2012 to 2030 (*continued*)



Source: World Bank staff calculations using the MAMS Sudan Model.

import growth. Foreign debt relief (Debt-) has a stronger impact—GDP growth increases by 0.2 percentage points while export growth declines and import growth accelerates, permitting growth increases by 0.3–0.4 percentage points for absorption, private consumption, and private investment (Figure 1.2.9). The driving force and the main change in the balance of payments is a decline in net

interest payments on foreign debt. By 2030, the total foreign debt would be 37 percent of GDP, compared to above 114 percent for the base scenario. For the government, lower foreign interest payments make it possible to reduce taxes (Table 2.3). Alternatively, the government could raise spending. Whether this would lead to better social and economic outcomes depends on the relative marginal efficiencies of government vs. private spending in terms of contributing to Sudanese development objectives; it is beyond the scope of this analysis to address this issue

Combining all normalization changes under one simulation shows cumulative gains in many macro indicators compared to the base scenario (Figure 1.2.9). The combined result of debt relief and higher foreign borrowing would lead to a 2030 foreign debt at 46 percent of GDP, compared to 37 percent when debt relief is introduced without an increase in foreign borrowing (Debt-). For the government, the increases in receipts from foreign sources is used to reduce taxation, which in 2030 is merely 6.9 percent of GDP (compared to 10.3 percent for base), other things being equal permitting higher private consumption and investment. Alternatively, the government could raise spending.

At the sector level, normalization leads to a diverse set of responses with the strongest gains for sectors that primarily meet domestic demands. Among the production sectors (Figure 1.2.10), the real growth is unchanged for mining (which are constrained by the availability of natural resources). The gains are relatively weak for government services (due to the fact that they primarily meet government demands, which are unchanged in real terms) and agriculture (which is negatively influenced by real exchange rate appreciation, compared to the base). The growth gains are stronger for the relatively non-traded private service and other industry sectors, which primarily are driven by domestic demand.

In sum, the welfare impact of normalization is largely positive, with increased household consumption leading to a decline in the poverty rate of about 7 percentage points in 2030 compared to the base scenario. Figure 1.2.11 summarizes the simulated welfare impact of normalization, which translates into a 16 percent increase in real household per-capita consumption in 2030, with the strongest impact from improved terms of trade, followed by debt relief and increased aid. The increases in household consumption bring about a 7 percentage point reduction in poverty in 2030 compared to the base scenario (Figure 1.2.12). At the very least, normalization would significantly soften the challenge of adapting Sudan's economic structure so that it can thrive in the post-oil era, most importantly via a revival of agriculture and other tradable sectors.

B. Components of Inclusive Growth

a. *Ingredients for growth*

International experience

Economic growth is a necessary condition for economic and social development of any country and key for poverty reduction (Dollar and Kraay, 2002). But one of the key issues of a majority of the low-income countries is how to boost economic growth and how to maintain it for a longer period of time in order to catch up with the middle- and high-income countries. One of the most influential analyses in this field is the Growth Report of 2008 (World Bank 2008), which underlies this section of the report.

Looking at a set of high-growth economies of the past, the Growth Report 2008 identified common characteristics of successfully applied growth models—the "ingredients of growth"—to inform policy formulation around the world. The Growth Report analyzed the experiences of the thirteen fastest growing economies[5] in the world

[5] Botswana, Brazil, China, Hong Kong – China, Indonesia, Japan, the Republic of Korea, Malaysia, Malta, Oman, Singapore, Taiwan – China, and Thailand.

that managed to sustain their growth rates of at least 7 percent in the last 25 years (or sometimes longer). Six of these thirteen economies even managed to reach the per-capita income level of industrialized economies.[6] There are seven "ingredients of growth" that could be particularly relevant for post-secession Sudan.

For an economy to grow there is a need for high levels of investment and savings. This "ingredient" of growth is related to the need for an initial accumulation of resources that can be used later on in the production of goods and services. Typical for the high growth economies is that their overall investments (public and private) are around 25 percent of GDP. Within this envelope and especially shown by some of the successful Asian countries (China, Thailand, and Vietnam), the public investment in the infrastructure sector was between 5 and 7 percent of GDP. The Growth Report 2008 emphasizes the importance of domestic savings as a counterpart of investments. Attracting FDI is important in that regard, but the Growth Report argues that an economy should not only rely on foreign savings to avoid vulnerability to fluctuations in inflows, especially in downturn periods. The importance of domestic savings is their stability and relative predictability. Sudan's experience in matching savings and investments is analyzed in Chapter 1.C; it will show that Sudan's savings rate is low and the savings-investments gap is large.

To foster structural change and growth an economy needs access to technology and knowledge through an active transfer of know-how. Technology transfer and inflow of know-how is usually associated with FDI inflows. In successful countries domestically owned companies are able to absorb technologies and know-how from advanced countries, thereby compensating for the relatively low capacity and resources for research and development.

Successful countries in the past have supported competition and structural change. Public policy that clearly supports competition on markets is identified as key for the growth process in any economy. And the single most important government support for having competitive markets is to keep entry and exit barriers of markets low. This allows progressive and innovative firms to more easily enter markets, which contributes to bringing about new technology, products, and services. More importantly, easy entrance of new and efficient firms has a spillover on incumbent firms in that it increases the need to raise the levels of their efficiency to stay in the market.

Policies that allow flexible labor markets to form and match supply and demand have been growth enhancing in other countries. The Growth Report argues that governments should support labor market flexibility in a view that this supports the goal of structural change in the economy. It is further argued that policy measures that enable workers and employers to more easily match each other are particularly important. Sudan's experience in pursuing structural change from the perspective of labor markets is analyzed Chapter 2.A; it shows that Sudan's record in furthering structural change and moving employment from low to higher value-added activities is very limited.

Export-led growth is associated with high-growth countries, especially if it is of a diversified nature. The export sector played a critical role in the thirteen high growth countries, especially in the initial period of their growth process. Much more, policies to facilitate exports are most effective if they support export diversification. Designing policies for non-natural resource exports is particularly important in resource rich countries.

An active exchange rate policy can support export development. In the early stages of export growth, experience shows that a low (depreciated) exchange rate can support nurturing an export sector. Keeping the exchange rate low initially also prevents the need of an economy to rely overly on

[6] Hong Kong – China, Japan, the Republic of Korea, Malta, Singapore and Taiwan – China.

capital inflows (foreign savings), which are notoriously unstable and unpredictable thereby increasing the vulnerability to shocks. On the negative side, however, an exchange rate policy that pursues a depreciated path for export promotion tends to encourage mainly labor-intensive export sectors rather than higher-valued more technology intensive sectors that are critical for long-term structural change. The role of the exchange rate in Sudan's development experience over the past four decades is analyzed in Chapter 2.A; it shows that Sudan's real exchange rate was overvalued for most of the past 40 years and that the nominal devaluations after the secession of South Sudan were not able to devalue the exchange rate in real terms due to simultaneous very high inflation rates.

Developed financial sectors that are open and connected with international financial markets are conducive to economic growth. Development of the financial sector is particularly relevant because of its ability to support the goal of high savings for high investments. A more developed financial system increases the level of financial inclusion, thereby helping the economy to better mobilize savings and to allocate them more easily to investment needs. Consequently, the Growth Report 2008 encourages policies that aid the development of financial systems. Another complementary determinant of growth is the financial openness of a country that, in the long run, aids the goals of financial development and deepening. Sudan's international connectivity is significantly limited due to the role of economic and financial sector sanctions imposed on Sudan successively since 1997.

Macroeconomic stability is one of the main pre-conditions for ensuring long-term growth of an economy. Yet, the Growth Report does not offer a unified definition of "macroeconomic stability." But it points to the fact that monetary and fiscal policy makers hold the keys for macroeconomic stability in their hands. To this end, the Growth Report emphasizes the need for independent central banks. In terms of fiscal policy, the lessons from the high growth countries show that policies that avoid running high budget deficits over long periods of time and efforts to keep debt-to-GDP ratios at sustainable levels pay off positively over time. In addition, in order to maintain macroeconomic stability an effective and committed government, clearly focused on the long-term growth objectives, is needed.

The Growth Report recommends support to productivity enhancements in the agricultural sector as particular important for growth in resource-rich African countries. Looking at sub-Saharan and resource-rich African countries the report identifies several key areas where the policy makers could place greater priority in order for growth strategies to "work." For example, governments should aim to provide greater support to the agricultural sector in direction of increasing the productivity. The majority of the labor force employed in Africa (formally and informally) is engaged in agricultural production. Hence, increasing productivity may be important for raising the output per-worker and the overall value added. This would also reduce the unemployment rate and aid the process of poverty reduction.

While the "ingredients of growth" generally refer to domestic policies, those policies can be leveraged through fostering an open international environment and trade integration. The Growth Report explicitly argues that all of the analyzed high growth economies benefited from the changing global environment, i.e. the process of rapid openness and integration of the world economy after the 1950s. This process is still ongoing and is characterized by greater openness of local and global markets, an increase of the volume of global trade, and increased financial integration that stimulated the financial flows from one part of the world to the other, including capital movements such as foreign direct investments (FDI).

There are two main channels through which global integration of trade and capital flows can leverage domestic policies for growth. *First*, capital mobility and related FDI flows contribute

substantially to technology and know-how sharing. To a large extent, FDI inflows in the thirteen high growth countries of the Growth Report originated from international corporations, which thus helped the countries to import new technology, knowledge and know-how from the rest of the world. The result of the spread of new technology and know-how in the domestic economies is that it substantially reduces the cost of acquiring new technology and know-how. This in turn helps recipient countries to develop their own competitive technologies and products, which supports the goal of product diversification and structural change in the economy.

***Second*, global integration leads to more competition on trade markets**. More competition means more products on domestic markets and tends to lower prices for inputs and end-consumption. It also provides an opportunity for domestic producers to face global demand and expand sales on international markets. At the same time, imports of new technology and know-how, accompanied by the trade integration in the world's markets, provides an opportunity to local producers to specialize in areas where they have a comparative advantage. This process incentivizes local producers to raise productivity and expand their output globally, especially those from the manufacturing sector where spillover effects to other sectors in the economy are greatest.

Situation in Sudan

Sudan's performance vis-à-vis the "ingredients of growth" is mixed, and between 2000 and 2011 heavily dependent on the effects of the oil economy. Time-series data shows that there were fundamental changes in the structure if the economy over the past 10 to 15 years mainly due to the advent of oil in 1999 and in the most recent period since 2011, due to the secession of South Sudan. Those changes are particularly pronounced in the areas of investments and savings, the export sector, FDI inflows, price stability, and, ultimately on GDP growth (Table 1.1). Some highlights are:

Table 1.1: Major Ingredients to Growth and Sudan's Record

Growth "ingredients" identified by the Growth Report 2008	Sudan's historical record
High levels of investment ≥ 25% of GDP and savings between 20–25% of GDP	Average level of gross investment during the period 1980–2012 is 18.8% and during the period 2000–2012 is 25.7% of GDP. Average gross fixed capital formation during the period 1980–2012 is 15.3% of GDP and average during the period 2000–2012 is 21.2% of GDP. Average level of gross savings for the period 1980–2012 is 13.4% of GDP and during the period 2000–2011 is 23.4%. Post-secession savings rates are in single digits and too low to drive and match investments.
Technology, knowledge and know-how transfer (requires FDI)	Average level of FDIs for the period 1980–2011 is 3.3% of GDP, for the period 2000–2012 is 7.8% of GDP.
Supporting competition and structural change	The World Bank Investment Climate Assessment of 2009 suggests a poor functioning of markets to allocate resources in the economy. This is primarily due to tight controls through the state in procurement processes, financial markets, and land markets (World Bank 2009b).
Labor market support	The formal labor market is tightly controlled, preventing the efficient match of supply and demand, and giving rise to informal, unregulated labor markets (World Bank 2009b).
Export promotion and exchange rate policy	Average level of exports of goods and services for the period 1980–2011 is 10.5%, for the period 2000–2012 is 16.9%. Official nominal exchange rate depreciated sharply in 2012 and there is a parallel exchange rate market.
Financial sector development and openness	Private credit-to-GDP ratio average for the period 1980–2012 is 11.8%, for the period 2000–2012 is 12.9%.
Macroeconomic stability	Average annual inflation for the period 1980–2012 is 40.2%, for the period 2000–2012 is 12.3%. The inflation is volatile during the recent period 2008–2012. Budget deficit is narrowing from 7.1% of GDP in 2008 to 5% in 2012. External public debt is growing rapidly from 60.2% of GDP in 2008 to 82.2% of GDP in 2012.

Source: Growth Report (2008); and World Bank staff own calculations, based on data from the WDI and IMF, and the analysis of World Bank 2009b.

- *Investment and savings:* Sudan's average level of investment to GDP ratio was been below 20 percent before 2000. Since then, mainly due to the oil discovery, the average level of investment has increased and was just above the 25 percent threshold level suggested by the Growth Report.[7] Similar conclusions hold for the gross savings in the country, which had increased during the oil economy, reaching the lower bound of the suggested threshold level. This indicates that the levels of savings and gross investment were relatively high during the oil period. Nevertheless, investments were concentrated on the oil-related economy and hence its contribution to diversify the economy as such was rather modest. However, looking at the post-secession period shows that gross national savings fell to a low of 8.5 percent of GDP, the lowest level since 1999. Raising the savings rate to match and drive investments is an immediate need for Sudan's economy to master the transition.
- *Technology and know-how transfer:* As mentioned earlier, FDI is critical for technology and knowledge transfer. And indeed, FDI has increased in Sudan from 2000 forward; an even more rapid inflow can be seen over the 2003 to 2010 period. This was again related to the oil economy. Data from fDi Markets, which records Greenfield projects in Africa, shows that between 2003 and 2010, two-thirds of recorded Greenfield projects went into the natural resource sector (coal, oil, and natural gas); much more, it records a virtual standstill of FDI in Sudan since the secession of South Sudan in 2011, confirming the dominance of the natural resource sector in the previous period. It also highlights the fact that in present day Sudan FDI-induced technology and know-how transfer is minimal and negligible.
- *Export promotion and diversification:* Sudan's exports-to-GDP ratio expanded significantly starting in 2000, which was undoubtedly the effect of oil discoveries. Oil accounted for nearly 90 percent of Sudanese exports during the 2000–2009 period showing a virtually non-diversified economy. This trend has only slightly relaxed after the secession with gold, sesame, and livestock being the only significant non-oil exports.
- *Exchange rate policy:* Sudan's real exchange rate showed substantial overvaluation during the oil economy reminiscent of the classic Dutch Disease symptoms. A theory-based real exchange rate (RER) Misalignment Index established by the World Bank for countries around the world from 1950–2011 shows that Sudan's RER was overvalued as much as 65 percent in 2008. Several successive nominal depreciations in 2012 and 2013 to the tune of 100 percent were not able to reverse this real overvaluation trend because there was a simultaneous prevalence of high inflation in the years after the secession. The real exchange rate thus is probably still overvalued, likely to the tune of 50 percent (see Chapter 2.B).
- *Financial sector development and openness:* The financial sector in Sudan is clearly underdeveloped as noticed from the relatively low level of credit-to-GDP ratio of 11–12 percent of GDP. The financial sector is also much closed with low levels of interconnectivity to the international financial system. The economic and financial sanctions implemented since 1997 play a role in this, and in fact have recently even tightened due the BNP Paribas court ruling in 2014 (see Chapter 1.C).
- *Macroeconomic stability:* While GDP growth intensified starting in 2000 due to the oil discovery, rates of growth stalled since 2008, even before the secession of South Sudan.

[7] Similarly, the average fixed capital formation was low before 2000 but has increases since yet was still below the Growth Report threshold of 25 percent over the 2000 to 2012 period. The difference between the gross and fixed capital formation is due to inventories that were increasing over time in Sudan.

To some extend the prediction of the 2009 Country Economic Memorandum (World Bank 2009) (that argued in the medium- to long-run Sudanese growth is not sustainable) became true. This was mainly related to the extreme dependency oil in the economy while there was a clear neglect of the non-oil sectors. Similarly, the inflation rate has increased substantially since 2008 and since then is quite volatile. In addition, the budget deficit, although somewhat narrowing, has been continuously above 5 percent of GDP even during the oil economy with all its windfall fiscal revenues. This stubbornly high budget deficit is reflected in the indebtedness of the country where the stock of public debt to GDP has further increased over the past decade.

Sudan's agriculture productivity has not sufficiently increased over the years of the oil economy to support agriculture-led diversification of the economy. While the agricultural share of GDP was around or above 40 percent before 2000, the share dropped precipitously to below 30 percent in 2007. Likewise, the annual growth of agricultural productivity dropped from almost 6 percent between 1988 and 1992 to 1–1.5 percent between 2000 and 2008. Low productivity is witnessed across many products compared to many countries. In sesame, for instance, productivity of Sudan compared to other major producing countries is very low as it is equivalent to 18, 27, 58 and 51 percent of productivity in China, Ethiopia, India, and Nigeria, respectively. Wheat productivity tells a similar story, with more details provided in Chapter 3 of this CEM.

While this analysis does not suggest that Sudan's growth record would have necessarily been substantially different from the historical actuals if followed the prescriptions of other country experiences, it does indicates the policy areas that could be tried to better the growth prospects of the economy. In fact, the Growth Report is focused mainly on analyzing the experiences of the successful stories, without analyzing the pitfalls of implementation of some of those "ingredients" of growth that might have contributed to episodes of economic and/or financial downturns. The Growth Report also does not analyze the examples of other economies that have implemented many of the growth "ingredients" but nevertheless, the ingredients have not provided such straightforward benefits for economic growth.

A different strand of literature analyzes the caveats of rapid implementation of some of the growth policies in an environment of not fully credible institutional capacity and governmental policies and slow structural transformation of the system for which more dynamic transformation is required. A starting argument of this type of literature is that it is unquestionable that macroeconomic stability, trade openness, and financial liberalization are core requisites for the growth process (World Bank 2005). However, the combination of their implementation, the extent to which they should be implemented, and what dynamics should be considered depends on various specific internal and external factors of a country. Some of the country's internal factors for example are: initial conditions, quality and diversity of existing institutions, credibility of the policy makers and their historical policy paths and actions, the commitment to pursue and implement the policy targets. The external conditions of a country are related to the economic and financial developments of the major trading and financial partners, specificity of the region as well as the systemic shocks in the global economy.

It is in this spirit of not only knowing the "ingredients for growth" but also the domestic limitations in Sudan that this report will aim to analyze and recommend policy options that can be both successful and implementable.

b. *Components of pro-poor growth*

While economic growth is a necessary condition for poverty reduction in a country, it is not a sufficient condition for reducing poverty

and income inequality in all economic areas and regions equally (Loayza and Raddatz 2010; Warner 2011). In fact, economic growth can be uneven across production sectors, income groups and regions in a country (World Bank 2009a). In order for any growth process to have wider beneficial effects for the whole society of a country, it needs to be inclusive and have an impact on all income groups and regions.

There are two broad approaches of measuring what is "pro-poor," referring to absolute and relative declines of poverty. *First,* according to the "absolute" approach, "pro-poor" is defined as some agreed measure of poverty (defined in absolute terms) to fall over time (Ravallion 2004 and Khandker and Koolwal 2006). This absolute measure of poverty could be set in terms of a threshold value of purchasing power of commodities and can be defined such as the number of people that live on less than US$1.25 a day measured in PPP. Consequently, the "absolute" approach suggests that the economic growth is pro-poor if and only if the number of people that live less than US$1.25 a day declines.[8]

The *second* approach defining the "pro-poor" growth—the "relative" measure—considers income inequality changes in the process of growth. According to the "relative" approach, the economic growth is considered to be "pro-poor" if the poor people (the low income group) benefit proportionately more than the higher income groups (Ravallion, 2004 and Khandker and Koolwal, 2006). In other words, growth is "pro-poor" if the incomes of the low income group increase proportionally more than the incomes of the higher income groups. Contrary to the "absolute" approach of "pro-poor" growth, the "relative" approach would argue that if the poor people benefit less than higher income groups—although in absolute terms the poverty has declined—then the process cannot be considered "pro-poor".

Poverty reduction depends crucially on the initial level of poverty and inequality. According to Ravallion (2004) a higher initial level of poverty and income inequality leads to a lower pace of poverty reduction and the distributional pattern of growth will be less beneficial for the poor people (Cord 2007). This indicates that higher rates of economic growth for longer periods of time are needed in order to get significant reduction of poverty and income inequality. Furthermore, according to the empirical findings of Easterly (2007), a high structural inequality in income distribution may even be an obstacle to economic growth. This is due to its negative effect on the growth elasticity of poverty, indicating the relationship between the economic growth and the poverty rate.[9]

The actual impact of economic growth on poverty reduction and income inequality depends on the sectoral composition of growth. Supporting growth in certain labor intensive sectors of the economy like agriculture, construction and manufacturing can have greater effect on reducing the poverty compared to other less labor intensive sector like mining, utilities and services (Loayza and Raddatz, 2010 and Warner, 2011). Promoting growth in agricultural sector can be particularly important for economies like Sudan where a great extent of the labor force is engaged.

[8] The major weakness of this approach is that it defines the pro-poor growth in absolute terms, without considering the equality of income distribution. For example, during a growth process, it may appear that the absolute number of poor people may fall, but the poor or the low-income group may benefit disproportionately less than the high- or middle-income groups. In this case the distribution of the income generated by the growth process may still be concentrated in the higher income groups that may result in greater increase of the income inequality, although the "absolute" poverty indicator may suggest that the poverty in the country has declined. The proponents of the "absolute" approach of pro-poor growth argue that, although this measure undermines the income inequality, if there is some benefit from the growth process for the poor people then it still can, however, be considered as beneficial.

[9] Another factor that affects the effectiveness of "pro-poor" growth policies is the geographic concentration of the poor people. A greater concentration of poor people in certain geographical areas impedes the effectiveness of pro-poor growth policies; this is since in these areas it is more difficult and more time is needed for the growth process to have any impact on poverty reduction. Related, the geographical proximity of the areas where poverty is concentrated to the more developed urban centers plays an important role. A greater proximity of these areas to the more developed urban areas leads to greater beneficial effects of the pro-poor growth policies on poverty reduction and income inequality (World Bank 2009a).

Economic growth in the agricultural sector is particularly powerful to alleviate poverty and works in two ways: *First*, through a reduction of unemployment and greater engagement of the labor force; and *second*, by raising the incomes in agriculture that may reduce the income inequality. Two examples where the growth of agricultural production was the major driving force of poverty reduction are Rwanda and China. An analysis conducted by Xinshen (2013) for Rwanda for the period 2005–2011 indicates that development of the primary sector had the most significant impact on poverty alleviation. This is in contrast to secondary and tertiary sectors, which were driving GDP growth during that period, but both had relatively small effect on poverty reduction. Similar conclusions can be drawn from the case China. Growth of agricultural production since the 1980s has been the major factor for poverty alleviation in China's rural provinces where most of the poor people are concentrated (Montalvo and Ravallion 2010). But in China the pace of poverty reduction has also been highly unequal among its provinces.

There are a number of supporting policies for the agriculture to thrive and increase the poverty reduction impact of growth in the rural sector. Greater access to electricity, for instance, brings about more efficiency of agricultural production and also provides opportunities for farm workers to engage in food processing activities that may additionally increase their income (Khandker and Koolwal 2006). Likewise, infrastructural development, in particular building paved roads that connect rural with urban areas, provides easier access to markets for farm and non-farm rural workers, which is also important for technology transfer between regions (Datt and Ravallion 2009). Improved access to water and irrigation will increase the agricultural production and the living standards of agricultural workers. Greater access to education in rural areas increases the opportunities for the youth in continuing their education and also in finding higher skilled work in the urban areas by which they may generate greater income in the future and thus, improve their welfare. Greater access to education will also empower gender equality where more opportunities will be created for rural female youth. And, finally, greater financial inclusion may lead to better solutions for farmers to finance and purchase fertilizers.

C. Institutions are Critical to the Diversification of the Endowment Base of the Economy

The 2009 Country Economic Memorandum developed a clear agenda for reforms to overcome the single reliance on oil and its associated Dutch Disease symptoms in Sudan. The report urged for private-sector-led growth to drive a more diversified economy, particularly through a revival of the agriculture sector. The CEM then proposed a set of interdependent steps to overcome the single reliance on natural resources. The work called for developing and maintaining the necessary enabling environment for growth, specifically macroeconomic stability and effective fiscal management. The report also highlighted the need to implement policies aimed at improving the investment climate. The need to increase returns in the agriculture sector, whose productivity levels have declined over the oil boom years, was identified as a key effort. Finally, the CEM emphasized that technocratic reforms need to be paired with good governance.

Progress on the 2009 reform agenda has been limited, but some key reforms may serve as a model for further change. This new CEM will argue that the agriculture sector is still suffering from very low productivity, the export basket continues to be very concentrated, yet less so given the declining relative importance of oil. Fiscal management of recent years was dominated by coping with the effects of the secession of South Sudan, which meant an unprecedented fall in revenues for the country. While a number of fiscal reforms were implemented the budget deficit increased significantly after the secession and expenditures had

to be cut substantially. A large part of the deficit was financed through monetization by the central bank, which in turn led to strong post-secession inflation. There was no real improvement in the business environment with most indicators either stagnating or falling.

Comparing the situation in today's Sudan with the reform areas identified in the 2009 CEM suggests that there is still a need to tackle the underlying issue of furthering structural transformation and economic diversification. There are basically two approaches to do this, by either diversifying the production base of a country, through for instance advances in agriculture or manufacturing; or alternatively, a country can diversify its endowment base. World Bank (2014d) developed and discussed the latter approach, which argues that diversification should be pursued as a result of policies that diversify national asset portfolios; such portfolios include natural resources, built capital, and public institutions. World Bank (2014d) thus argues that governments should "try to create the conditions for accumulating a balanced portfolio of national assets, by exploiting natural resources responsibly, building infrastructure and human capital, and instituting mechanisms to manage resource rents, provide public services, and regulate private enterprise" (World Bank 2014d: 31).

World Bank (2014d) argues that economies successful in their diversification efforts are able to broaden their endowments base by maximizing a triad of institutions to deliver services that ultimately increase productivity. This triad includes the abilities to manage natural resource rents, to provide public services, and to regulate economic activity (and foster a business enabling environment). Looking at Sudan, there are important weaknesses in all the three areas, often complicated by conflict and fragility, sometimes through uncertain assignments of responsibilities in an ever more decentralizing public administration. Overall, it finds there is much scope to improve the effectiveness of these institutions to lay the groundwork for a more diverse endowment base, and ultimately, a more diversified economy.

a. *Ability to manage natural resource rents*

The ability to manage natural resource rents refers to the ability to pursue overall stabilizing macroeconomic policies of which stable fiscal management is key, sometimes achieved with stabilization funds for natural resource rents. For Sudan, this section finds that the Government's ability to manage natural resource rents is limited; yet, natural resources have also declined in importance to fiscal revenues. Still, more effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues.

Fiscal policy and public debt

During the oil economy in Sudan oil revenues rapidly became the main source of public revenues and contributed more than 50 percent of total revenues at its peak, but this situation ended abruptly in 2011. With the secession of South Sudan came a substantial loss of oil revenues and the share of oil to total revenues declined from 59 percent in 2011 to 16 percent in 2012 (Figure 1.3.1). This massive shock in decline of oil revenues could not be compensated for by increased tax and non-tax-non-oil revenues, even though they increased significantly—and overall revenues declined by 33.5 percent between 2011 and 2012. During the pre-secession period Sudan had some experience in utilizing an oil revenue stabilization account (ORSA)—a failed attempt to smooth expenditure (Box 1.1).

Oil revenues are expected to fall to around 10 percent of total revenues over the next five years. At the same time, the ability of the government to generate fiscal revenues from the gold sector will be rather limited, primarily due to the nature of gold mining that is first and foremost artisanal in Sudan. Only if Sudan succeeds in establishing a

BOX 1.1: Sudan's Experience with the Oil Revenue Stabilization Account (ORSA)

The 2009 CEM argued that while Sudan had the foresight of creating an Oil Revenue Stabilization Account (ORSA) to help smooth expenditure during the oil economy, the account failed to deliver to its promise due to poor management. Withdrawals from the account had been highly volatile and nearly equal to deposits on net—highlighting its mismanagement and lack of effectiveness in stabilizing expenditure. More importantly, there were heavy withdrawals when oil revenue was well above budgeted levels.

ORSA was a locked sub-account for the Government at the Bank of Sudan, the central bank. The Ministry of Finance and National Economy had sole access to it. At the start of each fiscal year, a benchmark production figure and the Government of National Unity and the Government of South Sudan agreed upon the price of the oil used. The account was to receive any revenues accruing from production or price above the benchmark are, and withdrawals were to be distributed to both governments in proportion to their share of total oil revenue.

At its peak, ORSA accumulated more than US$300 million in early 2006, but was depleted by time of the secession of South Sudan. Substantial drawdowns from the account in 2006 to finance government expenditures in light of shortfalls from then delayed new fields let to a near-depletion by end-December 2006. While ORSA was built up again over most of 2007 and early 2008, it was again depleted in the wake of the global crisis and collapse of oil prices in late 2008 and 2009. It was not built up since that time and with the secession of South Sudan disappeared from the scene.

Source: World Bank (2009b).

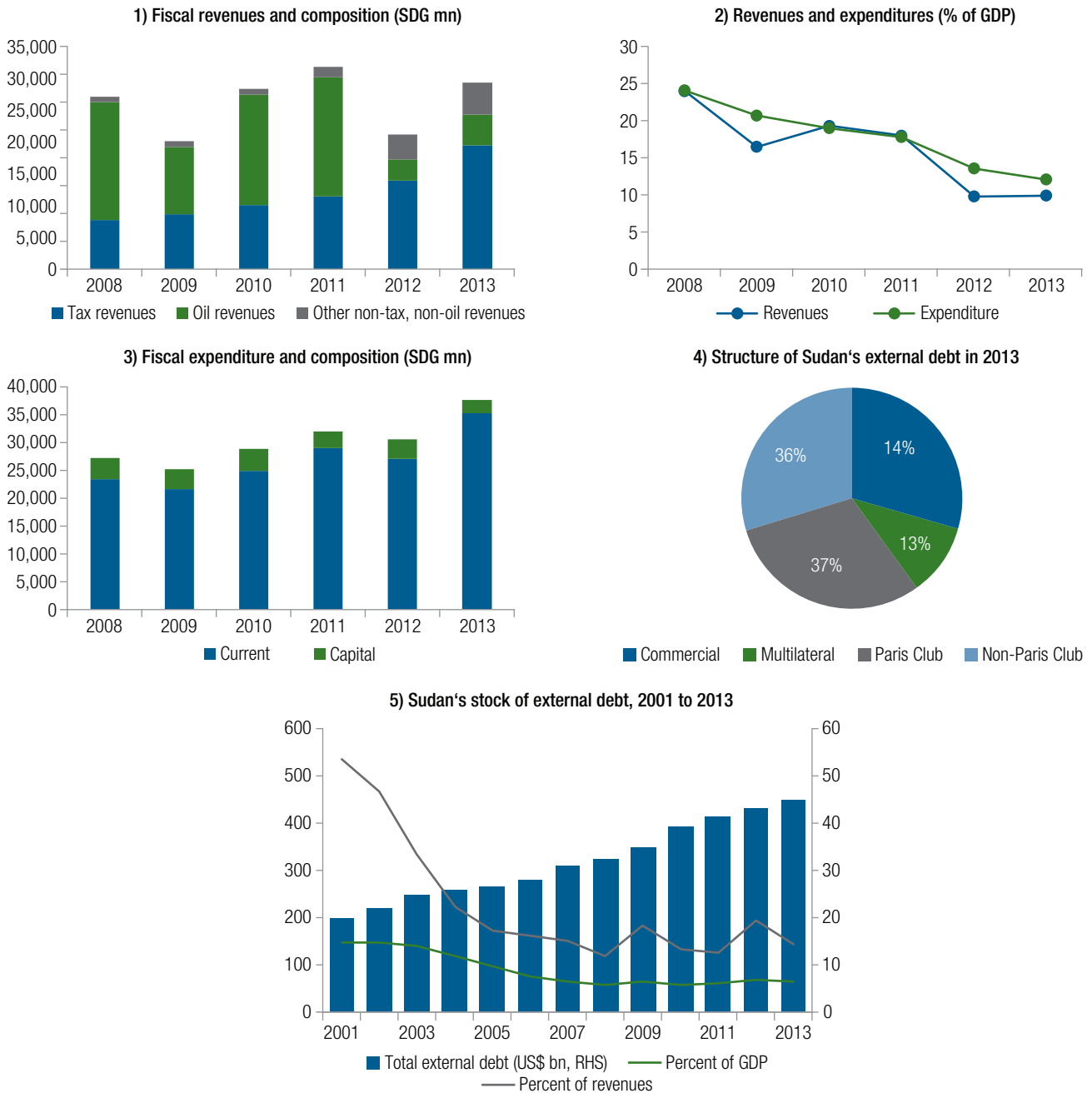
modern, industrial mining sector will there be a real possibility for relevant fiscal revenues from the gold sector. This is a medium- to long-term endeavor, however, and Chapter 5 will provide an assessment of these prospects.

In addition to oil revenue from Sudanese domestic production, fees are also expected from South Sudanese oil flowing through Sudan's oil infrastructure and time-bound proceeds of the transitional financing agreement (TFA) between the two countries. Chapter 5 will estimate that those additional oil-related funds are in the order of 10 to 20 percent of total revenues until 2016. Under the Bi-Lateral Agreements South Sudan is required to pay US$15.00 per barrel up to a maximum of US$3.028 billion as a Transitional Financial Arrangement (TFA). The TFA period ends in December 2016. In addition, the ongoing civil conflict in South Sudan puts the TFA payments in an uncertain light.

More effective volatility management within a fiscally sustainable framework requires a medium-term outlook on natural resource revenues. This claim was already made in the 2009 CEM; yet it is found that this is still an issue in today's Sudan. Chapter 5 will analyze this in detail, but it is clear that the current practice of government is to include in their medium-term plans expectations that successful exploration will add to production. This substantially increases the government's forecast for oil revenues over the medium-term with a high risk of not being able to meet those targets. The differences in assessment will be shown in Chapter 5 where the CEM base scenario is substantially lower than the Government medium-term oil outlook. A similar issue is observable in the mining sector, where production figures are unclear and may also reflect smuggled in and old gold.

After two years of balanced budgets in 2010 and 2011, a significant deficit opened up in 2012, but was narrowed again in 2013. Even though a reduction of total expenditures was achieved 2012 the decline in expenditure could not keep pace with the decline in revenues. The budget deficit shot up from virtually zero (–0.2 percent of GDP) to 3.8 percent deficit in 2012 (Figure 1.3.2). Moreover, in 2013 the expenditure side expanded again in real terms (Figure 1.3.3), but with a recovery of GDP growth from negative to positive territory in 2013 (Figure 2.1.1), expenditure as percent of GDP decreased. As a result, the deficit narrowed from 3.8 percent of GDP in 2012 to 2.3 percent in 2013. The gradual elimination of oil subsidies starting in September 2013 continues this effort and the 2014 deficit is expected to further decline.

FIGURE 1.3: Fiscal Policy and Public Debt



Source: World Bank staff own calculations, based on data from IMF 2012; IMF 2013; IMF 2014a; IMF 2014b; IMF 2014c; and World Bank World Development Indicators (WDI).

Financing the budget deficit is one of the key challenges in post-secession Sudan. In the aftermath of the secession the dominant source of financing was through monetization. Given its serious negative repercussions, however, monetization is not sustainable in the long term; it leads to an upsurge in inflation, an impairment of monetary transmission mechanisms, the crowding out of credit to the private sector, real exchange rate appreciation, and worsening foreign trade competitiveness.

Options for foreign financing of the budget deficit are limited as Sudan's external debt stood at about US$45 billion (79 percent of GDP) at the end of 2013 (Figure 1.3.5). Of this, about 85 percent was in arrears. The large majority of Sudan's external debt is public and publicly guaranteed debt (valued US$43.4 billion, of which 88 percent in arrears), mainly owed to bilateral creditors and almost equally divided between Paris Club and non-Paris Club creditors (37 vs. 36 percent of the total). Only a small fraction is commercial debt owed to suppliers (US$1.6 billion). Sudan is also in arrears with multilateral creditors, including the World Bank, the IMF, and the AfDB (Figure 1.3.4). The most recent joint World Bank and IMF Debt Sustainability Study (DSA) classifies Sudan being in debt distress (IMF 2014c).

Sudan's ongoing debt crisis dates back the 1980s. It started with the Government's inability to service its debt service obligations that in turn led to an unprecedented increase in arrears. This is a key feature of Sudan's striking debt burden up to the present time, where 85 percent of Sudan's debt is in arrears. There are widely recognized domestic and external causes for the debt crisis (Rahman 1995; and Ahmed 2008), including the global recessions of the 1970s and 80s due to oil price shocks, an overvalued exchange rate, and insufficient debt management capabilities within the government.[10]

Total contracting of external debt remained below 1 percent of GDP per year since 2011, but abstinence from non-concessional borrowing will be important for debt relief. Given economic and financial sanctions as well as the fact that Sudan is in arrears with most creditors, the country has effectively been cut off from external financing sources. The government currently can only contract new debt with a limited number of still-disbursing multilateral and non-Paris Club bilateral creditors such as China. Some US$152 million of new debt (0.2 percent of GDP) was contracted in the first half of 2014, of which US$$147 million is on non-concessional terms, which is well within the annual non-concessional borrowing limit of US$600 million prescribed by the government's Staff Monitored Program with the IMF. There has not been any new private external debt in decades. However, it will be important for Sudan to minimize non-concessional borrowing and avoid selective debt servicing to bilateral creditors, as these may complicate reaching agreement with creditors on a debt resolution strategy.

Given the constrained foreign financing options for Sudan it will be important to mobilize more domestic resources for productive use, most notably domestic savings to support investment. The next section in this chapter will look at Sudan's savings rate and identify the main determinants in a view to derive policy conclusions on how to increase savings in Sudan to support the transition to a non-oil economy.

Savings and investment: trends and determinants

National savings in Sudan, which is the sum of public and private saving, fell sharply in 2012 to 8.5 percent of GNDI, after being double-digit during the last decade (Figure 1.4.1). The initial increase in the savings rate in the late 1990s was driven by the private sector after the collapse in savings caused by a combination of poor

[10] An unfavorable external environment contributed to the debt crisis some three decades back. Sudan was vulnerable to the oil shocks of the 1970s and 80s as it was a net oil importer that faced rapidly rising commodity prices, coupled with high interest rates and recessions in most parts of the then western world (Rahman 1995). An overvalued exchange rate during that time added to the problem as it further eroded the export competitiveness of the country and ultimately led to a high degree of import reliance (Ahmed 2008). But there was also a strong domestic element contributing to the debt crisis. A very concentrated export basket, comprised of primarily agriculture exports such as cotton, sesame, groundnuts, livestock, sugar, oils seeds, and gum arabic meant a real exposure risks related to volatile demand and prices, both of which then unfolded (Ahmed 2008). Moreso, around this same time a crisis developed in cotton, Sudan's then principal export crop, and exports and production dropped sharply. Additionally, economic adjustments programs were only partially implemented due to the political economy of that times; the consequence was to revert to external borrowing to stem the crisis. Finally, the absence of effective debt management capabilities in the government meant that there was, de facto, no limit to external borrowing (Rahman 1995).

macroeconomic performance, external disturbances, and structural weakness. Public savings followed the trend in the early 2000s when oil revenue started to contribute to public investment and the budget. Private savings increased from –0.1 percent in 1995 to 17.5 percent in 2000, whereas public savings increased from 0.4 percent in 1999 to 5.8 percent in 2004 (Figure 1.4.2).

The July 2011 secession of South Sudan had negative impacts on Sudan's savings through a buildup of large economic imbalances. As a result of the secession, Sudan lost almost three-quarters of its oil revenues, and two-thirds of its foreign exchange earnings. The budget balance deteriorated considerably, registering a deficit of 3.8 percent of GDP in 2012 from a surplus of 0.3 percent in 2010 (Figure 1.4.3). Monetization of the budget deficit and weakening local currency in the parallel market led to skyrocketing inflation from 15.4 percent in 2010 to 44.4 percent in 2012 (end of year inflation). Against this backdrop, private savings fell from 13.8 percent in 2010 to 10.1 percent in 2012, whereas public savings dropped further from 5.1 percent in 2010 to –1.6 percent in 2004.

The two most common definitions for savings refer to Gross Domestic Savings (GDS) and Gross National Savings (GNS). These concepts are derived from the national accounts. Gross Domestic Product (GDP) and Gross National Disposable Income (GNDI) can be expressed as:

$$GDP = C + I + G + (X - M)$$
$$GDNI = GDP + Y_f + T_f$$

Where C is private consumption, I is investment (gross capital formation), G is government consumption, X is exports, M is imports; Y_f is net factor income from abroad, and, T_f is net foreign private and official transfers.

The relationship between Gross Domestic Savings (GDS) and Gross National Savings (GNS) can then be written as:

$$GDS = GDP - (C + G)$$
$$GNS = GNDI - (C + G) = GDS + Y_f + T_f$$

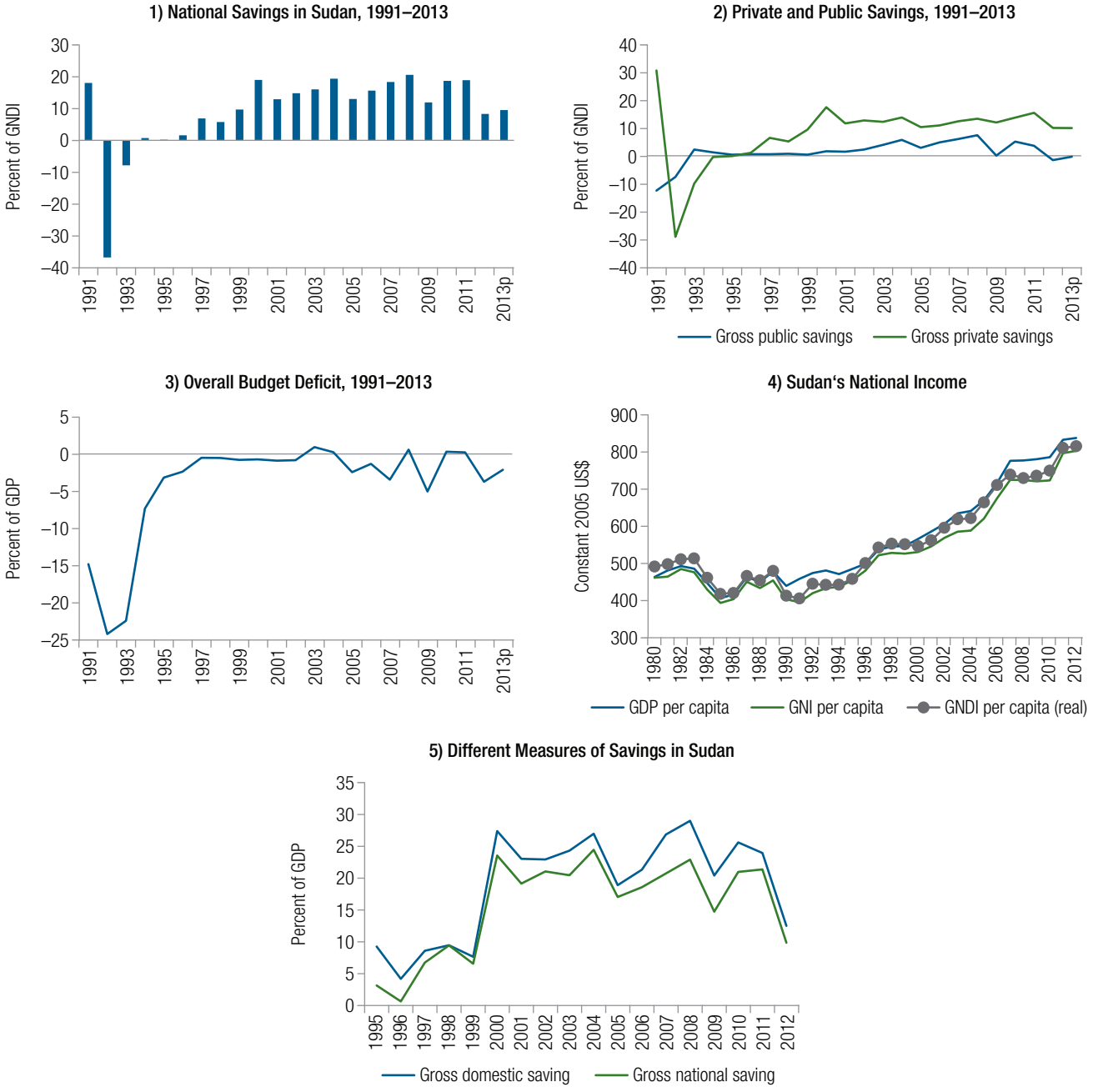
Hence, Gross Domestic Savings (GDS) and Gross National Savings (GNS) differ substantially if a country has large current transfers in the form of public (e.g., official aid) and private transfers (e.g., remittances) from abroad. In the case of Sudan, however, transfers in the form of aid are negligible and GDS and GNS are rather similar (Figures 1.4.4 and 1.4.5). It is for this reason that the analysis in this section uses GNS as underlying measure.

Sudan's national and private savings rates are comparable to those of neighboring Sub-Sahara African countries, but relatively low for an oil-producing country. In the 1990s, Sudan's savings rates were the lowest among peer countries. Thanks to the improved macroeconomic performance and the oil revenues, Sudan's national savings rates rose from –0.7 percent in the 1990s to 16.4 percent in the 2000s, reaching the regional average (Figure 1.5.1). A similar development pattern can be observed for Sudan's private savings rates (Figure 1.5.2). But then Sudan's national savings rates fell to 14.0 percent in the early 2010s. A similar pattern in the national savings rate is observed for oil-producing Algeria, whose savings rates sharply rose in the 2000s, but declined in the early 2010s when oil prices moderated.

The decline in savings in Sudan was led by public savings rates in the 2010s (Figure 1.5.3). In oil producing countries, including Sudan, public savings rates rose in the late 2000s when oil prices had a sharp uptick, but fell significantly in the early 2010s when oil prices were moderated. In contrast, non-oil producing countries, such as Tanzania and Ethiopia, steadily increased public saving, attributed to sound fiscal management.

Savings rates are highly correlated with investment and economic growth. This is confirmed in the literature Loayza et al. (2010) and through a cross-country analysis shown in Figures 1.5.4 and 1.5.5. Although there has been

FIGURE 1.4: Savings Rates in Sudan, 1991–2013

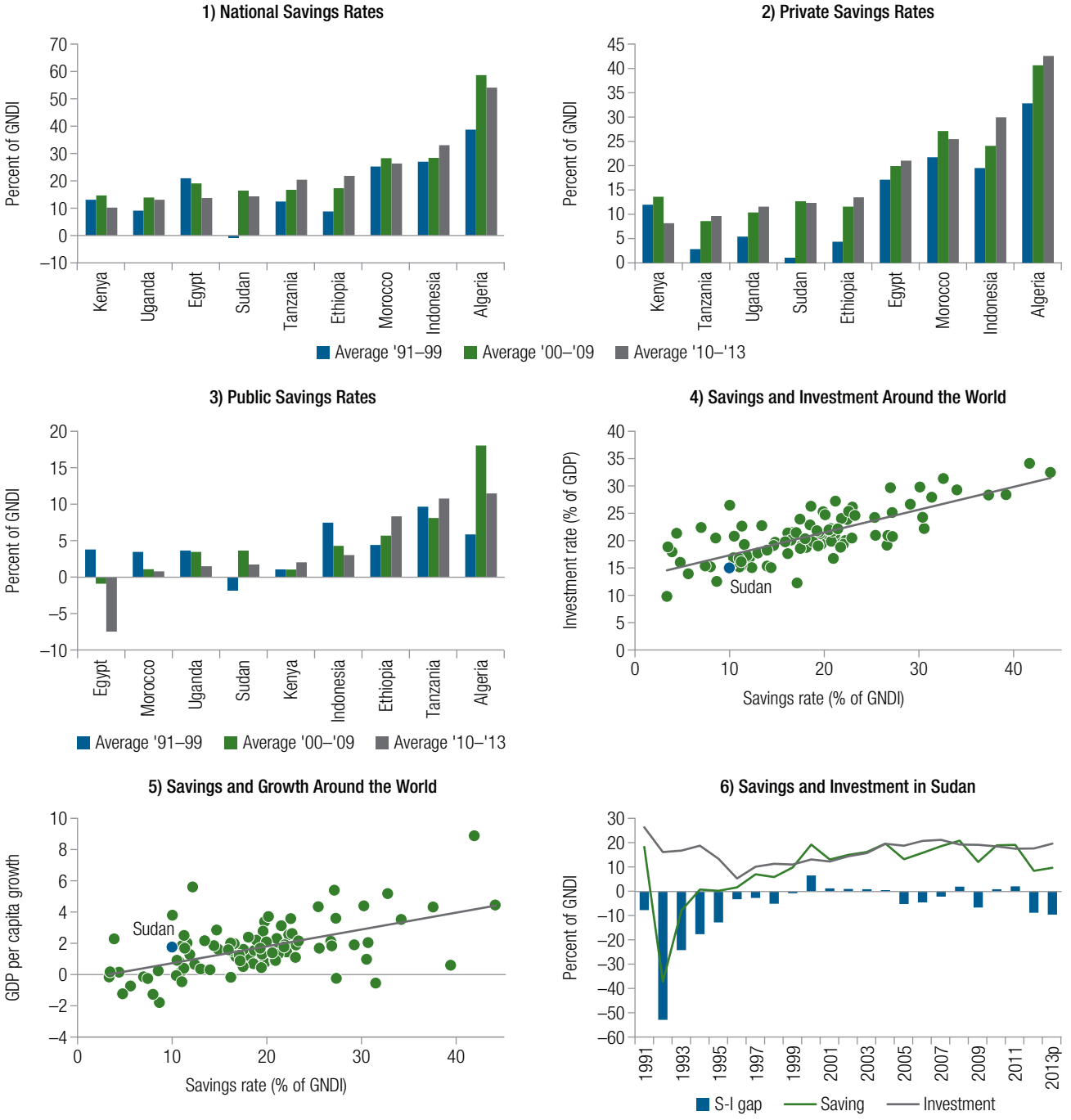


Source: World Bank staff own calculations, based on data from World Bank World Development Indicators; and IMF World Economic Outlook.
Note: (1) "p" denotes preliminary.

controversy on causality between savings and growth, the causality that runs from savings to growth plays a critical role through the capital accumulation process.[11] In theory, it does not matter how investment is financed. In practice, however, close connection between the two is observed, especially in the long run.

[11] Aghion et al. (2006) developed a theory that domestic savings affects economic growth in developing countries that are far from the technological frontier.

FIGURE 1.5: Savings and Investment Rates in Sudan and Selected Countries



Source: World Bank staff own calculations, based on data from World Bank World Development Indicators; and IMF World Economic Outlook.
Note: (5) and (6): Analysis based on average data for the period 1990–2009.

Thus, low national savings jeopardize investments and growth in post-secession Sudan. Initially, and despite the sharp decline in savings rate, investment remained stable after the secession (Figure 1.5.6). The increased saving-investment gap, in turn, has been financed by a deteriorating current account balance. The current account deficit was at 9.4 percent of GNDI in 2013, the

Table 1.2: Simulations of Savings and Growth Rates for Turkey

a. Savings Rate under TFP Growth Scenarios (GDP per Worker Growth Rate = 4%)		
	Moderate (TFP Growth=1%)	High (TFP Growth=2%)
Initial	24.9	19.5
5 Years	26.0	18.3
10 Years	27.2	17.2
25 Years	31.1	14.2
b. GDP per Worker Growth under TFP Growth Scenarios (Savings Rate = 20%)		
	Moderate (TFP Growth=1%)	High (TFP Growth=2%)
Initial	3.00	4.10
5 Years	3.03	4.33
10 Years	3.05	4.51
25 Years	3.09	4.88

Source: Hevia (2010).

highest rate since 1996. It is true that investment does not necessarily have to be financed by national savings if a country has access to external sources. But Sudan does not have good access to external sources due to its unique and isolated status in the world. Moreover, a country cannot rely indefinitely on external financing since large current account deficits tend to be not sustainable in the long term.

However, due to diminishing returns, capital accumulation through investment is not sufficient in the long term to sustain high growth. International evidence suggests that sustainable growth needs productivity growth through human capital enhancements and technological improvements. A country case study about Turkey (Hevia 2010), for instance, shows that the link between national savings and economic growth critically depends on productivity growth (Table 1.2). In addition, the channel from savings to productive investment plays a critical role for economic growth. An efficient financial system is a necessary condition through which savings is effectively allocated to investment.[12] Likewise, the institutional capacity and the rule of law affect investment decision. For instance, macroeconomic stability determines the real rate of return for investment but contract enforcement affects the smooth implementation of investments.

Turning from the past to the future, it is imperative for Sudan to raise its gross national savings rate beyond pre-secession levels. The analysis so far has illustrated that post-secession Sudan's national savings is low, creating challenges to economic diversification and sustained economic growth. Low savings imply the availability of fewer funds for productive investment that could transform the Sudanese economy from a highly oil-dependent one to a more diversified one. Given that the secession of South Sudan is a permanent shock to the Sudanese economy there is a real urgency to support the transition to a more diversified economy through higher levels of national savings. To this end, the recent decline in both private and public savings of particular concern for post-secession Sudan.

[12] Levin (2005).

Looking at the key determinants of savings, stable macroeconomic management with low inflation and positive real interest rates is crucial for raising both private and public savings rates (Annex 2). After 2011 loss of revenues from oil directly lowered public saving. At the same time, the monetization of the budget deficit and a weakening local currency led to skyrocketing inflation. Private savings immediately responded to this situation and lowered their holdings. Because international evidence suggests that the Ricardian equivalence holds only partially (public savings only partially crowds out private saving), policy makers could stimulate national savings by raising public saving, but not in the current fiscal situation. Therefore, going forward, efforts are needed to facilitate the build-up of private savings rates through lower inflation.

In addition, the high youth dependency ratio has a negative influence on the savings rates in Sudan. Reducing the *effective* youth dependency ratio through job creation is an important supportive factor for higher savings rates. Since most of the young workers start their career in the informal sector, providing job opportunities in the informal sector is a key in reducing youth unemployment. As the youth dependency ratio is a critical determinant of private saving, reducing *effective* youth dependency ratio through job creation in the informal sector holds tremendous potential for enhancing saving. To provide job opportunities for the youth, labor market policy would need to be specific to increase the capacity of the informal sector.

b. *Ability to provide public services*

The ability to provide public services relates to the ability of governments to invest into the human capital of the younger generation and to build infrastructure that can be used for forward-looking economic activities in the long-term. Sudan's ability to provide public services is a constraint. Historically, GDP growth in Sudan was rarely driven by enhancements in total factor productivity, which would indicate a rising role of human capital formation in the growth process. And human capital formation depends on the effective provision of services. In that regard, Sudan has undergone a process of decentralization that assigned basic service provision to subnational levels. Since fiscal decentralization is lagging behind, however, states do not have the ability to live up to their responsibilities and outcomes, for instance, for education are both low and with a large variability across states. Finally, conflict, governance, and debt are all complicating factors for government to effectively deliver services.

Effective public institutions increase productivity

Sudan has had a period of more than one decade with positive real economic growth rates driven by oil GDP since its discovery in 1999, ending abruptly **in 2011**. The secession of South Sudan strongly affected economic activity, resulting in contraction of GDP by 2.2 percent in 2012 (Figure 1.6.1). The sharp drop of oil GDP and the slow-down of non-oil GDP in the country as a consequence of the secession mainly drove this contraction of economic activity. One of the fast growing non-oil sectors in Sudan after the secession became gold mining, which accounted for 2.8 percent of non-oil GDP in 2012, and expanded by 64.7 percent in 2012 compared to 10.4 in the previous year. Consequently, the non-oil GDP became one of the major driving forces of overall economic activity in Sudan since 2011, registering growth rates between 4.5 and 6.8 percent in the 2010–2012 period. But the signing of the implementation matrix of the agreement between Sudan and South Sudan in March 2013 was one of the stimuli for the economic recovery in 2013 when the Sudanese economy grew by 2.7 percent. The signing of the agreement lessened the tensions with South Sudan and enabled resumption of oil production and flows from South Sudan, enabling a growth of oil GDP by 28 percent in 2013. Consequently, the economic recovery in

2013 was driven again mainly by oil GDP growth, which outweighed a slow-down of non-oil GDP growth. In 2014, non-oil GDP grew stronger than oil GDP, probably reflecting the new normal for Sudan but also the disruption of oil extraction in South Sudan due to internal conflict there.

While positive, Sudan's growth was rather volatile and its rate of expansion below the average for SSA, despite the positive effects of the oil economy. The variability of GDP growth in Sudan during the past decade (caused by the advent of oil and the secession of South Sudan) was quite high and is the highest compared to a selection of comparator economies and SSA (Figure 1.6.2). Despite the extensive exploitation of natural resources, the average GDP growth rate during the past decade was in the lower half of its comparator countries (Figure 1.6.3). The level of GDP per capita in Sudan is also lower than the average for SSA, urging the need for economic restructuring and diversifying production structure and increase in productivity.

High productivity is crucial for sustaining high growth, yet in Sudan total factor productivity has been low or even negative in the majority of years since oil was discovered in 1999. There are three distinct period of the economy since 1989, based on an assessment of the contributions of the production factors by decomposing GDP growth according to the Cobb-Douglas production function (Figure 1.6.4). The *first* period can be distinguished from 1989 till 1997 when the average GDP growth reached 4.9 percent and was driven mainly by labor and total factor productivity growth. This was a period of experimenting with economic reforms and liberalization of the economy. The *second* period of economic development of Sudan can be noted from 1998 to 2007. As a result of the advent of oil, the average economic growth increased by 1.2 percentage points, reaching an average rate of growth of 6.1 percent. Typical for this period is that the physical capital became the major driver of economic activity, whereas the contribution of labor and TFP significantly decreased. This is a reflection of increased capital investments in the country fueled by the oil economy and satisfied through both domestic sources and FDI. Investment reached its peak over the 2003 to 2006 period at about 24 percent of GDP, which was mainly achieved through expanding public investment, although private investment did retain its dominant position in the economy (Figure 1.6.5).

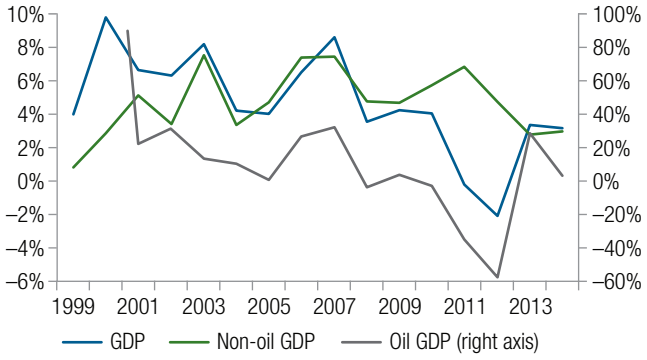
The latest and *third* period in the economy started in 2008 and is coined by negative TFP growth. This period includes the 2011 secession that is associated with the loss of the majority of oil reserves and related fiscal revenues. Declining growth rates of this period was driven by a decline in physical capital and the negative contribution of the TFP growth (Figure S.05). This is not surprising as investment in oil-related activities fell with the secession, FDI declined, and overall economic sentiment declined. The severity of the contraction can be explained by the importance of physical capital and TFP in Sudan's economic development prior to 2008.

The sectoral decomposition of GDP growth suggests that, historically, the major driver of growth in Sudan was and now still is the service sector. In fact, the services sector contributed on average 64.3 percent to overall value added during the sample period between 2003 and 2013. In contrast, the contribution of the industrial sector was much lower with an average of 21.7 percent. (Figure 1.6.7). A more disaggregated analysis of the contributions of the value added of different production sectors in the economy to overall GDP indicates that the shares of certain services such as trade, restaurants and hotels, and transport and communication has been increasing continually since 2005. This is not surprising as those services were important during the oil economy. Encouragingly, the share of the manufacturing sector has increased since 2011, albeit from a very low base (Figure 1.6.8).

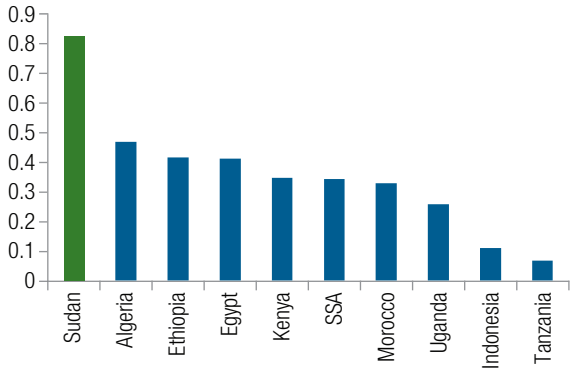
The importance of the service sector in Sudan is similar to most of its comparator countries, but both the contributions of the industry and agriculture sectors are relatively low. The average contribution of the services sector in Sudan is

FIGURE 1.6: Economic Activity

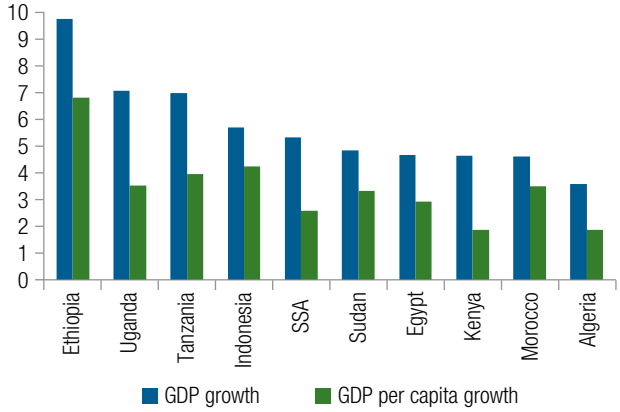
1) GDP growth in Sudan, 2001–2014



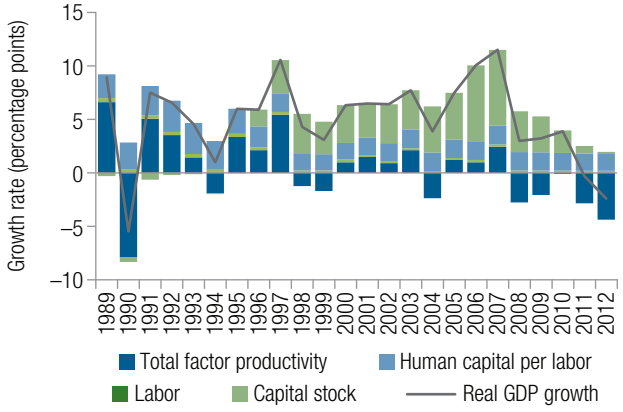
2) Variation of GDP growth, percentage points



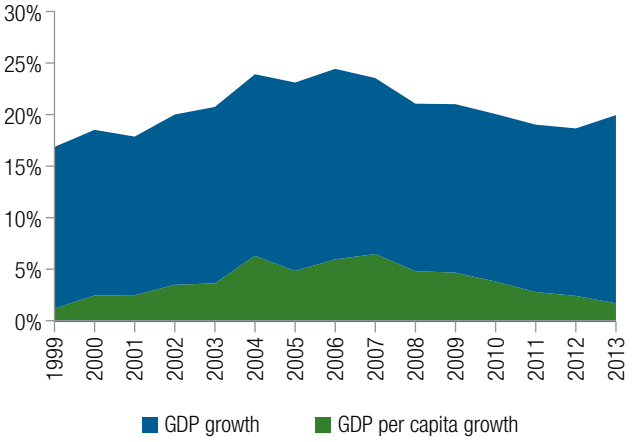
3) GDP and GDP per capita growth, selected countries, 2003–2013



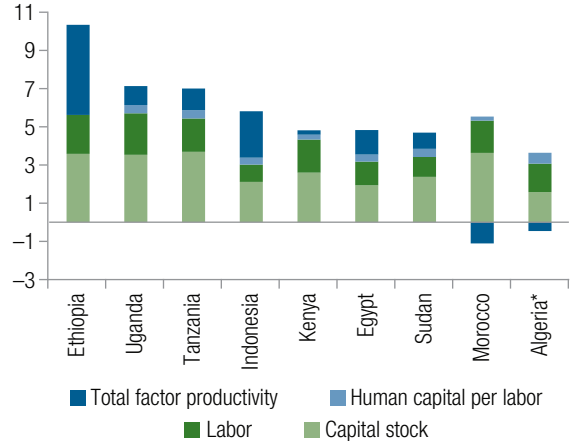
4) Growth decomposition of production factors in Sudan, 1989–2012



5) Public and private gross investment, 1999–2013



6) Growth decomposition of production factors, 2003–2012, percentage points

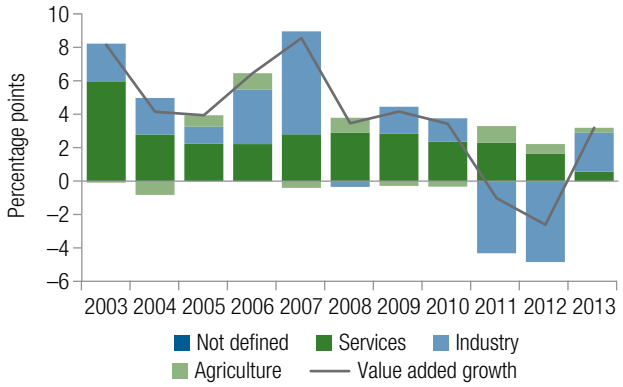


(continued on next page)

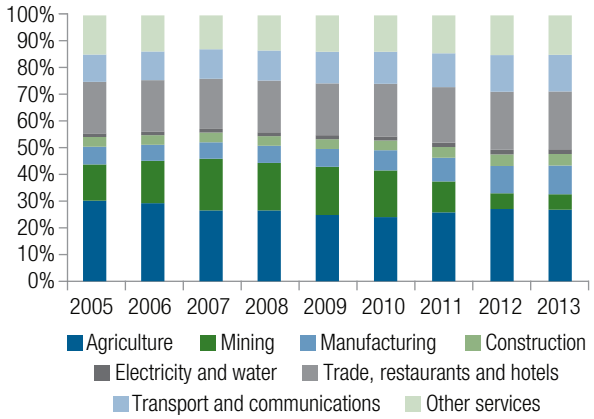
within the average contribution of the whole group of comparator economies estimated at 58.3 percent (Figure 1.6.9). But the average contribution of value added of the industrial sector to overall growth in Sudan is lagging behind the comparison countries whose average contribution equals 27.5 percent.

FIGURE 1.6: Economic Activity (*continued*)

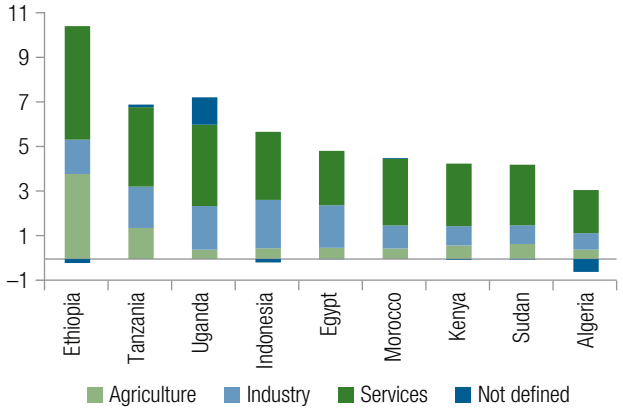
7) Growth by production sectors, 2003–2012



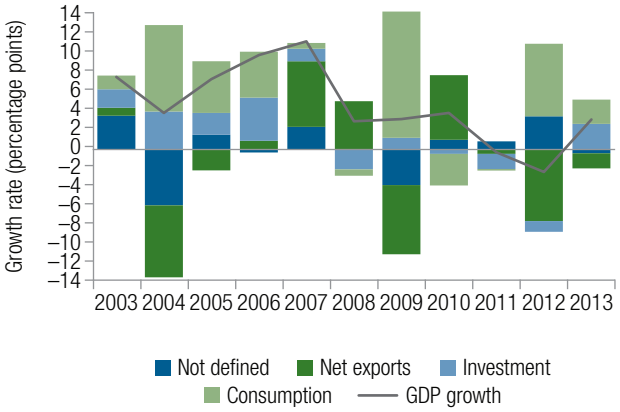
8) Gross value added by sector, 2003–2012



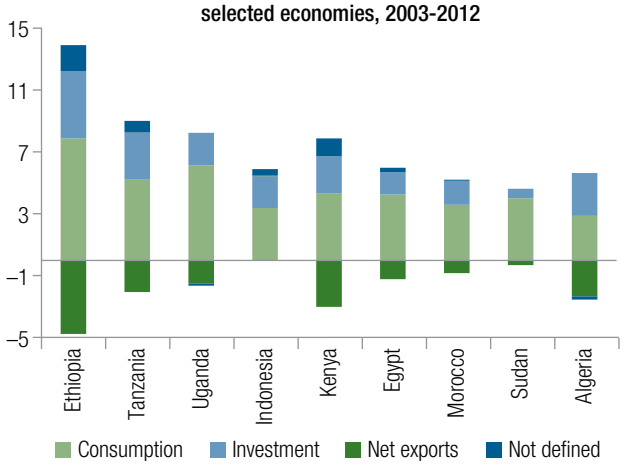
9) Average value added growth by production sectors, selected economies, 2003–2012



10) Expenditure side of GDP growth in Sudan, 2003–2012



11) Expenditure side of GDP growth, selected economies, 2003-2012



Source: World Bank staff own calculations, based on data from World Bank World Development Indicators; and IMF World Economic Outlook.
Note: (5) and (6): Analysis based on average data for the period 1990–2009.

Likewise, although Sudan is a country with a great agricultural potential this was undermined during the period of oil discovery. Although the average contribution of agricultural production to overall value added in Sudan is—relatively speaking—not as low as that of industry, there seems much scope for an expansion of the agriculture sector as an important factor for poverty alleviation over the short and medium term.

From the expenditure side of GDP in Sudan it is clear that domestic consumption (public and private) has been the major driver of GDP growth over the past decade and the role of investment was rather modest. The average contribution of consumption to GDP growth in Sudan is estimated at 92.8 percent (Figure 1.6.10). The relative importance of domestic consumption in the economy was in fact the highest in Sudan relative to its comparator countries (Figure 1.6.11). This is not surprising given the closed character of the economy that is also subject to a series of economic and financial sector sanctions since 1997. On the other hand, the contribution of investment on GDP growth in Sudan is quite low and in fact the lowest among the comparator economies despite the increase of domestic and foreign direct investments after the oil discovery. This suggests that the growth in investment was below the potential of the Sudanese economy.

Fiscal decentralization and devolution of basic service delivery

Sudan has undertaken political decentralization reforms since the early 1990s with the aim to transition the responsibility for basic service delivery to the subnational, state level. Sudan's government administration has three tiers: federal, state, and local, with elected legislatures at each level and elected state governors. At the sub-national level there are now 18 states each with several localities. Sudan's decentralization is governed by a plethora of laws and agreements. The Interim National Constitution (INC) and the Comprehensive Peace Agreement (CPA) of 2005 represented critical milestones for Sudan's efforts towards decentralization and enshrined it in an institutionalized system, especially for fiscal decentralization. Both documents commit to fiscal decentralization, to empower sub-national governments to align the use of resources more effectively with the need to address wide regional disparities and trace the root causes of conflict.

The INC provides the legal framework for state and local legislative assemblies to oversee the functioning of the various levels of sub-national government. The CPA established that decentralization and empowerment of all levels of government are cardinal principles of effective and fair administration of the country. At the same time, the CPA provided for a major reform to fiscal decentralization by the creation of the Fiscal and Financial Allocation and Monitoring Commission (FFAMC) to ensure a formula-based intergovernmental transfers system, though it remains unclear how this system is used in practice (World Bank 2013d).

Decentralization has devolved a number of key responsibilities to the sub-national governments; particularly vis-à-vis publicly funded pro-poor activities. According to the INC of 2005 Article 24-B, obligatory responsibilities for sub-national governments include the provision of social services (e.g., education, health, and registration of persons); regulation of businesses; and management of land. At the top of that system is the National Government, which has overall responsibility over functions such as foreign policy, defense, security, immigration, monetary affairs, and others (World Bank 2013d).

In reality, however, sometimes the division of responsibilities is less clear-cut. In health and education, for instance, the National Government is involved in funding service delivery in specific geographic areas (hard-to-reach) or to specific population groups (e.g., mothers, under five children). Therefore, equally important is building an understanding of respective responsibilities within a federal system (World Bank 2013d). While the Federal Ministry has a revenue generation and financing mandate, it also has coordinating, monitoring and

support (for poor performing states) functions, which it seems to have largely relinquished to lower levels of government for service delivery. The result is that no one is held accountable for results and ultimately the burden of service provision falls on the intended beneficiary.

A sound revenue assignment system is an essential pre-condition for successful fiscal decentralization. In certain fragile states, such as Sudan, the soundness of the sub-national revenue stream is a factor of the share of revenues collected by sub-national entities, given the poor reliability of the transfers from the central to sub-national governments (World Bank PER 2013). In addition to raising revenues, local revenue mobilization also has the potential to foster political and administrative accountability by empowering communities. Further, communities are likely to be willing to pay local taxes if the proceeds are used to provide local services.

In addition, sub-national entities are empowered by the INC to collect "own revenue." Own revenue is one of the three sources of funding for states and localities, in addition to federal transfers and shared revenues. Article 195 of the Interim National Constitution empowers states to collect own revenue from ten specific sources, and also allows them to introduce "any other tax as may be determined by law" (Interim Constitution 2005). The states have the highest degree of autonomy in defining own revenues, including authority to determine rates (World Bank 2013d).

Since resource disparities exists across the states of Sudan, the primary component of successful fiscal decentralization is a more equitable and transparent system of intergovernmental resource allocation across different levels of government. The specific objective of a sound intergovernmental transfer system is to address vertical imbalances between the center and sub-national levels of government with respect to revenues and responsibilities (as expenditure responsibility for basic services shifted to state and local levels), as well as horizontal (inter-state) imbalances due to differing own-revenue potential and differing needs. Several recent studies on Sudan have shown that the effects of fiscal transfers to equalize social spending and social outcomes patterns have been very limited, mostly due to weaknesses in the design of the intergovernmental fiscal transfer systems (World Bank 2007; World Bank 2011; and World Bank 2013d).

Fiscal decentralization has brought considerable extra resources to the States and substantially increased overall per capita social spending over the past ten years. Federal spending in health and education at the state level has substantially increased over the past decade, particularly since the establishment of the Interim Constitution (INC) in 2005. In real terms, and after adjusting for population growth, education spending as per school-age population has grown by an average of 22 per percent per year, from SDG697 in 2000 to SDG2,242 in 2010. This suggests the government has put substantial efforts into expanding public education and increasing enrollment among school-age children (Figure 1.7.1, left-hand panel). Per capita health spending by the federal government at the state level has also followed a very similar trend. In real terms, and after adjusting for population growth, per capita health spending has grown by an average of 26 per percent per year, from SDG229 in 2000 to SDG829 in 2010 (Figure 1.7.1, right-hand panel).

Yet, the observed increase in social spending has not translated into a more balanced distribution of resources by the government to address inequality across states and reduce poverty gaps. Public spending on social investments, as measured by per capita federal spending in health and education, is disproportionately allocated across states, largely favoring states with low incidence of poverty as measured by census data. Yet, annual per capita social expenditure in these three states was on average only a third of that reported for the richest state in the country, Khartoum Figure 1.7.2, panels (a) and (b). It also appears that fiscal decentralization has not had any observable effect in the way

in which federal resources are allocated towards social investments by the states. Figure 1.7.2, panels (c) and (d) show the average real per capita spending in health and education before and after fiscal decentralization, with allocation patterns seeming to have remained largely unchanged.

Ultimately, the weaknesses in public service provision in Sudan stem from poor prioritization of spending and an inadequate focus on results. Regional imbalances are consistently robust and clearly evident when looking at the state and local-level education outcomes for different states (Figure 1.7.3). In education, measured by state education spending per school-age population, federal government investments across states are strikingly different, particularly favoring the expansion of basic education in relatively richer states. In 2009, state spending in education per school-age population in South Darfur (SDG64), West Darfur (SDG96), and North Darfur (SDG115) was on average half of that in Khartoum (SDG216), and a fourth of that in Northern state (SDG429). State education spending per student, which measures the government effort to improve the quality and access to education among children already enrolled in school, shows similar patterns. Exceptions are the Red Sea and Kassala states, where the government seems to be investing disproportionately more on improving quality and access to education among students, as compared with other states that have similar levels of poverty. Similar outcome trends are observable in health and water and sanitation and the World Bank (2013d) provides in-depth analysis of this.

Conflict, governance and debt: Complicating factors for government to effectively deliver services[13]

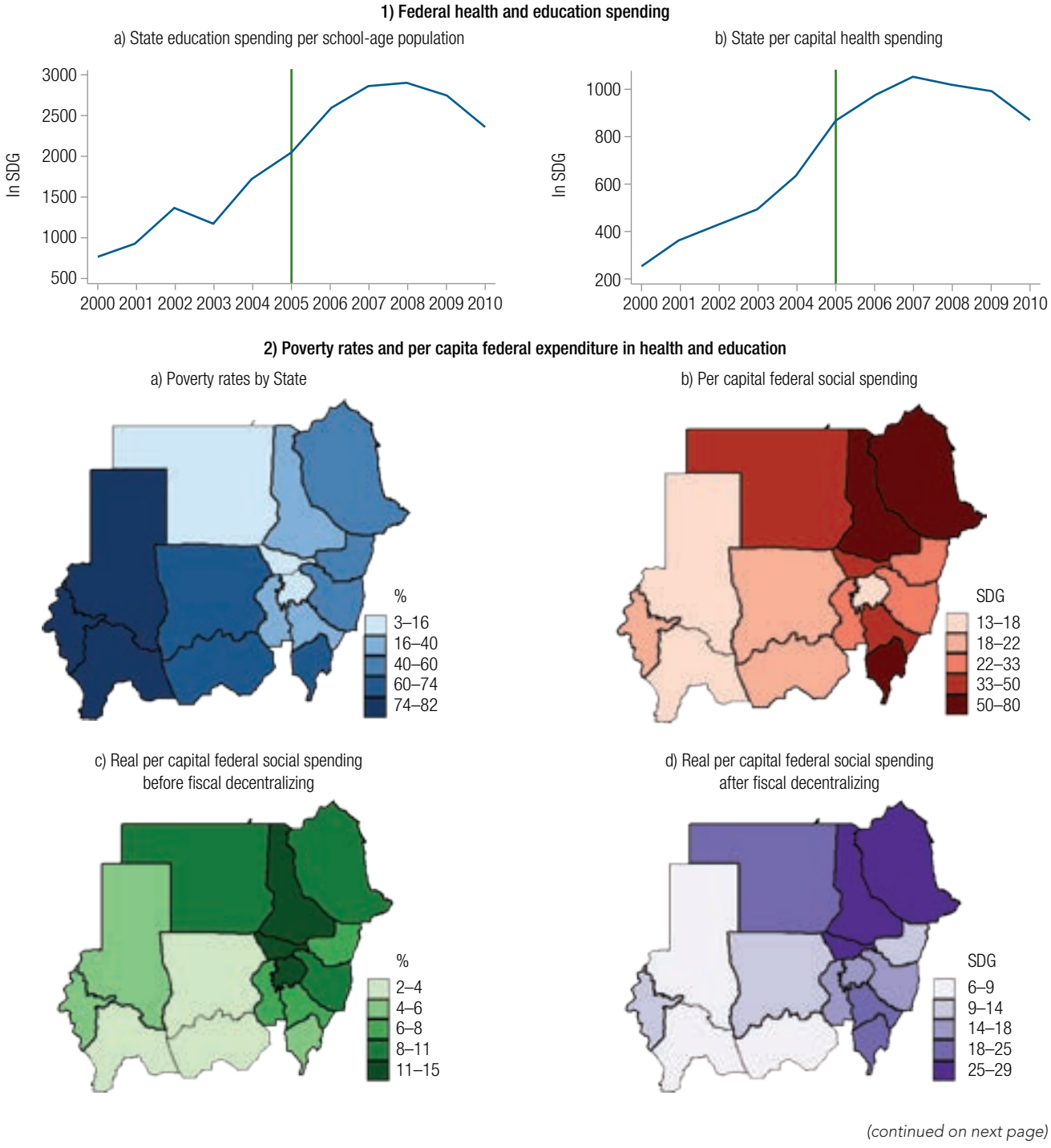
Sudan has been in conflict for most of its independence history. This conflict arises out of non-inclusive institutions with limited effectiveness and often-disputed legitimacy across Sudan, and has resulted in depressed development outcomes. While the defining conflict between the northern and southern regions was largely resolved by the secession of the latter to form the Republic of South Sudan in July 2011, tensions still remain. Several other conflicts with varied histories persist in different stages of intensity, stalemate, or resolution. Weak institutions at both national and subnational levels are unable to resolve most conflicts, often resulting in violence. Violent conflict, especially rebellion against the center and armed response by the state, is a direct contributor to the extreme poverty in Sudan's conflict-affected areas. Security concerns continue to inordinately shape economic and fiscal choices made by the government resulting in detrimental development outcomes and perpetuating weak institutions for public goods provision.

Sudan presents institutional discontinuities across its various regions, reflected in its regional economic imbalances and its geography of conflict. At the center, Sudan has institutions that enforce compliance and execute core state functions of providing security, commanding fiscal mechanisms, and delivering services. However, state presence and effectiveness diminishes further outside Khartoum and is outright contested in many peripheral areas. As with political power, the economy is centered in Khartoum and proximate riverine states, giving rise to significant inequality between the center and periphery, and historically between riverine and hinterland communities. Development indicators starkly mark the resulting inequality: while Sudan boasts a GNI per capita of US$1490 (i.e., lower middle-income) its poverty rate is 46.5 percent. In fact, poverty ranges from 26 percent in Khartoum state to 62.7 percent in Darfur, based on 2009 data.

The secession of South Sudan solved the key conflict in Sudan, but not all conflict has been eliminated; tensions continue and are expected to persist in the foreseeable future. The most potentially disruptive conflict remains

[13] This section is largely based on analysis presented in World Bank (2013e): World Bank's Interim Strategy Note for FY14 and 15.

FIGURE 1.7: Health and Education Spending and Outcomes in Sudan



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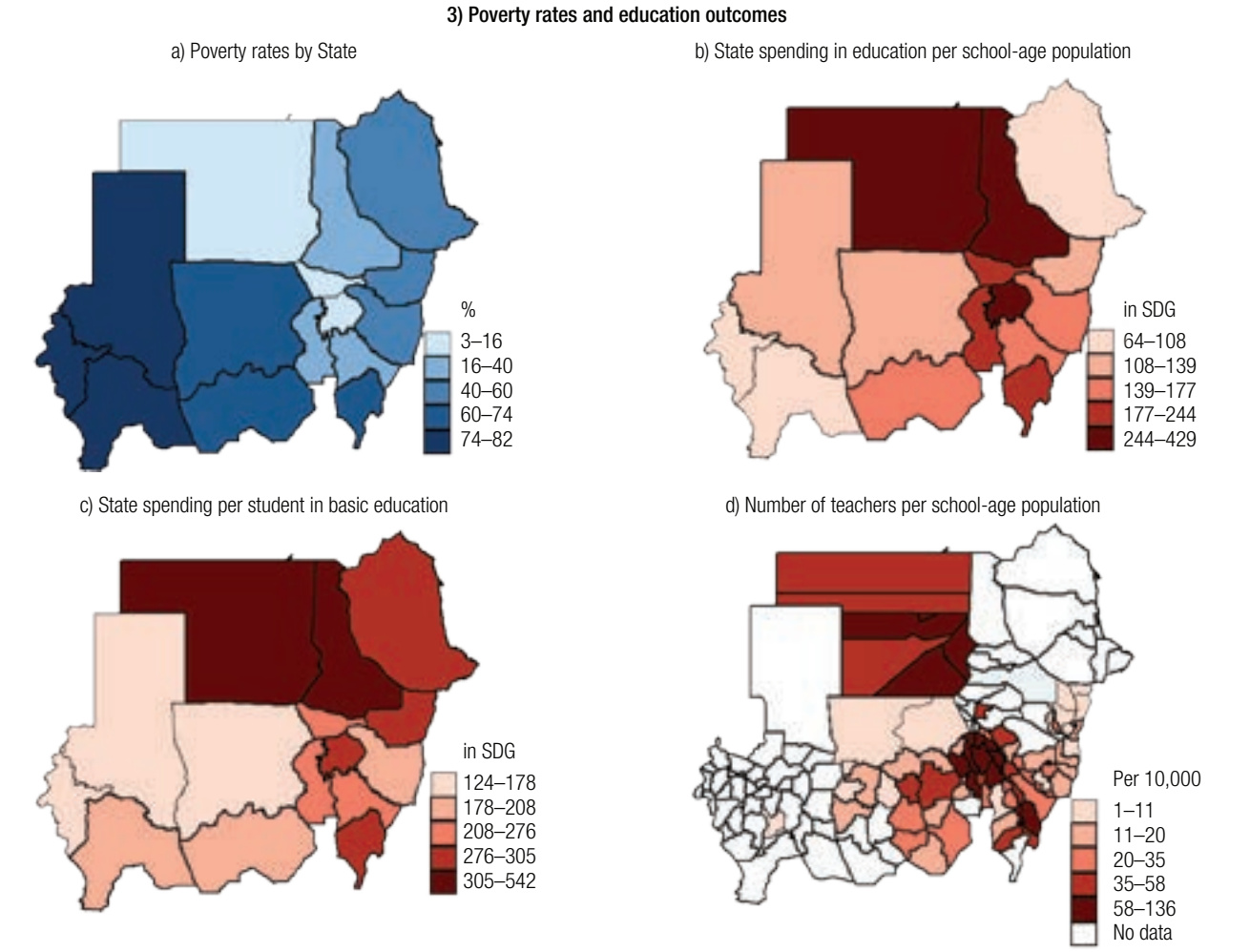
in the "Three Protocol Areas" (Blue Nile and South Kordofan states and Abyei area) where previous peace protocols have not yet been fully implemented. Abyei is one of the areas that suffered most from insecurity due to the conflict between the Misseriya and the Dinka-Ngok over natural resources (water and pasture) in the borderlands of Sudan and South Sudan.

FIGURE 1.7: Health and Education Spending and Outcomes in Sudan (*continued*)



Source: World Bank (2013d).

In most regions of Sudan, conflict over access to natural resources between pastoralists, agro-pastoralists, and settled farmers is endemic and also contributes to regional conflict, such as in the Sahel. Such conflict often leads to violence due to weak institutions for conflict management and especially weak natural resources management regimes. Climate change is likely to put further pressure on already fragile ecosystems and the livelihoods dependent on them, which may lead to further conflicts. In the western part of Sudan, especially in Darfur, conflict is exacerbated by porous borders that allow easy movement of rebels and arms, population shifts due to climatic changes as well as displacement from internal and regional conflicts, and lack of well-regulated resource sharing among different groups, including across borders.

Weak governance and accountability have contributed to fragility and conflict, including between the center and periphery. While some progress in government openness and pro-poor policy has been made, particularly since the signing of the CPA and the enactment of the Interim National Constitution in 2005, there remains a substantial governance agenda ahead. Progress in the delivery of basic services has been uneven and an acute challenge in peripheral areas. Governance institutions necessary to effect sound public financial

management—define and execute sectoral strategies; and ensure transparent, efficient, and equitable intergovernmental transfers—remain weak. As shown in various governance indicators, Sudan's capacity to maintain peace and security, promote rule of law, control corruption, and effectively manage public finance for delivery of services to the population remains very low in absolute and in comparative terms, and has hardly changed since 1996.

At the same time, conflict and fragility contribute to the plethora of governance challenges in Sudan. In fact, Sudan's governance quality has been stagnating or declining over the past decade. In particular, government effectiveness has declined, and control of corruption deteriorated, according to the Worldwide Governance Indicators and reported in World Bank (2015b). In addition, Government effectiveness has suffered due to an extended period of deciding appointments and promotions based on loyalty rather than merit, as well as relative international isolation. The relative quality of staff in line ministries in Sudan has tended to decline over time due to a confluence of several factors. Since 1989, a shift in hiring preferences from meritocratic criteria to considerations about political loyalty was put in place under the slogan of "empowerment." This was compounded by more limited access to international education and knowledge exchanges over the past 20 years compared to earlier periods.

In addition, coordination challenges have been increased by the practice of establishing various additional councils and by the process of decentralization (Word Bank, 2015b). High-level councils are often appointed ad hoc, mostly without a clear link to implementing agencies. Sector ministries have been requested to second staff to such councils, including particularly motivated or well-qualified staff. In addition, the more decentralized system of governance means that state-level ministries have assumed a larger role in implementation. As a result, national ministries have struggled with adjusting from a role of "doing things" to "organizing how things are done," for example with regard to irrigation, which has involved a shift from directly using technical specialist skills toward being an attempt to play more of a policy role (World Bank, 2015b).

Corruption drives fragility and conflict in Sudan, reinforcing barriers to investment and equitable growth that would provide opportunities to citizens. Institutional and governance weaknesses are further exacerbated by internal conflict, regional tensions, and international isolation, all of which conspire to divert attention away from the governance agenda. A weak civil society is unable to mount effective demands for improved corruption prevention and oversight systems or for greater transparency that help reduce the opportunities for corruption and misuse of resources.

Intrinsic to issues of allocation and management of resources and the need for greater transparency and accountability are the broader issues of the transformation of the state by providing for more participation of citizens and communities in decisions. The government indication of its willingness to engage in an inclusive process towards a new constitution might mitigate the lack of political reforms following the end of the CPA. As the World Development Report 2011 points out (World Bank 2011c), inclusive compacts are crucial to reducing the exclusion that often drives conflict and participatory governance is necessary to restore confidence in public governance at national and local levels. For Sudan, heeding calls by civil society and political parties for fair elections and an all-inclusive and participatory constitution-making process may represent the best opportunity to ground the needed institutional changes in a sustainable political process. The Bank's previous analytical and technical assistance work with the supreme audit institution and parliamentary oversight committees (e.g., budget and public finance committees) has also produced modest results in transparency in the management and use of revenue and follow up of reports of the audit institution.

Sudan's prospects for service delivery and poverty reduction are also hampered by its huge stock of external debt, most of which is in arrears, with the implication that Sudan is cut off from much needed official development assistance. Sudan is also in arrears with multilateral creditors, including the World Bank, the IMF, and the AfDB. The clearance of arrears would allow Sudan to access significant levels of concessional financing. Resolving Sudan's debt crisis would make available significant resources for its development, providing an opportunity to have a transformative impact on poverty and inequality in the country. Sanctions imposed on Sudan since 1997 are a major stumbling block for the country to reach HIPC debt relief (see next section on the impact of sanctions on economic activity).

c. *Ability to regulate economic activity*

Finally, the ability to regulate economic activities refers to the Government's capabilities to establish and nurture a business-enabling environment. The Sudanese business environment has stagnated or is even slightly deteriorated since 2008, a key factor holding back private activities in support of the Government's diversification agenda. The picture here is also being complicated by the economic and financial sanctions imposed on Sudan.

Business enabling environment

The business environment in Sudan remains challenging. The 2014 Doing Business (DB) report ranks Sudan 149 out of 189 economies; it is ranked marginally lower in comparison with some of its regional neighbors (Kenya at 129, Uganda at 132, and Ethiopia at 125). Enabling Sudan to benefit more fully from the export and growth opportunities offered by both the regional and global economy requires improving the business environment, facilitating trade and regional integration within COMESA and the GAFTA, making credit more available and affordable, especially to smallholders', and addressing the skills gap. Governance and accountability problems also need to be addressed. Enhancing policy certainty and predictability requires the reduction and removal of the legal and regulatory hurdles to business.

Since 2008 Sudan has experienced a slight deterioration in the business-enabling environment. All of the DB indicators experienced a relative decline in their rankings,[14] with "Getting Credit" and "Starting a Business" indicators experiencing significant drops in comparison with other indicators. The secession of South Sudan in 2011 and the cross-border tension resulting in the disruption of oil flows certainly influenced the changes to the business environment in Sudan (Figures 1.8.1 and 1.8.2).

Sudan lags behind the comparators in getting credit and protecting investors, resulting in a lower rank for the ease of doing business. Sudan ranked at 170 for getting credit and 157 for protecting investors in the Doing Business indicators (2014). When it comes to starting a business, Sudan's performance is similar to the comparator countries. Sudan ranked at 131 for starting a business while Kenya was at 134 and Ethiopia at 166, respectively (Figure 1.8.3). The difficulties of running a business in Sudan lie more in the lack of support to investors and business people than administrative procedure. The strength of the investor protection index is relatively low at 3.3 out of 10 (Figure 1.8.4).

Compared to other indicators of doing business, the tax regime in Sudan is relatively favorable to enterprises. A new tax law since 2009 has reduced the tax burden on business by reducing the corporate tax rate by an average of 15 percent, and the capital gains tax by an average of 5 percent. Moreover, the tax on labor has been abolished (Doing Business, 2014). Corporate tax rates

[14] The number of economies for DB reports varies from year to year; therefore, this drop in ranking cannot be explained assertively due to the deterioration of the Sudanese business environment.

in Sudan differ, depending on the business activities of the company,[15] which effectively discriminates against the sectors with the relatively higher tax rates and distorts the allocation of investment (Figure 1.8.5).

The standard Value Added Tax (VAT) is also comparable with the neighboring countries. The standard VAT rate is 17 percent in Sudan, with a special 30 percent rate imposed on telecommunication services. The VAT rate is similar to its neighbors; in Uganda, the standard rate is 18 percent and in Kenya 16 percent (COMESA 2009) respectively.

A wide range of activities and services are exempt from VAT. Activities related to agriculture (agricultural products, seeds, and fertilizer), medicines, bread and locally produced wheat flour, animals, meat, fish, chicken and chicken products, and milk and dairy products are all exempt. Financial, insurance, education, and medical services as well as the rental and sale of real estate for residential purpose are also exempt from VAT (Africa Legal Network 2013).

Sudan has encouraged private sector investments, aiming at diversifying its economy with foreign direct investment. Sudan had attracted substantial amounts of foreign direct investment (FDI) after the signing of the CPA in 2005, but most of the investment was probably destined for the oil and petroleum sector. Therefore, following the secession of the South Sudan, the amount of FDI has dropped.[16] The government has established incentives to encourage investment. The president signed the new National Investment Promotion Law (provisional decree) on March 2013. This law prohibits discrimination against foreigners and allows both domestic and foreign investors to have access to incentives described in the law and the regulation,[17] such as licensing, tax exemption, and land access. Foreign private entities can establish and own business enterprises, and repatriate capital and profits, on the condition that investors open an investment account at the Central Bank of Sudan (CBS) before entering into business. Foreign and domestic private businesses may be registered as a sole trader, partnership, a limited liability company (private or public), special concession, or branch of a foreign registered company (U.S. State Department 2013).

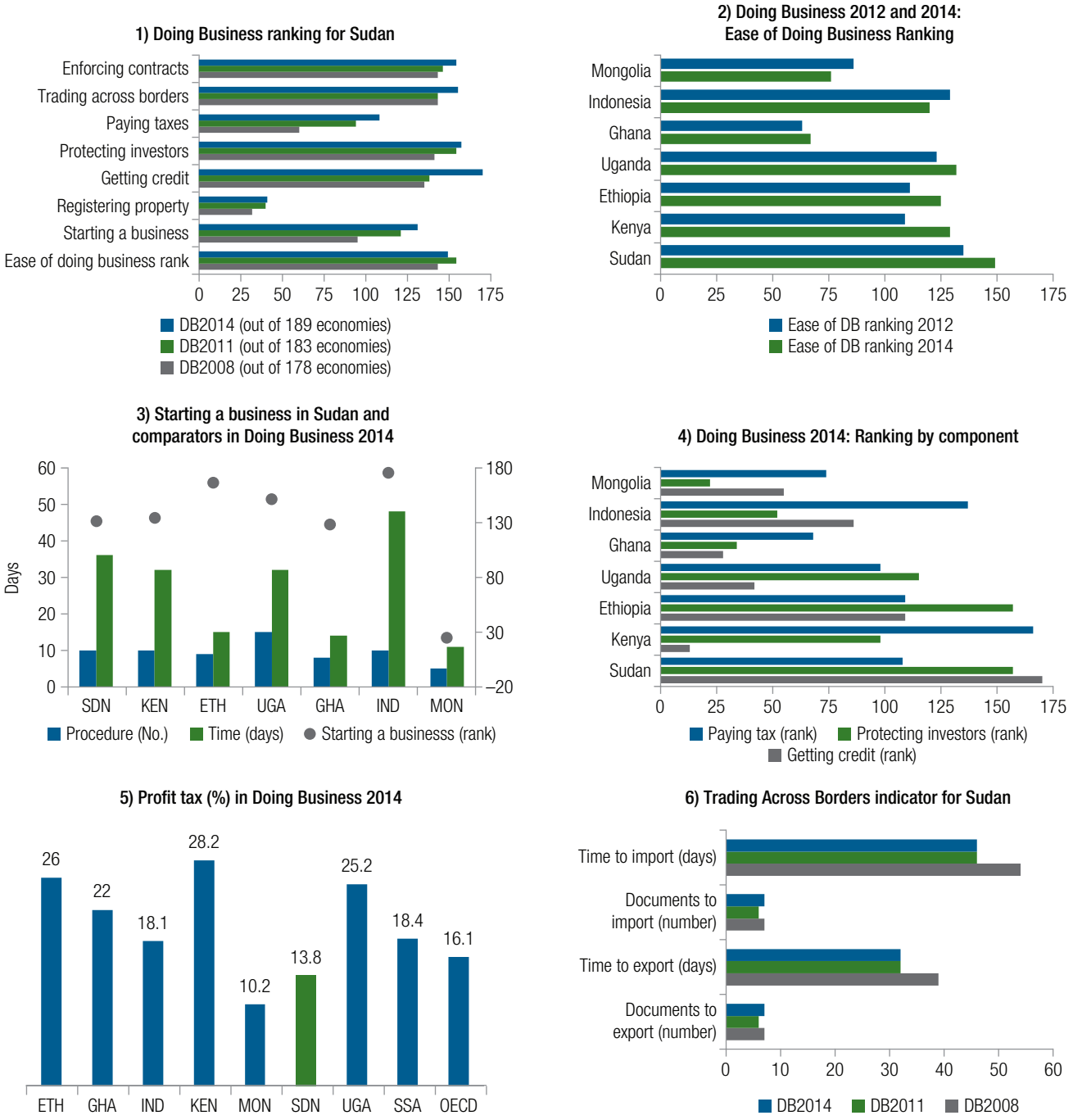
Under the 2013 law all service sectors are, in principle, open to foreign ownership. However, existing government monopolies and other licensing requirements effectively limit the opportunities for private investment in the transportation, media, and communications sectors. More precisely, railway freight transportation, airport operation, television broadcasting, and newspaper publishing continue to be effectively closed to foreign capital participation.

New legislation aims to reduce red tape for investors, both domestic and foreign. The High Council for Investment was established 2011 with a mandate to facilitate investment procedures and follow up on implementing the incentives (Africa Legal Network 2013). In addition, a new National Agency for Investment is to be established with financial and administrative independence under the new law in 2013. It will act as the administrator for licensing, granting investment projects, and the preparation of investment plans. This Agency will also manage the "investment single window" with the membership of the commissioners of the ministries and other agencies concerned with investment.[18]

Sudan has succeeded in reducing the number of days to import and export with the introduction of automation; however, the operational procedures to import and export have not changed much (Figure 1.8.6). The beginning of

[15] Zero percent for agricultural activities; 10 percent for industrial activities; 15 percent for commercial and service activities, real estate rental companies, and banks, insurance and fund management companies; 30 percent for cigarette and tobacco companies; and 35 percent for companies engaged in the exploration, extraction and distribution of oil and gas, and their subcontractors (Deloitte 2013).
[16] FDI inflows to Sudan were US$2,894 million in 2010 and US$2,692 million in 2011 (COMESA 2012).
[17] The earlier Investment regulation 2000 (amended in 2003) is available at http://www.sudanembassy.ca/Docs/Investment%20regulations.pdf (Sudanese Embassy for Canada).
[18] National Investment Promotion Law of 2013, National Agency for Investment (English Translation)

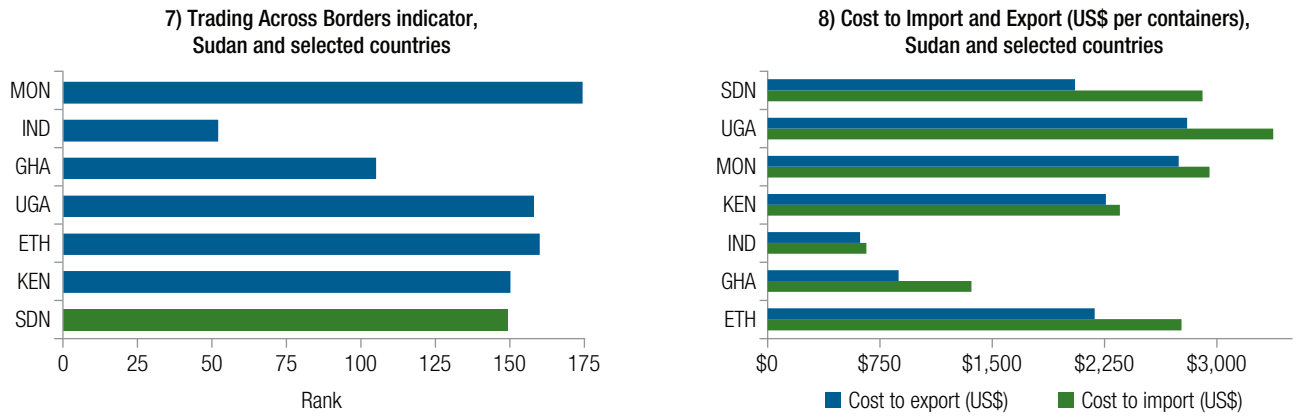
FIGURE 1.8: Business Enabling Environment



(continued on next page)

the introduction of ASYCUDA World coincided with the reduction of time to import and export. While cooperation between the related agencies has improved through the ASYCUDA system, the Doing Business indicators imply the procedure with documents remained largely unchanged. The relatively long time required for importing and exporting are indicative of high trade costs. Indeed the time taken for clearances may be converted into an ad valorem equivalent (Nathan 2007).

FIGURE 1.8: Business Enabling Environment (*continued*)



Source: World Bank staff own calculations, based on data from Doing Business various years.

For a country with sea access Sudan has a relatively low ranking on the trade facilitation component of the Doing Business indicators (Figures 1.8.7). The Doing Business (2014) ranking for Sudan (155th) on trading across borders is closer to the ones for landlocked countries and slightly worse than the regional average for SSA (141). Landlocked countries, such as Uganda and Ethiopia in the comparators, often have more penalties than non-landlocked ones in trading across borders (Alvis et al. 2010). Sudan, with relatively good port infrastructure, does not appear to be taking full advantage of its geographic location. It is notable that the cost to import is close to the price for the neighboring comparator landlocked countries (Figures 1.8.8).

Impact of sanctions regime on Sudan

The United States imposed economic sanctions on Sudan in 1997 through a United States Executive Order. This order, taking the form of a national emergency and originally consisting of a comprehensive ban on bilateral trade, as well as specific sanctions relating to the arms trade and certain financial transactions, has been relaxed over time. Annex 3 provides a timeline of sanctions between 1997 and 2014. Over the years, the trade sanctions have been relaxed. The United States now exports a variety of goods to Sudan subject to a regime of export controls related to military or dual-use goods. In 2004, the United Nations imposed an arms embargo on non-governmental actors in the three provinces of Darfur, including the Janjaweed. In 2005, under UNSCR 1556, the United Nations imposed a travel ban and asset freezes on specified individuals, "those impeding the peace process in Darfur." From 2005 onwards, specific sanctions have been imposed by the European Union, including individual sanctions by the Netherlands and United Kingdom; Switzerland, Canada, Australia, New Zealand, and Singapore. These sanctions may have constrained the supply of foreign exchange to Sudan.

But there are also examples of sanction related easing and tightening—in the area of gum arabic trade and financial sector transactions—that do not arise from Executive Orders. To illustrate, gum arabic is not exempt from sanctions, but trade is permitted with traders that hold special licenses. In November 2000, the U.S. Congress adopted legislation to require the Secretary of the Treasury to consider approving licenses for the import of gum arabic from Sudan. As a result, gum arabic became an exception to the comprehensive trade restrictions imposed by the Executive Branch (World Bank, 2015a). On the other hand, a multi-billion ruling against BNP Paribas in June 2014 for

facilitating foreign exchange transactions between Sudan (and other countries under sanctions) with the rest of the World led to a de facto and significant tightening in financial sector restrictions. In effect, that led to a breakdown in the foreign corresponding bank network of Sudanese banks and brought foreign exchange transactions with Sudan to a virtual standstill for much of 2014 (IMF 2014b).

The largest, yet most difficult to assess impact of the sanctions regime on Sudan is transmitted through the financial system. Financial sanctions create difficulties for non-U.S. companies in trading with Sudan, partly due to the fact that US$ transactions are routed through the U.S., and partly due to the fact that many non-U.S. banks have very significant dealings with the U.S. and want to avoid the appearance of being involved in trade with Sudan (World Bank, 2015a). To illustrate: although Sudan quotes gum arabic prices in US$, all purchase transactions have to be made in Euros; but despite this many banks refuse to be involved in the trade, especially after the BNP Paribas ruling. In Germany, it was reported that Commerzbank was one of the few that would still accept transactions involving Sudan. In the UK, it was reported that Barclays had refused to accept transactions with Sudan. In a similar way, it was also reported that the Gum Arabic Board (GAB) of Sudan had not been able to take a stall at the 2013 Food Ingredients Europe trade show, the major European trade show for the food ingredients business, as it is organized by an American company.

Sanctions have also a direct impact on the real economy through restrictions on sourcing of inputs and replacement parts. Over the years, a great deal of anecdotal evidence of the negative impact has emerged, much of which are mentioned in discussions with representatives of the Government of Sudan. Specific examples include (World Bank 2014e):

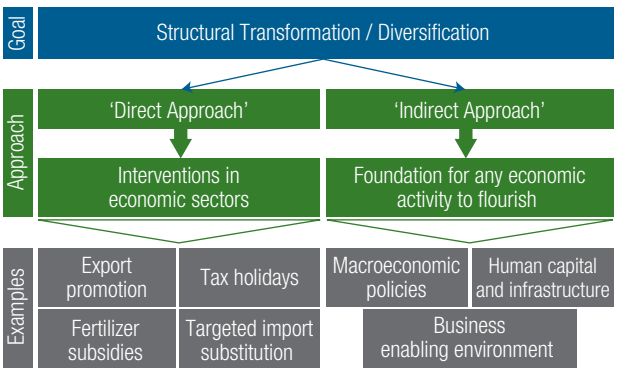
- ***Sudan Railway Corporation*** has explicit problems in maintaining their locomotive fleet, which requires spare parts from western countries.
- At the ***Customs Authority*** there are indications that important technical infrastructure and resources (e.g., scanners) are not being used to their full potential because of on-going support and maintenance issues. The investment in such technical infrastructure needs to be accompanied by on-going support and maintenance contracts, which are sometime not possible due to the sanctions.
- The national airline, ***Sudan Airways*** is not able to maintain its whole fleet; some aircraft are grounded due to lack of spare parts. Some international airlines are also not able to repatriate their profits due to the non-availability of foreign currency through official channels. The latter is one of the reasons given for the January 2014 withdrawal of Lufthansa from the Sudanese market.
- The ***Tourism Sector*** is restricted by the limited technology available and the inability to use credit cards in Sudan. The U.S. embargo has had a negative impact on tourism to the country, both in terms of creating a much more challenging business environment for operators as well as creating a major inconvenience for tourists. Tourism businesses face major challenges when trying to obtain essential equipment such as commonly used front desk and restaurant management systems. Without the ability to use credit cards, they must spend time and money to obtain licenses in order to make international transfers of funds. The embargo also results in high transaction costs for tour operators and hotel owners to receive funds sent by international tour operators via non-commercial banking systems such as Western Union or wired through third-party accounts in neighboring countries.

The absolute level of real economy impact of sanctions remains unknown. For instance,

Sudan's non-oil exports are concentrated in a small number of markets, but this is likely not solely a consequence of economic sanctions against Sudan (World Bank 2014e). In fact, it appears that Sudan is isolated even within Africa. However, sanctions have exacerbated the isolation through increasing the difficulty in settling cross-border payments, which affects trade with all partners including their African neighbors. The United Arab Emirates has always been a key trading partner for Sudan; Canada was a particularly important partner in 2009 but has declined; and since 2010 Saudi Arabia has steadily become an important market for Sudanese exports.

Yet, there is reason and evidence to believe that a normalization of relations with the rest of the world, including a lifting of economic sanctions, could promote export diversification. The simulations presented in chapter 1.A confirm this view. Over the years since 1997 the trade sanctions have been relaxed. But sanctions on financial transactions limit the ability of Sudan to engage in international trade, both its ability to finance imports in general and to engage in some export transactions that require the intermediary of a foreign bank. While all systems of government foreign exchange allocation are likely to impose inefficiencies, these inefficiencies are likely to be greater when sanctions make foreign exchange particularly scarce. The U.S. embargo on all Sudanese exports except gum arabic reduces export sales to the U.S. market directly. Both foreign exchange shortages and U.S. export controls on specific goods could prevent Sudan from importing intermediate goods used either for production in the domestic economy, or for export.

FIGURE 1.9: Two Approaches to Diversify an Economy



Source: World Bank staff own visualization, based on World Bank (2014d).

D. Lessons for Sudan: Growing Endowments and the Production Base

This initial chapter reviewed recent key literature on growth and diversification with a view of defining a suitable approach for Sudan. Looking into the future to 2030, the sectoral structure of Sudan's economy shows a growing importance of agriculture, less importance of extractives, and relative stability of other sectors (manufacturing, services). The simulation presented also shows that the strongest growth rates are coming from sectors that are capable of producing internationally competitive tradables. Simulations thus suggest that in the absence of dominant resource-based exports, growth in the future must be centered on sectors producing tradables that are exported and/or replace imports.

There appears to be a case for Sudan to approach growth through diversification from two angles: the production and the endowment base. Figure 1.9 distinguishes both approaches into a direct and an indirect one and provides illustrative examples. Taken together the direct and indirect approach define a coherent way for Sudan to diversify that takes into consideration the current and future sectoral structure of the economy, existing sectoral policies of the Government, as well as the need for long-term institution building as a foundation for diversification through broadening the national endowment base.

The CEM therefore uses a sectoral focus and looks at agriculture as sources for diversification, but also makes the case that trading of goods and services—especially of the higher value-added kind—could be a means to grow the endowment base of the country. It is from this framework that the remainder of this CEM unfolds with a detailed

analysis of agriculture and trade of goods and services, and concludes with an analysis of the extractive sectors (oil, gold) in search of fiscal support for the diversification agenda of the future.

a. *Macroeconomic management crucial for economic growth*

From the Growth Report come a number of clear macroeconomic policies that were underlying economic growth periods in other countries that are of relevance for Sudan (World Bank 2008a). Reviewing Sudan's record vis-à-vis those policies indicated a number of important policy areas where Sudan has scope to improve its emphasis:

- ***Investment and savings:*** High rates of investment and savings were driven by the oil economy of the past. In the post-secession Sudan, efforts are needed to increase the investment rate to past levels supported by domestic savings. Key will be to rely less on public resources, which were much driven by the oil economy, and encourage private investment and a combination of domestic and foreign savings.
- ***Technology and know-how transfer:*** FDI into Sudan was high during the oil economy, but focused on the natural resource sector. Going forward, a new kind of FDI—that brings in technology and know-how for a diversified economy—is needed.
- ***Export promotion and diversification:*** Driven by oil discoveries Sudan's exports-to-GDP ratio expanded significantly starting in 2000 with oil constituting around 90 percent of exports at that time. The challenge ahead will be to find new export sources and export markets, probably in agriculture, initially for raw materials, but then also for processed agricultural goods to pave the way for a higher value-added activities in the future.
- ***Financial sector development and openness:*** A more open and accessible financial sector for the population would be instrumental for development in Sudan. This is not only important for the productive sector as in important input, but also for financing trade activities where foreign currency is needed. The economic and financial sanctions implemented since 1997 play a role in this, and in fact have recently even tightened due the BNP Paribas court ruling, bringing trade financing activities to a virtual standstill.
- ***Macroeconomic stability:*** The macro economy was stabilized as part of the oil economy in the 2000s, but had started to show vulnerabilities even before the secession of South Sudan. Inflation has been (and remains) high and volatile since 2008. Budget deficits have always been high, which is reflected in the high indebtedness of the country.

Careful management of the real exchange rate will be particularly important for Sudan's economy in the future for an overall low inflation environment. Sudan's real exchange rate of the past decades was significantly overvalued and still is so today, despite several rounds of nominal depreciations that took place in 2012 and 2013. Those depreciations were consumed by similarly high inflation rates, and, as a result the overvalued real exchange rate of the past is much a thing of the present. But a more competitive exchange rate would be instrumental for boosting agriculture exports, which are currently largely unprocessed in nature. Chapter 2 will analyze this in detail, preceded by empirical evidence on the extents of structural transformation being visible in Sudan's labor market.

b. *Agriculture and livestock: important for inclusive growth*

Given that poverty in Sudan is deep and largely a rural phenomenon the agriculture sector is crucial for efforts to reduce poverty. About one in two Sudanese, close to 14 million people, lived in poverty in 2009, each consuming less than the national

poverty line (consumption of the poor is about 65 percent of the national poverty line). The incidence of poverty in urban areas, particularly Khartoum, is significantly lower than that of the rural areas. Rural areas are more than two and half times as poor as the capital and almost twice as poor as the rest of the urban areas. While rural areas account for a little over 60 percent of the Sudanese population, they account for almost for 80 percent of Sudan's poor. For the rural population, any poverty reduction strategy needs to build on agricultural growth, while at the same time looking into the creation of off-farm employment opportunities there.

In addition, agriculture in Sudan is by-and-large a story of low productivity, which indicates the potential to realize quick wins. Chapter 3 will show that low crop yields are associated with low fertilizer usage in the country. In 2009 the average fertilizer use per hectare of cropland was 7.3 kg, which ranked Sudan at 129 among 155 countries, far behind Ethiopia, Sudan's poorer neighbor. To illustrate, sorghum and millet yields are low and generally on a downward trend, yet more so in the rain-fed production areas than in irrigated regimes, where yields are more stable or slightly increased over the past decade. Wheat, of which the government encourages production even though it is not a crop native to Sudan, has yields that are among the lowest in the world, if not the lowest. Similar developments are seen in the main oil seeds, groundnut and sesame. Two notable exceptions to the decreasing production and yield trends are gum arabic and cotton, which currently realize a renaissance of production over the past years with particularly strong production in 2013. Low yields in Sudan indicate that by adjusting key levers in agriculture in Sudan there could be potential to quickly realize large productivity gains.

Low productivity is not only related to input usage, but also distortive centralized marketing and distribution arrangements that eroded producer incentives. This is now starting to change, and the experiences of gum arabic and cotton could pave the way for more such reforms. Both products have shown a remarkable recovery, which will be described in detail in Chapter 3. In each case the Government had, in the past, instituted monopolized marketing structures (monopsonies) in the form of parastatal companies. As is often the case with such companies, paying farmers less and less for their products (independent of the world price) seems an easy path to profitability, until the farmers stop harvesting or even planting their crops. That this happened can be seen in low yields in both gum arabic and cotton, as well as many other agriculture products. As the monopsonies were eventually relaxed and competition provided, prices received by farmers increased substantially, and with them so did areas cropped and especially yields. Cotton yields tripled nation nationwide in one year (2010/11), and in three years increased by five and a half times, with no improvements in irrigation or varieties. Such remarkable increases in agricultural yields show that poor agriculture performance is not only a product of low fertilizer usage or weak varieties due to often local breeds of seeds, but also, and possibly most importantly, a lack of incentives for the producers.

Livestock production and exports are a remarkable success story of agriculture in post-secession Sudan. Livestock showed a fantastic recovery after virtually no exports in 2008 due to an imposed export ban and quarantine measures, and which grew to a multi-million business and earned more than US$670 million in 2013. The backbone of this success is pastoral livestock production, which is superior to any other form in Sudan. But pastoralism is under pressure due to uncertain land tenure and land rights that effectively diminish the historical grazing grounds of pastoral farmers.

Given the unique performance of the livestock sector in Sudan and the fact that pastoralism is so successful, there is surprisingly little policy attention on the sector. More attention on the sector will be important in part due to the interlinked issues of land tenure and land policy, which need to be solved to sustain pastoral livestock production into

the future. But there are also other issues, such as the inherent volatility of the sector and the risk due to droughts and diseases and the negative affects they entail. Hence there is a need for more policy focus on a better, forward-looking management of the sector. Chapter 3 will provide an in-depth analysis of livestock to inform such a new policy focus.

c. *Goods and services trade to build endowments*

To support growth and diversification in the longer-term, trade can be used as a vehicle to build a broader endowment base in the Sudanese economy. World Bank (2014) argues that global and regional integration are key to leverage trade effects for a country. Trade will not only build on a broader endowment base, which would both change the composition of trade and the profile of production World Bank (2014d), but trade can also be used as driver to build endowments through its network effects and the ability to connect the Sudanese economy with the world. Chapter 4 provides an analysis of goods and services trade.

Advancing trade also means to putting due emphasis on the necessary groundwork for higher value added activities through manufacturing. Such groundwork will be especially important so that the rural population, as it develops through improved agriculture productivity, has an opportunity to move to the non-agriculture sector. Currently Sudan is primarily exporting raw agriculture materials and livestock. Through a process of basic value addition on agriculture products (for example such as machine flaying of animal skins) existing exports can be increased in value and basic structures for light manufacturing can be established. However, the current imposition of sanctions on Sudan plays a constraining role for export diversification (see also Section 1.C).

Services and trade-in-services have an important role in economic diversification. Services are essential intermediate inputs and have the potential to enhance productivity and increase technology and skills transfers through significant positive spillover effects throughout the economy. Services sectors can help Sudan diversify its economy and reduce poverty. For example, while the agricultural sector is viewed as an important engine of growth, it has remained far below its potential and the country has stayed a net importer of agricultural products. The productivity of farms will have to improve to increase agriculture production. That means better transport infrastructure, agricultural technology, and support services including financing.

d. *Extractive industries: still important, but less dominant*

The natural resource sector is still significant in Sudan and recently had new impetus from the discovery of gold, but it is likely to be temporary. Lessons from other countries show that growth in the natural resource sectors is not necessarily "pro-poor" due to if there are insufficient spillovers to the rest of the economy. The sector, however, could possibly provide—through its power to generate fiscal revenues—financial means to advance policies for "pro-poor" growth in other sectors. Chapter 5 provides an in-depth analysis of the extractive sector.

The diminishing effects of both oil and gold on Sudan over the next 10 to 15 years are obvious. Yet, revenues are still important and a source for financing capital-intensive diversification activities. Examining oil projections to 2030 shows that the level will decrease over the next one or two decades; this finding is important especially as the base case considered in this analysis applies oil projections that are significantly lower than the Government's own projections). In either case, it seems inevitable that oil production will decrease to below 100,000 bpd, but the question is whether this will happen now or in three, five, or ten years. Hence, direct domestic oil-related revenues will likely be around 10 percent of total revenues, and if fees and TFA are included around 20–30 percent.

These could be used to finance capital-intensive diversification activities such as investment in education and building of infrastructure.

The outlook for gold is slightly more optimistic, and Sudan is projected to produce between 18 to 28 tons annually over the next five years—worth about US$750 million to US$1,130 million annually. But the fiscal contribution of gold mining is minimal. The traditional sector will continue to be the source of most gold produced in this period, although the ability to sustain this contribution beyond this five-year period is increasingly doubtful. A more likely pattern is that industrial mining will become the main source of domestic mined gold after 2020. It is unlikely that production after 2020 would be significantly higher than 18 to 28 tones estimates for the next 5 years.

The contribution of mining to Sudan's economy over the medium term could be positive, however, the scale of the sector is very unlikely to rival that of the oil sector in its heyday and its fiscal impact may be substantially lower. These considerations will be elaborated on in Chapter 5. There are numerous scenarios that could unfold regarding gold mining in Sudan, including much less positive ones, in which a lower gold price environment coupled with continuing constraints on financing of major mineral projects means that the recent gold mining boom will wane. Any sustained program of reforms to make the industrial mining sector more competitive and to strengthen regulatory institutions would require strong leadership and probably external support to enhance institutional capability and effectiveness.

2 STRUCTURAL CHANGE AND THE ROLE OF THE REAL EXCHANGE RATE FOR EXPORTS AND GROWTH

Successful economic development has typically been accompanied by structural transformation in which manufacturing and industry's share of output and employment rises at the expense of agriculture. At present, however, the agriculture and services sectors account for the vast majority of employment in Sudan, with manufacturing providing an almost negligible number of jobs.

A more competitive real exchange rate could support export and output growth and hence help attract much-needed FDI. Sudan's real exchange rate is overvalued, which is similar to other African oil exporting countries, most of which experience Dutch disease symptoms. Empirical evidence presented here suggests that a 10 percent lower real exchange rate (RER) could raise economic growth by 0.9 percentage points in Sudan. Given that Sudan's exports of non-natural resource and agriculture products comprise mainly low-value, raw, and unprocessed products, which compete primarily on prices, the historic and current RER overvaluation was and is a major inhibiting factor for export development in the country.

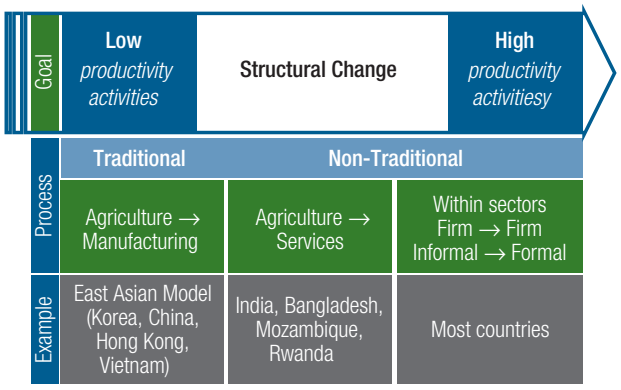
A major determinant of the RER is the level of inflation. And since 1999 inflation in Sudan has a history of high rates and increased volatility. But inflation became also a key symptom of the post-secession economy with rates above 40 percent in 2012 and 2013. A major driver of the upsurge was the approach to monetize the budget deficit by the Central Bank of Sudan through granting direct loans to the government.

A. Structural Change: Evidence from the Labor Market

Structural change in Sudan

Structural change shifts economic activities and employment from low to high productivity activities. Figure 2.1 illustrates the process and distinguishes a traditional and a non-traditional definition of structural change. In the traditional definition of structural change manufacturing and industry's share of output and employment rises at the expense of agriculture. This is the type of development model often associated with East Asia

FIGURE 2.1: Illustration of Structural Change in an Economy



Source: World Bank staff own visualitzation, based on McMillian et al. (2014); Zeufack et al. (2015); and Ghani & O'Connell (2014).

where there was a strong rise in manufacturing sector shares in the economies of China, Korea and Vietnam, to name a few. The non-traditional view of structural change increasingly also acknowledges the role of the services sector for structural transformation and productivity increases within sectors and within firms. Given Sudan's early days in structural transformation, and the illustrative character of the traditional definition of structural change, the focus in this chapter is primarily on the (lack of) shift from agriculture to manufacturing activities in the economy.

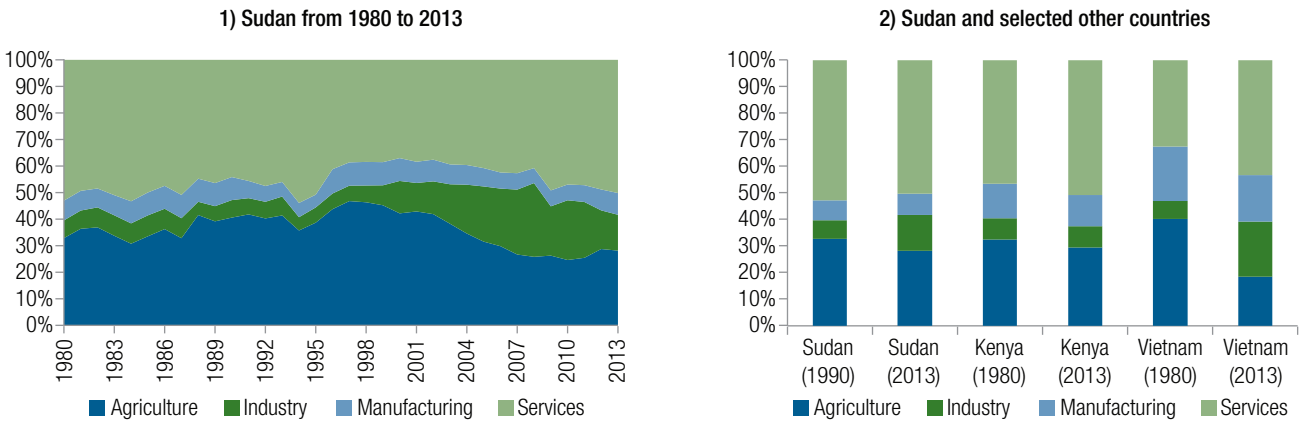
But Sudan still stands at the beginning of structural transformation, while others advanced. Looking at the sector decomposition of GDP, Figures 2.2.1 and 2.2.2 show Sudan's situation in 1980 and 2013. With the exception of a rise in industry that is related to the oil economy and extractives, the sector shares are rather constant in the period covered. This is in stark contrast to Vietnam, where the importance of agriculture has decreased from 40 to 18 percent both on account of rising shares for services and industry (incl. manufacturing). Kenya's structural transformation over the same period was less pronounced, and driven primarily by the services sector. The remainder of this section will provide further evidence of the lack of structural transformation in Sudan from the perspective of the labor market.

Demographics and education

Sudan has a very young, relatively rural population, with a low level of education attainment. Table 2.1 shows a simple breakdown of the Sudanese population by gender and rural/urban location. The total population of 29.2 million is largely rural (64.3 percent) and approximately gender-balanced (49.3 percent female). Rural areas are considerably younger on average than urban areas: 49 percent of the urban population is younger than 20 compared to 55.7 percent of the rural population. The gender ratio also differs across cohorts: women constitute 48.4 percent of the population younger than 20 and 50.4 percent of the population aged 20 or older (Figures 2.3.1 and 2.3.2). This partly reflects the legacy of the civil war, which led to disproportionately high male mortality, and may also be a reflection of male migrant workers to the Gulf states.

The age distribution of the population leads to a dependency ratio that is very high by global standards but comparable to some other African countries. The dependency ratio is the ratio of young and elderly to working-age people. The exact

FIGURE 2.2: Structural Change through Sector Decomposition of GDP



Source: World Bank staff own calculations, based on data from World Development Indicators (2015).
Note: (2)Industry's rise in Sudan (2013) is associated to extractives and not indicative of structural change.

Table 2.1: Age Composition of the Population in Sudan

	Total	Rural	Urban
Total	29,154,357	18,775,152	10,379,205
Female	14,380,529	9,302,234	5,078,295
Male	14,773,828	9,472,918	5,300,909

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Note: Calculated using NBHS household weights.

Table 2.2: Dependency Ratios in Sudan

Working age group	Rural	Urban	Both
10–59 years	0.61	0.47	0.56
10–65 years	0.56	0.43	0.51
15–59 years	1.04	0.78	0.94
15–64 years	0.96	0.72	0.87
20–59 years	1.61	1.23	1.46
20–64 years	148	1.13	1.34

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Note: Calculated using NBHS household weights.

value depends on the definition of "working age" and Table 2.2 shows dependency ratios for several possible definitions. Using a standard definition of working age, there are approximately six people aged 15–64 for every five people aged younger than 15 or older than 64. An alternative definition includes youths aged 10–14 in the potentially working-age population (see following paragraphs), in which case there are approximately two working-age people for each young or elderly person. The dependency ratio is consistently considerably higher in rural than urban areas, reflecting the relatively young rural population.[19]

Half of the population in Sudan has never attended a formal school and only a tiny portion has some post-secondary education. Only 15.8 percent of the population has at most secondary school education, and only 3.8 percent have some post-secondary education shows the distribution of education attainment for the Sudanese population.[20] Education levels are substantially lower in rural than urban areas and substantially lower for women than men. The gender gap in schooling is slightly smaller in urban than rural areas.

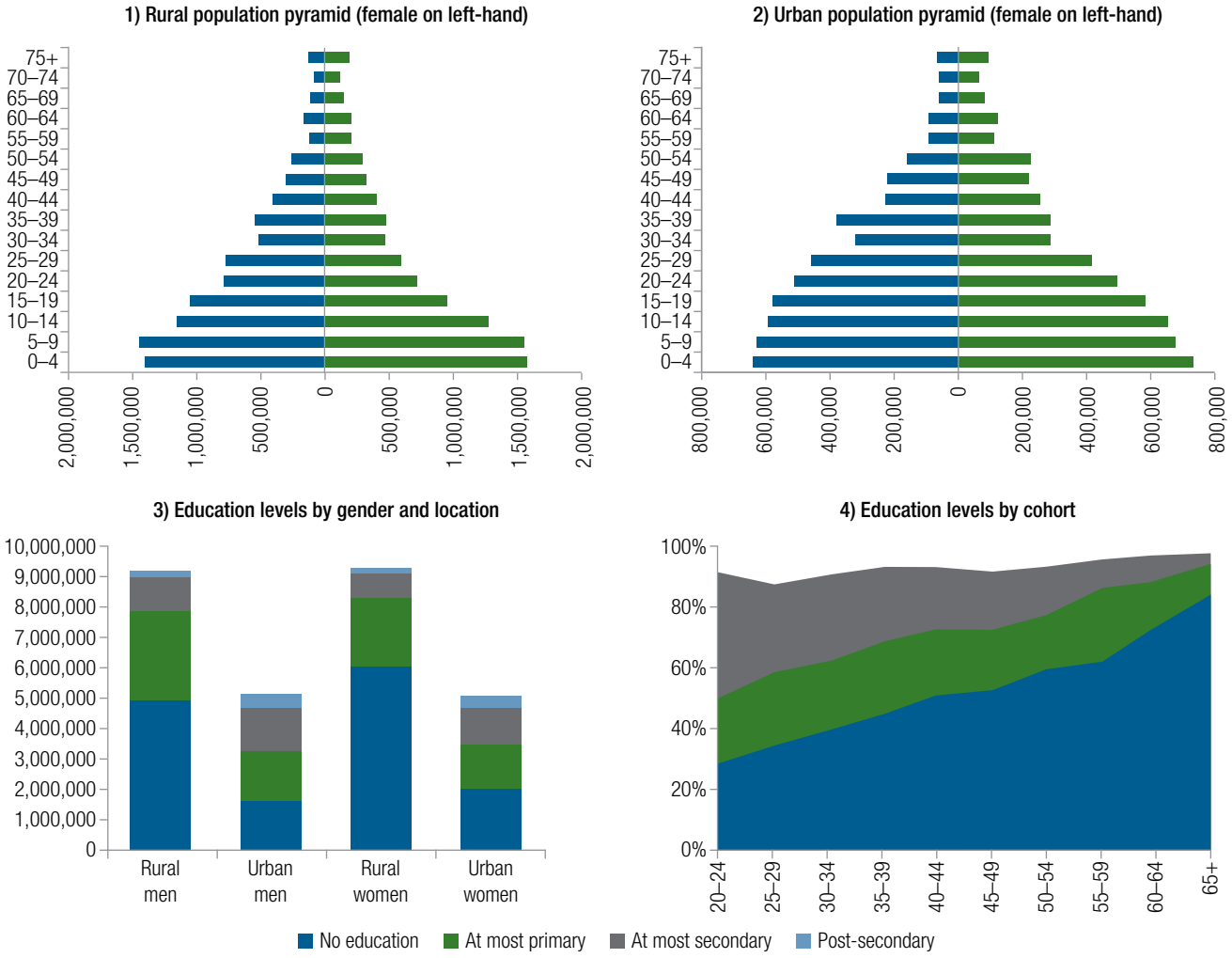
Older parts of the population have lower education than younger parts and the gender gap in education is smaller in younger cohorts than in older ones. Figure 2.3.4 shows the percentage of the population with each level of education attainment for five-year age brackets. Older cohorts have substantially lower education attainment: fewer than 30 percent of individuals aged 60 or older have any formal schooling. Individuals aged 20–29 have substantially higher levels of education: one in ten has some post-secondary education and a further one in three has some secondary education.[21] The gender gap in education is smaller in young cohorts than older cohorts but this is driven almost entirely by urban areas. In rural areas, the gender gap in education is approximately stable over cohorts and may in fact be widening slightly. Secondary school access appears to have increased more for younger men than younger women (relative to older men and older women respectively).

Employment and labor force participation

Sudan's labor force participation rate is relatively high and formal unemployment is moderate. Figure 2.4.1 shows the labor force status for all individuals aged 10 or older, the youngest age at which the NBHS work module is administered. Across the entire population, 36 percent are employed

[19] This comparison should be interpreted with some degree of caution, as rural areas may face a much lower effective dependency ratio if households are supported by remittances from urban migrants.
[20] This report omits Islamic *khalwa* schooling from the analysis, which cannot be easily classified into a conventional primary, secondary, tertiary division. Approximately 2 percent of the population report attending *khalwa* schools and this fraction is higher for men, in rural areas, and for older cohorts.
[21] This cohort difference in years of completed education reflects rising education enrollment and spending through time, documented in World Bank (2012). Despite the recent rise in education spending, Sudan still spends a substantially smaller fraction of its GDP on education than most North African countries.

FIGURE 2.3: Demographics and Education in Sudan



Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).

and 6 percent are unemployed.[22] Of the remaining 58 percent of the population, approximately half report attending school and the other half are classified as neither studying nor participating in the labor force. Both unemployment and labor force non-participation are higher in rural than urban areas. Non-participation is far higher for women than men, a pattern discussed in more detail below.

While both wage work and self-employment are common, labor force non-participation is far higher for women than men. Many women are engaged in home production and there appears to be some variance in whether they self-report this as work. Figure 2.4.7 shows employment and labor force participation for five-year age cohorts.[23] Non-participation for females rises sharply across

[22] Respondents are defined as employed if (1) they worked at least one hour in the past week for pay, profit-share, in-kind payment, or without pay; or (2) they did not work in the past week but have some form of job in which they normally work. This definition of employment is quite inclusive. A substantial fraction of respondents, particularly women, are classified as working under this definition but are not paid. Respondents are defined as unemployed if they are not currently working but report that they are available for work.

[23] The remainder of the analysis focuses on individuals aged 10–64. Sudanese life expectancy is only 61 and labor force participation is low for older individuals, so omitting the older tail of the distribution has little effect on the analysis. Respondents aged younger than 10 are not asked questions about work and so must be omitted from the analysis.

cohorts. This pattern may reflect a life-cycle explanation in which many women complete education and do not transition into the formal labor force. It may also reflect a cohort explanation in which younger women are obtaining more education than their predecessors and will go on to enter the labor force. These explanations cannot be separately tested until additional waves of household survey data become available. The same pattern is not visible for men, most of whom are either in schooling or in the labor force. Younger men are slightly more likely than older men to be neither studying nor in the labor force

Child labor is not uncommon in Sudan but most working children are concurrently enrolled so this does not represent completely foregone educational opportunities. One in ten youths aged 10–16 is employed and another one in thirty is available to work but not currently working. The rate of child employment is considerably higher in rural than urban areas (13.5 and 4.3 percent, respectively) and slightly higher for men than women (12.9 and 7.7 percent, respectively). The gender gap may, however, be considerably smaller if female youths are engaged in time-consuming home production but do not report this as work. Most working children are concurrently enrolled (67.8 percent), so much of this child labor does not represent completely foregone educational opportunities.

The overwhelming majority of women that are labor force non-participating report that they are full-time homemakers or housewives, which is not an uncommon reporting Figures 2.4.2 and 2.4.3 show the reasons given for not participating in the labor force by respondents who are not studying. Reporting by women reflects a common phenomenon in which formal labor force participation rates substantially understate female economic activity because they do not measure home production.

But there is a high number of discouraged job seekers that show labor force non-participation. This pool of untapped potential workers represents both a challenge and opportunity for Sudan. Almost 750,000 working-age respondents are not employed, not studying, and report that they perceive job search as useless. This accounts for a large majority of non-participation by men and by women who are not homemakers. The pattern is visible for both men and women and in both rural and urban areas. Discouragement is concentrated amongst respondents below median age, in line with a global phenomenon of falling youth labor market engagement.

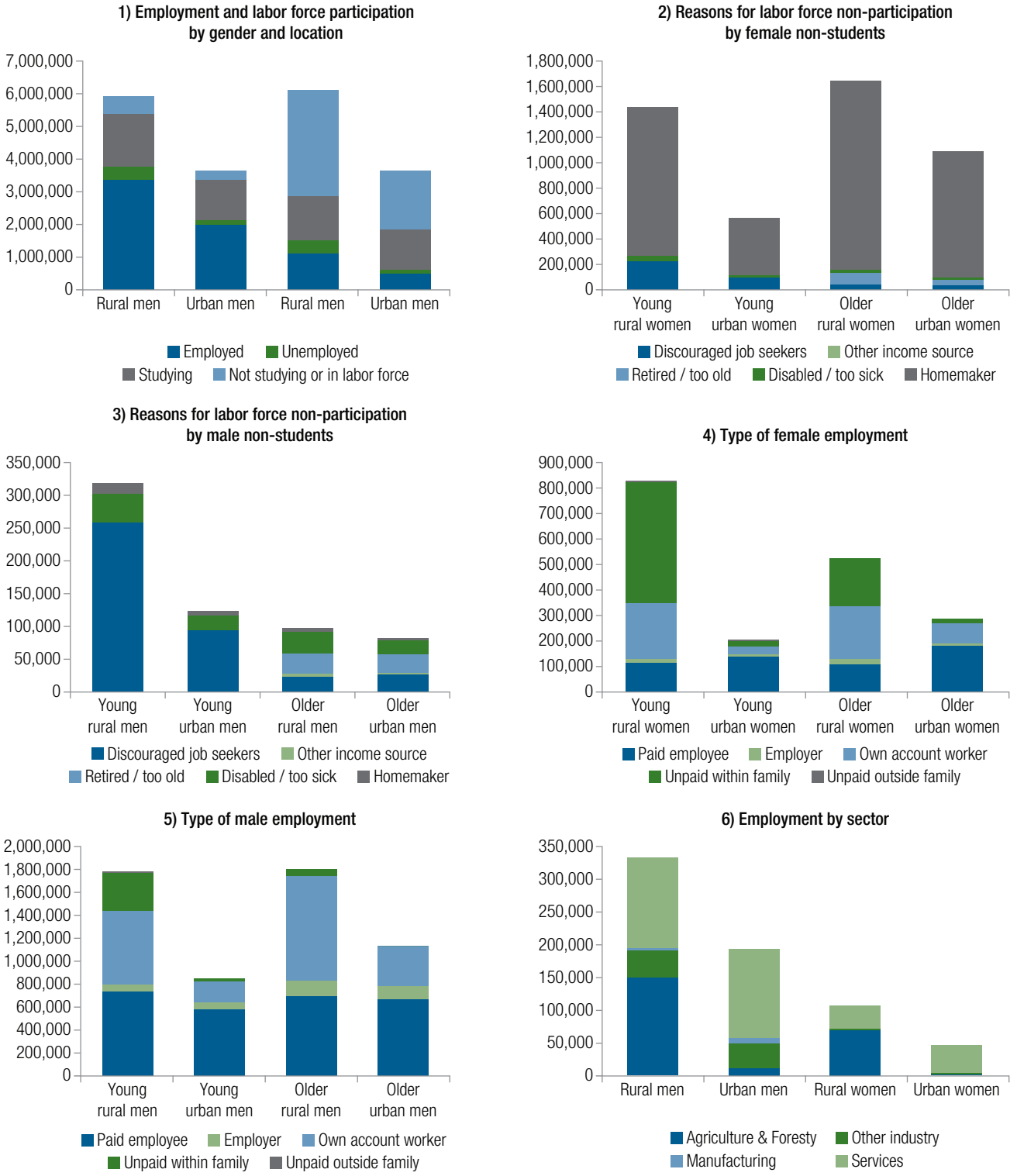
The majority of men in both rural and urban areas are paid employees or own account workers, while this is not the case for women. Figures 2.4.4 and 2.4.5 show the type of employment for different population groups. A relatively small fraction are employers and most of these are in older cohorts.[24] Unpaid employment within the household is relatively common in rural areas and concentrated in the agricultural sector. The pattern is very different for women. Unpaid work within the family is the most common type of employment in rural areas, particularly for younger women. Own account workers are slightly more common than paid employees and very few women are employers.[25]

The regularity of employment differs across gender and location. 12.4 percent of workers report working less than five days in the past week, but this is higher for women than men (11.6 and 16.7 percent, respectively) and in rural than urban areas (15.3 and 8.2 percent, respectively). This is a crude measure of underemployment but suggests that the extensive margin employment data

[24] The NBHS survey defines an employer as anyone whose main employment status is operating their own business, profession or trade and who employs at least one employee, who presumably need not work for them fulltime. This differs from an own account worker who does not employ anyone.

[25] The employment analysis by gender suggests a complex picture of female labor force participation and home production. More than 4 million women report that they did not work because they are fulltime homemakers or housewives, while another 700,000 report that they worked without pay in the family. This may reflect heterogeneity in respondents' understanding of work. But it is also important to realize these dimensions to try to understand whether non-participating women do or do not represent a pool of potential workers outside the home.

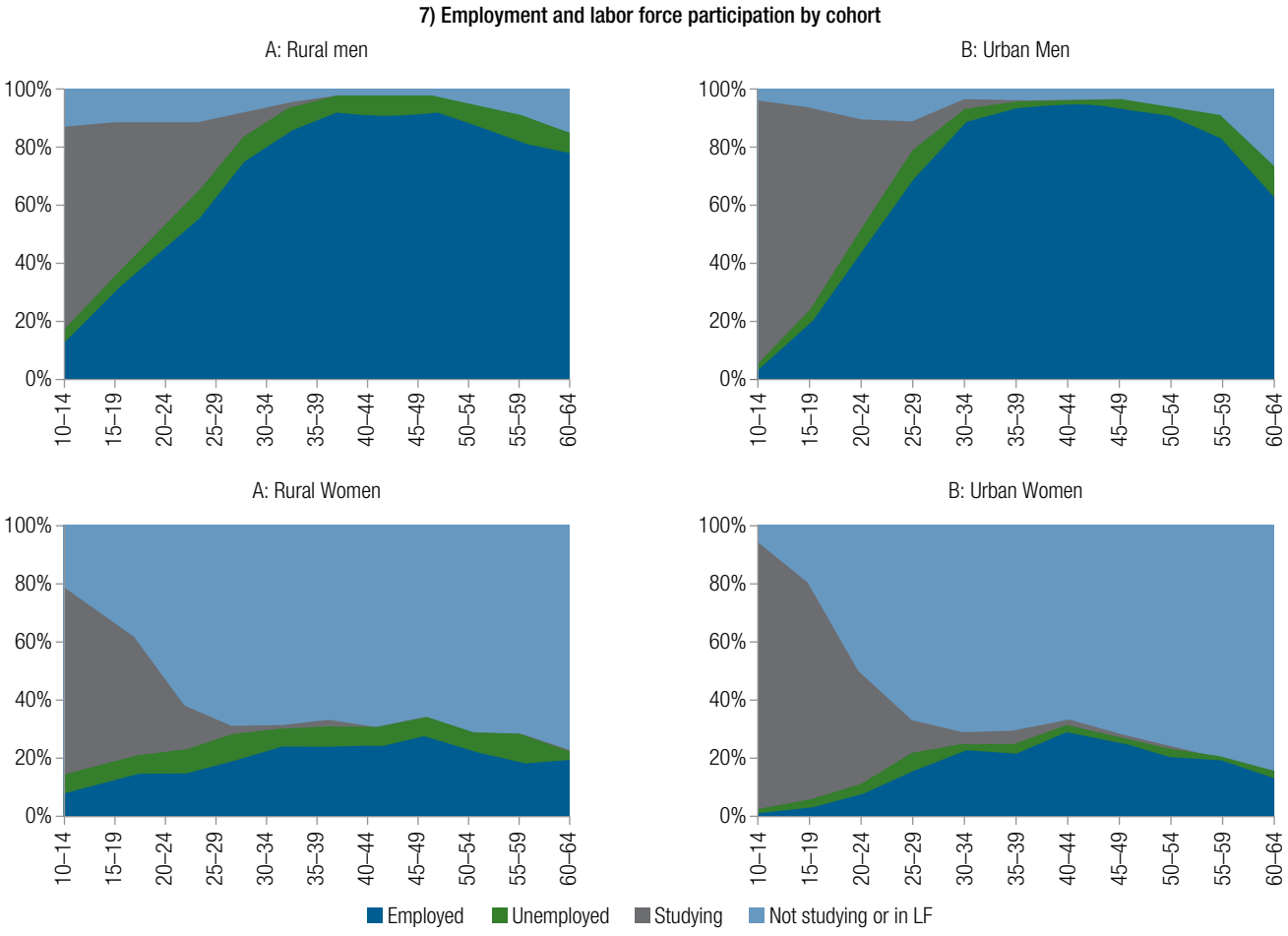
FIGURE 2.4: Employment and Labor Force Participation in Sudan



Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Notes: (6) Sector classifications are based on the jobs held by survey respondents, rather than the sector in which their employer is located. This measures the distribution of workers across sectors rather than the distribution of firms across sectors.

(continued on next page)

FIGURE 2.4: Employment and Labor Force Participation in Sudan (*continued*)



Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).

(continued on next page)

discussed above may understate the total female-male and rural-urban employment differences.[26]

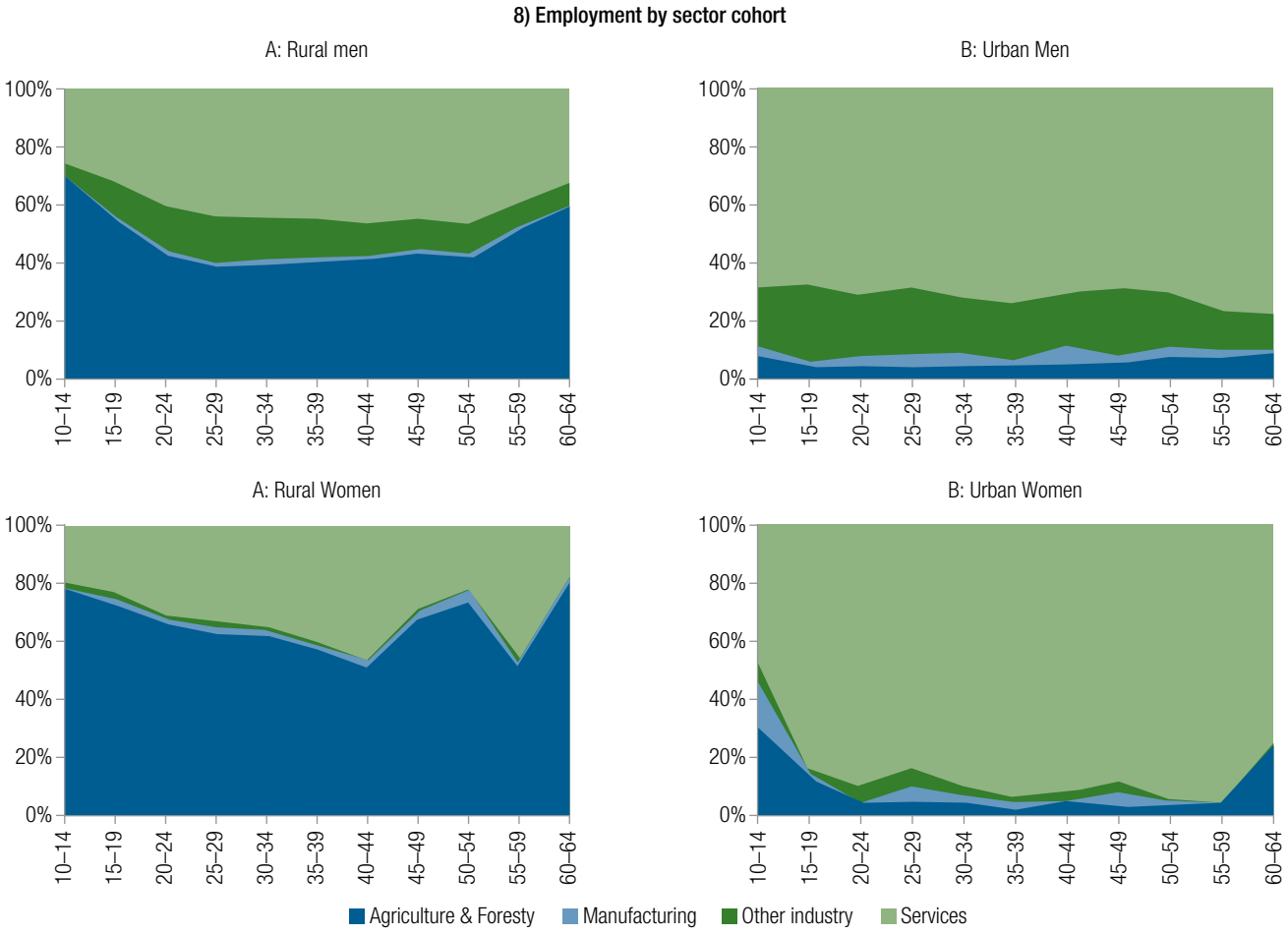
In sum, and perhaps not surprisingly, employment and labor force participation differs by education level. Table 2.3 shows that respondents with no education are least likely to participate in the labor force and, conditional on participation, are more likely to be unemployed. Respondents with post-secondary education are at the opposite extreme, with the highest rates of participation and lowest rates of employment. People with primary and secondary education fall in between these two extremes but the differences between these two groups are not themselves large or statistically significant. The education gap in labor force participation is considerably larger than the education gap in unemployment. These patterns are visible for men and women and in rural and urban areas.

Employment by economic sectors

Employment is dominated by agriculture in rural areas and by services in urban areas.

[26] The comparison should be interpreted with particular caution because 34 percent of respondents report that they worked more than seven days in the past week. This suggests that many respondents misunderstood this question.

FIGURE 2.4: Employment and Labor Force Participation in Sudan (*continued*)



Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).

Table 2.3: Education and Employment Status, Percent of Total

	Employed	Unemployed	Not in labor force
No education	41.2	50.9	7.9
At most primary	56.1	35.9	7.9
At most secondary	54.9	38.2	6.9
Post-secondary	63.4	25.5	11.0

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Note: Calculated using NBHS household weights. Includes all respondents aged 10–64 years who are not currently enrolled in school. Excludes respondents with khalwa education.

Figure 2.4.6 shows the breakdown of employment across sectors for men and women in rural and urban areas. Agriculture and services almost completely dominate employment, accounting for 34.3 and 51.7 percent of employment, respectively. Manufacturing provides only 1.8 percent of employment and other industries account for the remaining 12.2 percent.

Employment patterns differ significantly between rural and urban areas. In particular, agriculture accounts for 50 percent of rural employment and 5.5 percent of urban employment. Services account for most urban jobs (74.6 percent) but are also important in rural areas (39.1 percent). Both manufacturing and industry are more common in urban areas (3.1 and 16.8 percent, respectively) but still present in rural areas (1.1 and 9.8 percent, respectively). Overall, however, manufacturing and mining account for extremely small shares of employment in both young and old cohorts (Figure 2.4.8).

Prime-age cohorts are more likely to work in services and industry than younger and older cohorts. There is limited evidence that employment sectors vary by cohort. The only clear pattern is that prime-age cohorts are more likely to work in services and, to a much lesser extent, industry than younger and older cohorts. There is no trend toward greater employment in manufacturing or industry amongst younger cohorts, which is sometimes an indication of an economy's movement toward structural transformation. But there is no evidence for such a demographic structural change happening.

The sector that employs most people in the economy—agriculture—is also the sector that employs most people without education. Table 2.4 shows the distribution of education levels across sectors. Agriculture is a clear low-education outlier. Almost two in three workers in this sector have no education and less than one in fifty has post-secondary education. Workers in the remaining three sectors—manufacturing, non-manufacturing industry, and services—have relatively similar levels of education.

There is a substantial skill differential and gap across sectors, which are slightly decreasing in the younger population. The ratio of workers with secondary or post-secondary education to workers with no or primary education is highest in manufacturing (0.94), followed by services (0.96) and non-manufacturing industry (0.73), with agriculture scoring far lower (0.12). This has clear implications for economic transformation. Raising employment in the manufacturing and non-manufacturing industry sectors is likely to require substantial increases in aggregate education levels. While education levels are indeed higher in younger than older cohorts (Figure 2.4.7) but this is not (yet) reflected in higher youth employment in industry and manufacturing (Figure 2.4.8).

Labor productivity and wages across sectors

Both productivity and wages differ sharply across sectors: Workers in the agricultural sector have low productivity and earn low wages; workers in manufacturing and industry have high productivity and earn high wages; workers in services have low productivity and earn high

Table 2.4: Education Breakdown of Employment by Economic Sector, Percent of Total

	No education	At most primary	At most secondary	Post-secondary
Agriculture	64.1	25.0	9.6	1.3
Manufacturing	30.2	21.5	36.3	12.1
Industry (non-manufacturing)	23.9	33.9	33.1	9.1
Services	29.6	27.3	30.0	13.2

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Notes: Calculated using NBHS household-level weights representative at the state level. Includes all respondents aged 10–64 years who report working recently or having a job. Sectors are based on "main activity of work [during] the last 7 days." Excludes respondents with missing values for work activity and hence sector of employment (1.6 percent) or highest level of education (1.8 percent). Non-manufacturing industry includes: mining, electricity, water, construction, transport, and communications.

Table 2.5: Annual Value-Added (VA) Per Worker by Sector (US$)

		2009		2010		2012	
	Employment	VA (US$ mn)	Labor productivity	VA (US$ mn)	Labor productivity	VA (US$ mn)	Labor productivity
Agriculture	3,114,411	8,473	2,721	8,374	2,689	12,343	3,963
Manufacturing	931,005	8,307	8,923	8,486	9,115	8,107	8,708
Industry (non-manufacturing)	132,440	2,241	16,921	2,643	19,956	2,711	20,470
Services	3,949,954	14,668	3,713	15,374	3,892	7,242	1,833

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009); and World Development Development Indicators (WDI).

Notes: Employment totals use household-level population weights representative at the state level. Employment totals are drawn from all respondents aged 10 or older at the time of the survey who reported a sector employment. Sectors are based on "main activity of work [during] the last 7 days", which may differ from employer's main activity. Value-added data for 2009 and 2010 include South Sudan, but exclude for 2012. Non-manufacturing industry includes: mining, electricity, water, construction, transport, and communications.

wages.[27] Table 2.5 reports labor productivity by sector.[28] Two patterns are clear. First, labor productivity is highest in manufacturing (>$16,000). This is consistent with nearly universal international trends and highlights the importance of the manufacturing sector in driving the upgrade of skills. Second, labor productivity in non-manufacturing industry (which includes mining, electricity, water, construction, transport, and communications) is somewhat lower than manufacturing but still considerably higher than either agriculture or services. Hence, labor productivity is inversely proportional to employment, with the most productive sectors employing the fewest people. This is partly a natural consequence of higher capital-labor ratios in these sectors but also highlights the importance of growing these sectors.

Daily wages in agriculture are considerably lower than in any other sector, while wages in industry, manufacturing, and services are relatively similar. Table 2.6 reports summary measures of the distribution of daily wages by industrial sector. Agriculture is a clear outlier, with workers earning considerably lower wages than in any other sector. Wages in industry, manufacturing, and services are relatively similar to one another. There is some evidence that wages may be more dispersed in manufacturing, with a lower 25th percentile and higher 75th percentile. However, the difference is small and not statistically significantly different from zero.

Wages by sector have a direct implication for poverty rates by sector and a wage gender gap is present in all sectors, but at varying degrees. In the agricultural sector, 34.8 percent of workers earn less than the monthly poverty line of SDG114. This rate drops to 15.3, 12.9, and 12.7 percent in the service, industry, and manufacturing sectors, respectively. Shifting employment away from agriculture may thus play an important role in alleviating poverty, provided these wage differentials

[27] There are important data limitations in Sudan that may affect the accuracy of this analysis, particularly the detailed productivity numbers. But reported trends should be unaffected and be a good guide in the analysis. Limitations are that the employment data are drawn from a survey of Sudanese households in 2009 while the value-added data for 2011 and earlier years aggregate Sudan and South Sudan. The table therefore reports productivity in 2009, which uses value-added data for the appropriate time period and incorrect region, and 2012, which uses data for the appropriate region and incorrect time period. Productivity in 2010 is also reported as a mid-point measure. This mismatch means that the total value-added in 2009 is generated by Sudanese and South Sudanese workers, so the average labor productivity will be upward biased. Furthermore, employment in manufacturing in the survey is small (237 people, equal to 1.6 percent of the sample) so results may also reflect some sampling error.

[28] Labor productivity is defined as the ratio of total value-added (from the World Development Indicators) to total employment in each sector. It provides a measure of the average worker's contribution to total output.

Table 2.6: Distribution of Daily Wages by Industrial Sector (US$)

	25th percentile	50th percentile	75th percentile	% missing wages
Agriculture	3.2	5.7	10.0	48.7%
Manufacturing	6.8	10.4	17.5	6.8%
Industry (non-manufacturing)	4.3	10.0	18.3	7.0%
Services	5.7	10.0	15.5	10.2%

Source: World Bank staff own calculations, based on data from National Benchmark Household Survey (2009).
Notes: Calculated using NBHS household-level weights representative at the state level. Includes all respondents aged 10–64 years who report working recently or having a job. Sectors are based on "main activity of work [during] the last 7 days." Excludes respondents with missing values for work activity and hence sector of employment (6.9 percent) or highest level of education (1.8 percent). Weekly wages are missing for 25 percent of the sample, primarily in the agriculture sector. Non-manufacturing industry includes: mining, electricity, water, construction, transport, and communications.

remain stable as employment composition shifts. However, sectoral shifts alone will alleviate neither poverty-level earnings nor gender differentials in earnings. For example, 35.1 percent of women earn less than the monthly poverty line, compared to only 16.5 percent of men. This gender gap is present across all four sectors, though to varying degrees.[29]

Comparing daily wages with the labor productivity analysis shows that agriculture is lagging behind, but also that the services sector offers scope for well-paid employment without the capital intensity of manufacturing. On the one hand, productivity is highest in manufacturing, followed by non-manufacturing industry, agriculture, and services. But wages are highest in non-manufacturing industry, manufacturing, and services, and lowest in agriculture. Both measures point to agriculture as the lagging sector (Tables 2.5 and 2.6) but they provide mixed evidence on the relationship between the other three sectors. Services lags industry and manufacturing on productivity but not wages, which suggests that this sector offers scope for well-paid employment without the same capital intensity.

B. The Role of the Exchange Rate

This section utilizes a simple theory-based real exchange rate (RER) Misalignment Index for countries around the world from 1950–2011, and shows that Sudan's RER has been overvalued. Overvaluation was as much as 65 percent in 2008, during the heyday of the oil economy. The section shows that an undervalued RER is associated with higher real export and output growth, especially for developing countries today and developed countries in the earlier decades. Across all countries and time, on average, for each additional 10 percent RER undervaluation, the country's export growth goes up by 0.6 percentage points and its output growth goes up by 0.88 percentage points a year.

Empirical results are used to explore the question of whether an undervalued exchange rate can help boost export and therefore also output growth. The issue needs to be addressed from an empirical perspective since the theoretical relationship between the real exchange rate and exports/outputs is not clear-cut (Annex 4). The analysis in this report utilizes a cross-country RER misalignment index. A country's RER is defined as the relative price of the domestic consumption basket and the foreign consumption basket. The domestic consumption basket includes domestic non-tradable goods, domestic tradable goods, and some foreign tradable goods; the foreign consumption basket

[29] The analysis of wage distributions has three caveats important enough to be mentioned: First, the small number of survey respondents working in manufacturing means that the wage distribution in this sector reflects substantial sampling error. Second, wages are missing for a large fraction of the respondents. Third, there are some outliers who report extremely high daily wages, which motivates the focus on percentiles of the distribution instead of means.

includes foreign non-tradable goods, foreign tradable goods, and some domestic tradable goods.

The analysis uses a simple theory-based approach first developed by Rodrik (2008) to calculate the RER misalignment. In his work, Rodrik has shown that undervalued real exchange rates are associated with higher output growth. Since the original work does not include export growth this report will slightly modify Rodrik's approach to measure RER misalignment and will present evidence about the relationship between undervaluation and export growth. Annex 4 provides the details on how the study measures the RER misalignment index. The key is to establish the RER misalignment index through controlling for the Balassa-Samuelson effect. Balassa-Samuelson captures the effect of an economy's productivity on its non-tradable goods' prices. The empirical results show that the Balassa-Samuelson effect is highly significant with a negative sign.

There are other approaches to calculating RERs and to determine any undervaluation. Currently, the most popular one is to regress a country's real exchange rate against a large set of the country's fundamentals to establish a real exchange rate norm.[30] The gap between a country's actual real exchange rate and its norm (i.e. the residual in the regression) is considered the "misaligned" part. The most well-known research using this approach is from the IMF (Lee et al. 2006), which forms the basis for the IMF's work on assessing countries' RER misalignment in its Article IV papers. This report does not rely on the methodology given the complexity of the approach and the difficulty to identify "fundamentals." Instead, Rodrik's amended methodology is found to be more intuitive.

Sudan's RER has been greatly overvalued over most of the past 40 years. From 1970 to the present, there were only two years when the RER was undervalued (Figure 2.5.1). For the rest of years, the RER is greatly overvalued, as much as 65 percent in 2008. In 2010 and 2011 the overvaluation lessened to 50 percent and 40 percent, still very significant numbers.[31] The overvaluation may have slightly eased in the years 2012 and 2013 where the nominal exchange rate devalued by almost 100 percent (Figure 2.5.2). But the positive RER effects of this nominal depreciation, were also eaten up again by persistently high inflation rates of 35.1, 36.3 and 37.4 percent in 2012, 2013, and 2014, respectively.

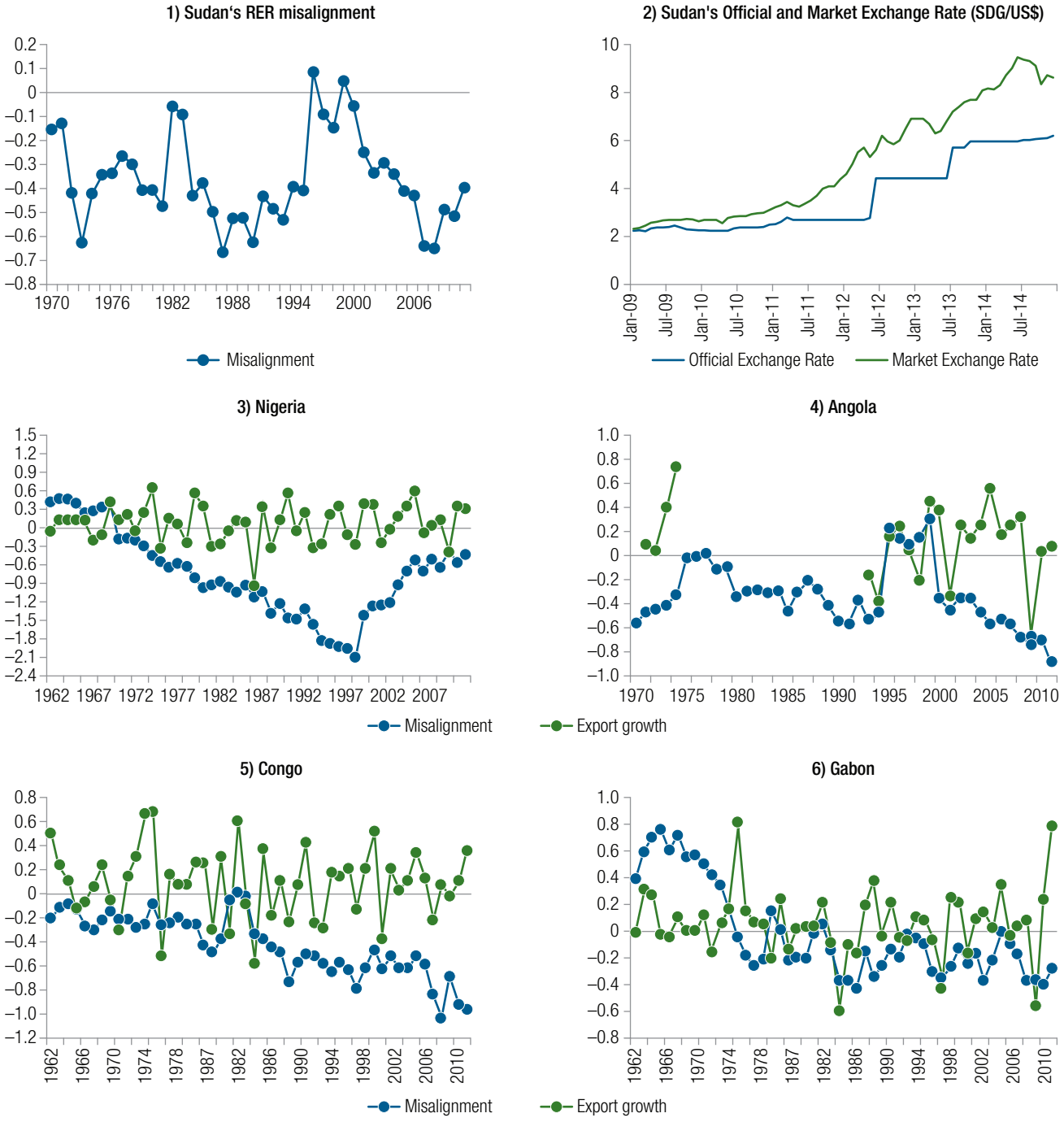
The historical overvaluation is consistent with the gaps observed between official nominal exchange rates and black market exchange rates (Figure 2.5.2). If one was to consider the black market exchange rate as a *de facto* market-driven equilibrium value of the nominal exchange rate, the official nominal exchange rate was overvalued to the tune of 50 to 70 percent in 2010 and 2011. Given data constraints, there is no measure of RER Misalignment for Sudan after 2011. However, based on the gap between the official and the black market rates, and given the historical relationship between the two that reflects the RER Misalignment Index, it is likely that the extent of RER overvaluation remained at a similar level for 2012 and 2014. Such an overvaluation pattern identified through the misalignment index is consistent with other estimates. For instance, the IMF Article IV in 2014 estimated that the Sudan real exchange rate was about 40 percent overvalued in 2014 (IMF 2014c).

Sudan's RER overvaluation is somewhat consistent with the experience of other African

[30] In the "kitchen sink" approach, researchers throw believed-to-be fundamental variables to the right hand side of the regression—often without a clear theoretical rationale to why they are fundamental—and hope to find some significance. There are two problems with this. *First*, there may be neglected fundamentals that also affect the real exchange rate, but are not included. Negligence may come from the fact that it is virtually impossible to come up with an exhaustive list of factors affecting productivity and consumption and savings decisions. *Second*, variables considered "fundamentals" might actually contain elements that distort the real exchange rate. For example, government consumption is considered a "fundamental." However, government consumption could be directly affected by an incentive to lower the real exchange rate. Eden and Nguyen (2012) offer more detailed criticism of the current approaches.

[31] The data underlying the RER Misalignment Index—Penn World Table 8.0—does not have RER data for 2012 and 2013 at the time of this analysis.

FIGURE 2.5: Sudan's RER Misalignment in Perspective of other African Oil Exporting Countries



Source: World Bank staff own calculations, based on data from PENN World Tables; CBOS; and World Bank World Development Indicators (WDI).
Note: Undervaluation zone is above 0.

oil exporters. Figures 2.5.3 to 2.5.6 show that the magnitudes of overvaluation in other African oil exporters are somewhat similar to the levels observed in Sudan. The range is from 30 percent in Nigeria to 90 percent in Congo. Overall, this is a clear evidence of Dutch disease symptoms among

African oil exporters. But Sudan is not a huge crude oil exporter anymore, and its RER management needs to be compared to other, more diversified economies.

Comparing Sudan to more diversified economies, the RER overvaluation is in contrast to Asian experiences, but in line with Latin American experiences. Sudan's overvaluation experience is in stark contrast to the experiences in Asian countries. Figures 2.6.2, 2.6.3 and 2.6.4 show China, India, and Korea. All of them had undervalued exchange rates during their catching-up periods: China between 1981 and 2009, India since 1999 until the present, and South Korea during much of the 1960s and 70s. With regard to RER undervaluation, Sudan's neighbor Egypt followed the Asian experience (Figure 2.6.1). On the other hand, Latin American countries adopted a rather different strategy, where RERs were overvalued during most of the past decades (see Figures 2.6.5 and 2.6.6 for Argentina and Brazil).

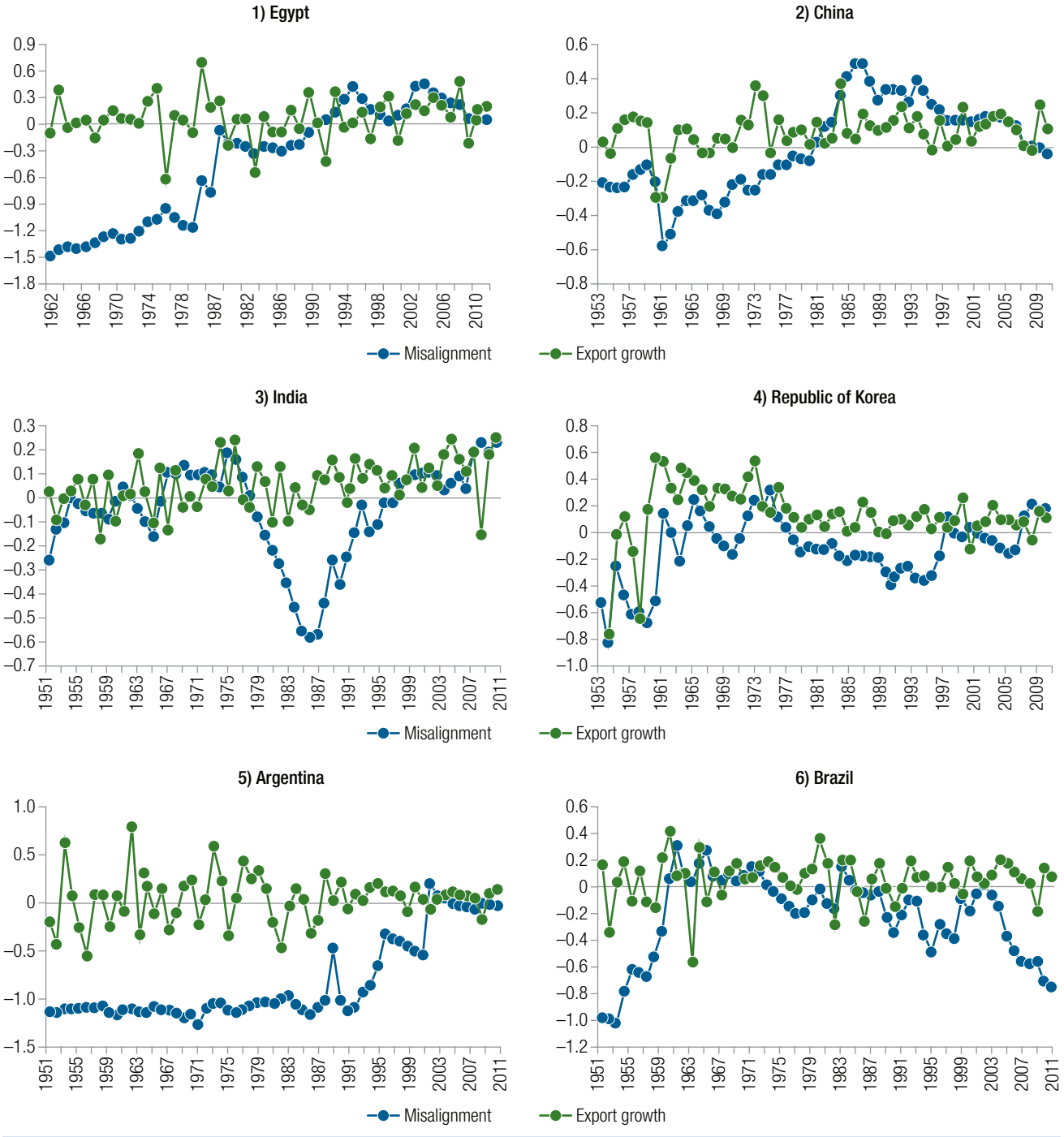
A regression analysis more definitely confirms the graphical observations of the undervaluation index and export growth plotted in Figures 2.5 and 2.6. Annex 4 provides details about the regression and its results, which are very intuitive. Overall, undervaluation is associated with higher export growth; this phenomenon is true for both high-income and low-income countries (defined as having an annual GDP per capita below $6,000 in 2000). Interestingly, the coefficients are significant for high-income countries in the earlier decades (1950–1980) and for low-income countries in the latter decades (1981–2011). This implies that countries need to be at a certain level of income to be able to take advantage of the undervalued RER strategy. This is likely to be when a country is at the stage of exporting relatively simple, light manufacturing products. In turn, this means that if a country's economy is dominated by agriculture production and/or only exports commodities, an undervalued RER may not help the exporting firms. On the other hand, when a country is already rich enough and its firms already operate at the technological frontier, an undervalued RER might not matter anymore for the country's export. Rather, at the frontier the country's firms need to rely on better technology and innovation.

On average, across all countries and the full time period considered (1950–2011), for each additional 10 percent RER undervaluation a country's export growth will rise by 0.6 percentage points per year. Among high-income countries between 1950 and 1980, an additional 10 percent undervaluation boosted export growth by 1.26 percentage points. Among low-income countries between 1981 and 2011, that figure is 0.7 percent. A similar exercise for countries' real output growth shows a significant positive impact of an undervalued exchanged rate on real output growth. The positive impact holds for both high-income and low-income countries: on average across all countries and all time, if a country's RER is 10 percent undervalued its real output growth goes up by 0.88 percentage points per year.

In the case of Sudan, each additional 10 percent RER undervaluation is associated with higher output growth of 0.9 percentage points and a positive relationship is expected also for undervaluation and export growth. A positive relationship between RER undervaluation and export growth is likely and at least in the order of 0.7 percentage points as witnessed by the cross-country analysis above. But in the case of Sudan's RER Misalignment Index, due to the small sample size used for the analysis that is carried out with Sudanese data, no significant relationship between the two is found (Table 2.7).

In turn, RER overvaluation is an important inhibiting factor for Sudan's export sector, since its non-natural resource and agriculture exports comprise mainly of low-value, often raw and unprocessed products, that compete primarily on prices. In theory, the overvalued real exchange rate hurts exports because Sudanese products are less competitively priced than identical products

FIGURE 2.6: Undervaluation and Export Growth, Selected Countries



Source: World Bank staff own calculations, based on data from PENN World Tables.
Note: Undervaluation zone is above 0.

from other countries, all else being equal. In practice, the relationship between competitiveness and movements in the real exchange rate is not straightforward. The latter can appreciate as a result of an improvement in competitiveness when there are gains in productivity of tradable goods relative to

Table 2.7: Effects of Undervalued RERs on Export and Output Growth Sudanese Data

	ΔIn (real exports) (1)	ΔIn (real exports ex-oil) (2)	ΔIn (real GDP) (3)
In (Initial Real Exports)	0.014 (0.040)		
In (Initial Real Exports ex-Oil)		–0.27433 (0.201)	
In (Initial Real GDP per capita)			0.032 (0.044)
Undervaluation	0.367 (0.315)	–0.673 (0.619)	0.0954** (0.045)
Constant	0.067 (0.310)	5.536 (4.109)	–0.175 (0.316)
R-squared	0.05	0.13	0.06
Adjusted R-squared	0.0	0.05	0.02
S.E. of regression	0.320	0.553	0.07

Note: Newey-West HAC Standard Errors in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1.

that of non-tradable goods. Competitiveness is lost when there is a misalignment from the equilibrium RER. In particular, the agricultural commodities that are primarily behind Sudanese non-natural resource exports tend to be affected by real appreciation because import content in these sectors is generally lower than in manufacturing.

Potential changes in the exchange rate would need to be considered in the context of the overall macroeconomic policy mix, which may also need adjustment. There are macro-economic trade-offs to consider. Nominal currency depreciation increases import prices and thus contributes to inflation, especially if imported food inflation is already a problem as it is in Sudan. There are also balance sheet effects through a rise in external public debt when expressed in local currency. Some of these trade-offs can be addressed by adjusting other policies. A tighter monetary and/or fiscal policy can help contain the inflationary impact, for instance, which is needed more than ever with core inflation at its historic high in 2014 (Figure 2.6.1).

The analysis is silent on the equilibrium effect and notes that, from an international perspective, competitive devaluations from many countries are not optimal. If every country devalues to take advantage of the lower RER, countries might undercut each other's export (i.e., a race to the bottom), and the end result might be that no exporting country will benefit from their exchange rate devaluations. In other words, from the point of view of a specific country such as Sudan, maintaining an undervalued exchange rate is beneficial for its export and growth. However from the point of view of the developing world as a whole, competitive devaluation (recently dubbed as currency wars) from many developing countries may not be optimal. An international exchange rate coordination system could play a role in this regard, but this is beyond the scope of this paper. In the long run what really matters is that exports strive for productivity and product quality.

But how to change the RER? In a situation where the RER is off the equilibrium rate and there is a gap between the official nominal exchange rate and the black market rate, nominal devaluation can lead to RER devaluation. Sudan is off the equilibrium rate since its official nominal exchange rate is below the black market rate and the Misalignment Index showed an overvaluation

of the RER over the past. In this situation a devaluation of the nominal exchange rate to bring about RER devaluation is likely indicated.

When a country's exchange rate is in equilibrium, depreciating the RER is more challenging. In such a situation, changes to the nominal exchange rate will potentially create disequilibrium transitional problems, and then nominal changes are not effective in the long run. So in this case, any devaluation strategy would need to focus on factors that affect real fundamentals. The following examples show some potential channels that affect the RER:

- *Reduce import restrictions:* Reducing import restrictions (tariff for example) would increase spending on import and therefore reduce the demand on domestically produced goods. This would help lower wages. Export would be more competitive due to lower imported input and lower wages. In fact, Sudan suffers from high tariff and non-tariff barriers as shown in the 2014 Update to the Diagnostic Trade Integration Study (DTIS). Sudan's simple average tariff and trade weighted tariff rates of 20 and 22 percent, respectively, are among the highest in the world and are substantially higher than most countries in Africa and the Middle East (World Bank, 2014e).
- *Increase domestic savings:* a reduction in domestic demand would lower both the RER and the price of export. The reasoning is as follows: reduced domestic demand would lower the prices of both the domestic non-tradable and tradable goods. This implies that wages are lower and the domestic tradable goods become relatively cheaper compared to the foreign tradable goods, which implies cheaper exports. Reducing domestic demand also enables the government to spare the scare resources for importing foreign technology and know-how. Sudan's savings rate is rather low as was shown in the preceding section 2.C.

In Sudan, in the short term it is important to bring the official exchange rate back to closer to the black market exchange rate. The authorities had only limited success thus far, even though two large nominal depreciations brought about a nominal depreciation of about 100 percent in 2012 and 2013. In December 2014 the gap between the two rates was just below 30 percent. So the case for further devaluating the currency is convincing, based on the black market exchange rate data and the RER Misalignment Index.

There are two approaches toward large devaluations: big bang vs. gradual. The first approach is to do a one-off devaluation. However, a problem of a large sudden devaluation is that it will bring about economic disruptions, for instance to trade and debt services, and inflation. And in a way Sudan already tried the approach twice in 2012 and 2013, with limited success thus far. The second approach is to devalue gradually and credibly (see for instance Sutela, 2010). The upside to this approach is that the economy will only have to deal with incremental changes. The downside is that the depreciation expectations would put pressure on the central bank to devalue earlier than planned. For this reason, credibility is key. Given the ever-changing black market rate and the earlier attempts in 2012 and 2013, gradual but ongoing devaluation may be the approach of choice for Sudan.

In the medium to long term, and after the official and market exchange rates have been successfully unified, the question arises for what exchange rate regime may serve the country best. The choices are between pegged and flexible exchange rates, and a case could be made for the former for the following reasons: (1) A pegged exchange rate provides stability that is needed for the export sector. This is especially important if the country would like to promote exports. (2) A peg provides an inflation anchor. Developing countries with low technical and institutional capability often choose to peg their exchange rate as a way to anchor inflation expectation. Sudan may not be an

exception to this. (3) A slightly undervalued, rather fixed exchange rate, will help the government to accumulate foreign reserves to bolster the exchange rate regime and protect against economic volatility.

Finally, a crawling peg arrangement may be the preferred choice for a pegged exchange rate regime as it combines the advantages of a peg but can also avoid real appreciation. A hard peg (i.e. fixed exchange rate) runs the risk of real appreciation if the domestic inflation is high. When the nominal exchange rate is fixed, an increasing domestic price level means that the dollar price of the domestic goods is more expensive compared to the foreign goods, an RER appreciation. With a crawling peg, the nominal exchange rate is allowed to gradually devalue if domestic inflation is high. Since Sudan's inflation is rather high in the post-secession world, a crawling peg may be the preferred arrangement.

C. Volatile and High Inflation: Important determinant of the Real Exchange Rate

Inflation in Sudan has a history of high rates and increased volatility for decades. Since the advent of oil, the average annual inflation in Sudan has been around or above 10 percent with the exception of the 2003 to 2006 period. The persistently high inflation was also accompanied by high volatility. As one of the key symptoms of the 2011 secession shock the Sudanese inflation rate has significantly increased since 2011, and has been beyond 30 percent since 2012 (annual CPI rate, period average). (Figure 2.7.1). Analyzed with monthly frequency, inflation was even higher over certain periods (exceeding 40 percent) such as in the second half of 2012 and the first quarter of 2013 when inflation reached a monthly peak of 47.9 percent in March 2013, after which the price level growth started to decelerate. There was another peak of inflation with 46.8 percent in July 2014, which relaxed to 25.7 percent in December 2014.

A major driver of the upsurge in inflation since 2011 was the approach to monetize the budget deficit by the Central Bank of Sudan through granting direct loans to the government. This resulted in rapid monetary expansion that triggered the growth of prices. Another significant measure that contributed to the upsurge in inflation since June 2012 was the adoption of a reform package that resulted in steep devaluation of the official nominal exchange rate, an increase in taxes, and a gradual elimination of fuel subsidies. All of these measures resulted in prices increases, especially the announced elimination of subsidies of petroleum products. The latter affected the expectations for the economic agents about higher prices for petroleum products in near future that had spillover effects on other prices in the economy.

The structural components of the CPI show that since 2011, inflation in Sudan was driven by food prices and services such as prices of transport, recreation and culture, and health services. What is most striking in Sudan is that core inflation follows closely the movement of overall inflation; this is more pronounced since 2010. The rise in core inflation actually suggests that price pressures are persistent, requiring strong, long lasting, and credible policy actions for reducing the core inflation because it is tied with inflationary expectations of the economic agents in the country.

The monetization policy by the Central Bank of Sudan[32] resulted in a substantial increase in the volume of money in the economy (an upsurge of the currency in circulation). The significant upsurge affected the broad money aggregate (M2), which increased by 40 percent in 2012 compared to 17.7 percent in the previous year (Figure 2.7.2). An additional contribution for the sharp rise of the broad money was that the nominal value of foreign

[32] The monetization of the budget deficit was done mostly through long-term loans to the government whose nominal value more than doubled for the period December 2011–December 2013 and temporary advances to the government whose nominal value tripled during the same period.

currency deposits more than doubled for a period of one year from 2011 to 2012. Consequently, the share of the foreign currency deposits in M2 aggregate also rose from 12 percent in 2011 to 19.1 percent in 2012. The significant increase of the foreign currency deposits in Sudan is a result of a loss of confidence in the Sudanese currency that was triggered by the unstable macroeconomic environment such as high inflation, unstable nominal exchange rate and non-credible central bank authorities.

The level of broad money in the economy, measured as share of GDP, is low in Sudan. Broad money was only 21.0 percent of GDP in 2013, compared to 48 percent on average for low-income countries, and the share of currency in broad money is high (Figure 2.7.3). This indicates that Sudan is a low monetized economy that relies more on traditional real currency transactions compared to other countries with more modern financial systems.

Solid but volatile credit growth to the private sector in the past decade resulted in the continual increase of credit-to-GDP-ratio, but financial intermediation remains low. The credit-to-GDP-ratio increased by 11.9 percentage points as share of GDP from 2000 to 2006 and since then it has remained stable around that level. However, looking at growth rates of private sector credit, one can see large volatility. At times credit growth to the private sector is high (in nominal terms), which is both a symptom of high inflation rates and also a reinforcing factor (Figure 2.7.4). Growth of credit to the private sector reached its maximum of 12.8 percent in 2012 and went down to 10.5 percent in 2013 (Figure 2.7.5). However, despite the growth of private sector credits the level of financial intermediation in Sudan is still very low (Figure 2.7.6). This suggests that there is significant space for future development of the financial sector as one of the key ingredients for growth.

Sudan's banking sector is based on Islamic finance principles, and is currently composed of 35 banks (Table 2.8). As of 2013, the sector consisted of four government-owned banks, twenty five domestic mixed-ownership banks jointly owned by the Central Bank of Sudan (CBOS)/government and the private sector, and six foreign-owned banks. Ninety percent of banking system assets are those of banks owned fully or jointly by the CBOS/government. The dominance of state-owned banks presents apparent conflicts of interest with the supervisory role by the CBOS.

Table 2.8: Structure of the Financial Sector in Sudan

	Number of institutions	Percent of total assets
Banks		
Government-owned	4	13%
Joint venture	25	77%
Foreign-owned	6	8%
Insurers	n/a	1%

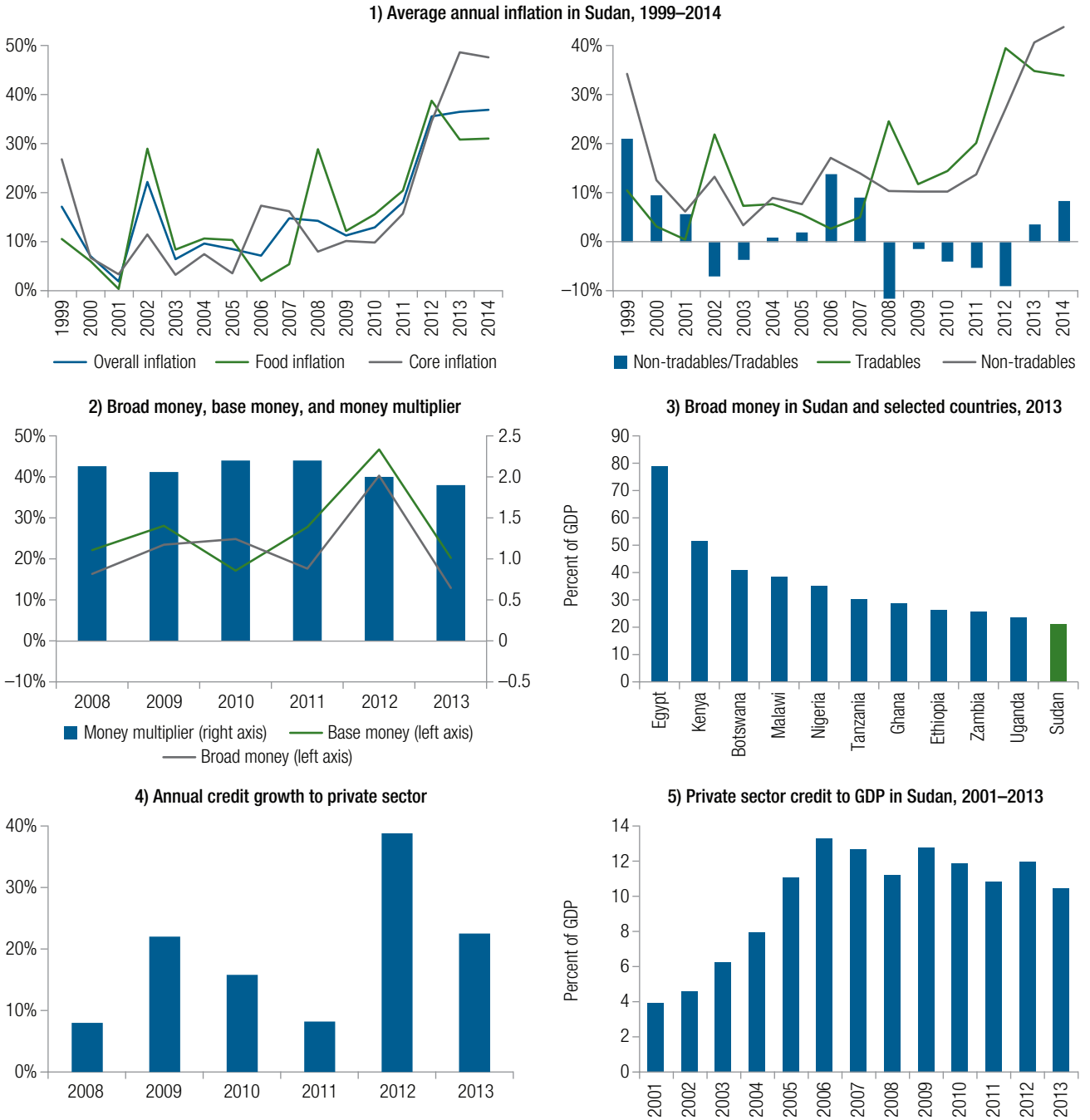
Source: IMF 2013.
Note: Does not include the small finance houses that operate.

Sudan's banking system is characterized by a lack of financial instruments and excess liquidity. The Islamic principle does not allow short-term liquidity products, resulting in the absence of an active interbank market. The absence of an interbank market, as well as a cap on commercial bank holding of government and central bank securities, have led to persistent excess reserves (Figure 2.7.7) and budget financing by the Central Bank of Sudan (CBOS).[33]

Although still weaker than its SSA peers, Sudan's banking system showed a sign of improvement in 2013. The capital adequacy ratio increased to 16.6 percent in December 2013, above the required adequacy ratio of 12 percent (Figures 2.7.8 and 2.7.9). The ratio of liquid assets to total assets increased to 39.5 percent. Bank profitability, measured by return on assets and equity, has gradually recovered since the lows reached in 2008, although it is still well below the inflation rate.

[33] Banks can only invest up to 20 percent of their investable funds in government securities, short-term *murabaha* investments, and central bank certificates.

FIGURE 2.7: Inflation, Monetary and Financial Sector Developments



Source: World Bank staff own calculations, based on data from CBOS 2014; IMF 2012; IMF 2013; IMF 2014a; IMF 2014b; IMF 2014c; and World Bank World Development Indicators (WDI).

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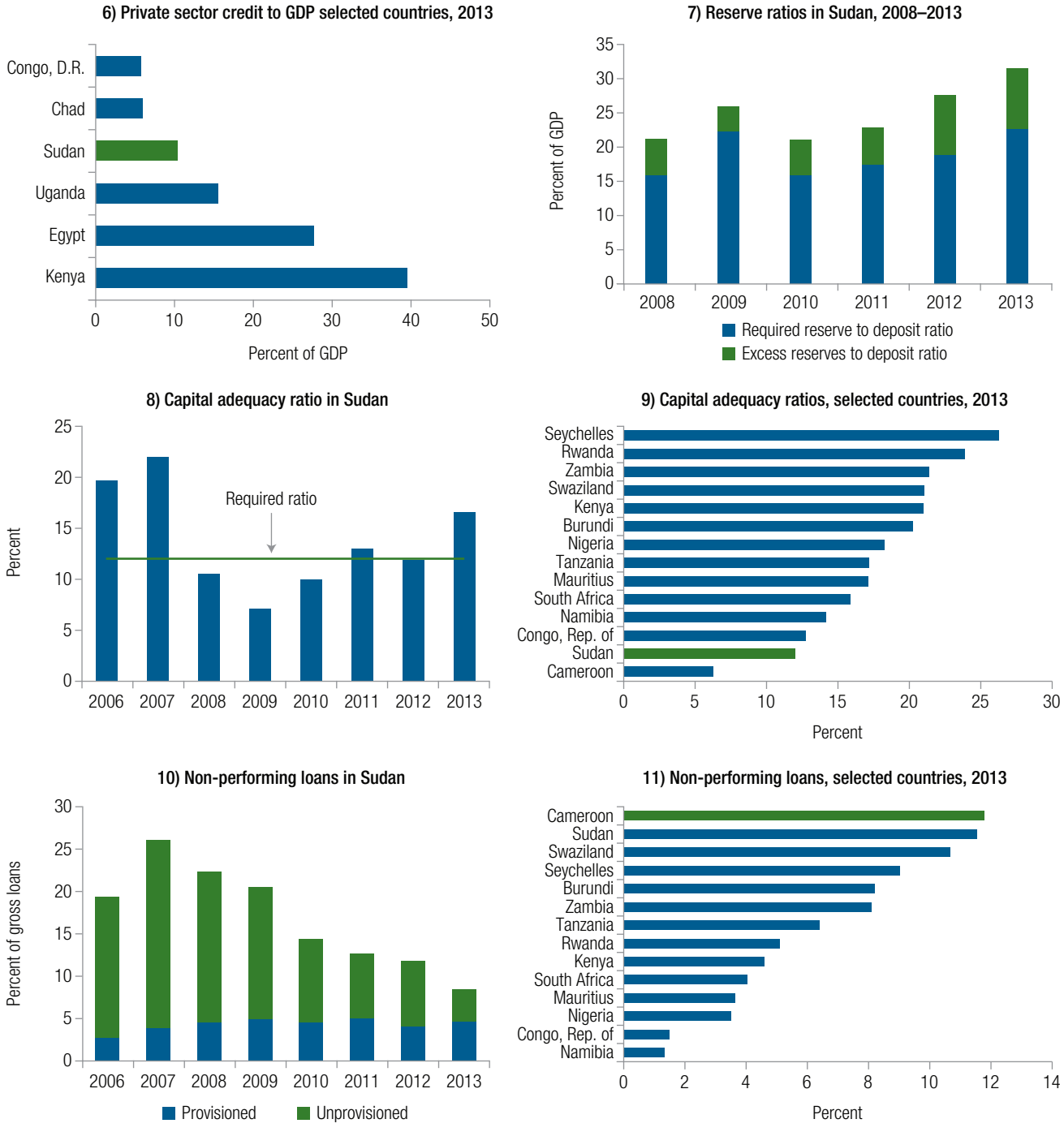
Nonperforming loans continued to fall to 8.4 percent in December 2013 from 11.8 percent in 2012, leading to provision ratio increasing from 33.5 percent in 2012 to 53.6 percent in 2013 (Figures 2.7.10 and Figures 2.7.11). Annex 5 contains a full set of financial soundness indicators.

FIGURE 2.7: Inflation, Monetary and Financial Sector Developments (*continued*)



Source: World Bank staff own calculations, based on data from IMF 2012; IMF 2013; IMF 2014a; IMF 2014b; IMF 2014c; and World Bank World Development Indicators (WDI).

3

AGRICULTURE AND LIVESTOCK: KEY FOR ECONOMIC DIVERSIFICATION

Rising agriculture trade since 2008 is the visible testament to a starting recovery in Sudan's agriculture economy, albeit from a low level. The rising trend is also only driven by a small number of products, most notably livestock, gum arabic, and cotton. Livestock may be the most remarkable of these with a remarkable recovery after virtually no exports in 2008 due to an imposed export ban and quarantine measures, which grew to a multi-million business and earned more than US$670 million in 2013. The backbone of this success is pastoral livestock production, which is superior to any other form in Sudan. But pastoralism is under pressure due to uncertain land tenure and land rights that effectively diminish the historical grazing grounds of pastoral farmers.

Gum arabic and cotton have shown a remarkable recovery. In each case the Government had instituted monopolized marketing structures in the past (monopsonies) in the form of parastatal companies. As is often the case with such companies, paying farmers less and less for their products (independent of the world price) seems an easy path to profitability, until the farmers stop harvesting or even planting their crops. That this happened can be seen in low yields in both gum arabic and cotton, but also many other agriculture products. As the monopsonies were eventually relaxed and competition provided, prices received by farmers increased substantially, and with them so did areas cropped and especially yields. Cotton yields tripled nation nationwide in one year (2010/11), and in three years increased by five and a half times—with no improvements in irrigation or varieties. Such remarkable increases in agricultural yields show that poor agriculture performance is not only a product of low fertilizer usage, weak varieties due to often-local breeds of seeds, but also, and possibly most importantly a lack of incentives for the producers.

There is no comparative advantage for wheat production in Sudan, which needs more seasonality than most of Sudan provides. This is why Sudan's average yield is half of Chad's, one quarter that of Ethiopia, and 1/14 that of Egypt. Sugarcane is somewhat different, in that areas of Sudan have achieved good yields in international terms. But sugarcane is the second highest water-consuming field crop in the world, after rice. Meanwhile, Sudan's irrigation schemes are deteriorating rapidly, and the largest, Gezira, is almost to the point of collapse in terms of delivering water. Sudanese farmers know this, and they have turned against sugar as decisively as they have turned against wheat. As for government support of wheat production, this study follows World Bank (2015b) in its recommendation to first shift the focus of subsidies to domestically produced wheat and then, second, to gradually reduce the extent of subsidies on domestic production.

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Some critical public goods must be provided by public investment. Two such encountered by the study team are the rehabilitation of the Gezira Scheme, and establishment of a system of regional grain stores. The Gezira Scheme, the centerpiece of Sudan's crop agriculture for the past 90 years, is now approaching total collapse in terms of water delivery, though long ago its drainage systems became hopelessly clogged. Sudan's President has declared the Scheme a failure in 2014. Yet the natural advantages which led to its construction and expansion still exist: slopes permitting gravity irrigation, decent soils, good climate, and now a knowledgeable workforce from among the three million residents of the area. A thorough yet quick feasibility study would be needed to determine if rehabilitation of the scheme is economically beneficial and what needs to be done differently to again make it a success.

Food security in the modern world has more to do with efficient storage capacity than with attempted self-sufficiency in production, whether of wheat or anything else. As Sudan produces very little wheat and imports most of its needs, there is considerable modern storage capacity on the Red Sea around Port Sudan, both to buffer incoming shipments and as a working reserve for flour mills. These represent around two months of wheat consumption—not a comfortable reserve but tolerable with good management of procurement and the silos themselves. Aside from traditional peasant reserves of the sorghum and millet they produce (mainly in the west), there are only 20 days of those two commodities in government stores, and this is probably inadequate, especially given that the consumers of these grains are far from the port. In event of crop failure, a serious humanitarian emergency may arise. Thus the study proposes an innovative approach to a series of modern silos.

A. Overview

Agriculture is a key sector of the Sudanese economy contributing about one-third to GDP and value added creation every year (see Figure 2.18). Agriculture provides a livelihood to about 65 percent of total population, employment to about 35 percent of the labor force in the country, 50 percent in rural areas (NBHS 2009), and is responsible for the supply of basic staple foods and animal products, in addition to the supply of raw material to the food industry. Agricultural exports are returning to prominence as ab important source of foreign exchange earnings after the decline of oil exports. Their share rose from 8 percent in 2011 to about 23 percent of total export earnings in 2012, with livestock alone reaching 19 percent.

About one-third of Sudan's area is suitable for agriculture production. The total land area of Sudan after secession of South Sudan is estimated at 446.4 million feddan[34] of which 134 million feddan is, in principle, suitable for agricultural production. Reliable statistics about how much of the arable land is currently used are not available, but staff estimates are that about 30 percent of that area is under exploitation.[35] Approximately 52 million feddan are forestland and 118 million feddan rangeland. This section will show that the agricultural sector in Sudan operates below its true productive potential, even though a great potential for further development exists through vertical (productivity) and horizontal (land area) expansion. Agriculture in Sudan is paramount for sustained future national economic growth, poverty reduction, food security, and foreign exchange earnings. At present, Sudan's

[34] 1 hectare = 2.4 feddan

[35] This does not mean that the other 70 percent of the 134 million feddan of land are readily arable land that is basically wasted. In fact, anecdotal evidence points to the facts that there is often significant soil degradation, that semi-mechanized farming has displaced pastoralism, and then when soils are exhausted, the area cannot be used either for further crops or for grazing.

main agricultural products are sorghum, cotton, groundnuts, sesame, millet, wheat, sugar cane, gum arabic, and livestock, particularly live sheep and camels, and hides and skins.

There are three main agriculture sub-sectors active in Sudan: pastoral livestock, cropping, and fish production.[36] Figure 3.1.1 shows the average share of these agriculture sub-sectors in GDP between 2006 and 2009.[37] Animal husbandry and cropping are similar in relative importance, both with shares just below 50 percent of GDP (Animal husbandry: 46.9 percent; cropping: 46.4 percent). This is followed at a long distance by forestry/fishery, which accounts for 6.3 percent of GDP. In terms of employment, cropping accounts for 25.9 percent of total employment, followed by animal husbandry with 6 percent and forest/fishery with 2.4 percent (NBHS 2009).

Pastoral livestock production

The pastoral livestock system has evolved in accordance with Sudan's harsh climate. Sudan's climate makes movement of herds a necessity to optimize volatile and adverse weather conditions. In addition, pastoral livestock has a relatively higher economic potential than any other form of livestock production in this climate. Much more, it shows good prospects for resilience in response to climate change, largely due to real-time, informed decision-making by a large corps of herders who move herds around the country in response to real-time weather (mainly precipitation) conditions and resulting available forage.

Sudan's livestock sector is fairly unique in the world, but perhaps comparable to Mongolia's. It is not a sector based on feed brought to animals in sedentary settings, but rather one where seasonality demands movement of the herds to places where rain is present, and with it grass and other vegetation. Feed is used in feedlots, at markets and transit depots, where grazing is an impossibility. Even sedentary producers must have members of the family or trusted hands move the flocks at various times of the year. Aside from being suited to Sudan's resource base, this mode of production is attractive to Sudan's major importer, Saudi Arabia, as reminiscent of how meat used to be produced there.

The major problem of pastoralism today, which has been building for decades, is the loss of rangeland to mechanized dryland and irrigated farming. A study in Gedaref State (Babikir 2011) reported that grazing lands reduced from 78.5 percent of the State's total area in 1941 (28,250 km^2), to 18.6 percent in 2002 (6,700 km^2). Meanwhile the mechanized farming sector in the State increased by 725 percent in the same period: from 3,150 km^2 in 1941 to 26,000 km^2 in 2002. In other areas, center pivot irrigated farming is used. The old tradition of allowing herds to graze crop residues, while they simultaneously fertilize the land, is now increasingly forgotten. Instead, farmers sell their residues for cash and clashes between pastoralists and farmers are now much more common than ever before. Box 3.1 provides for a short analysis of land policies and land tenure.

Cropping

Cropping in Sudan is just short of livestock's importance in GDP, but employs more people. It is generally broken down into three main systems, differentiated by the ways rain and irrigation are used in the sector: 1) the irrigated system; 2) a traditional rain-fed approach; and 3) a mechanized rain-fed one. Figure 3.1.2 shows the relative importance of the three different systems, where the irrigated one is by far the most important one, and the mechanized rain-fed is almost insignificant.

The traditional rain-fed sector occupies the majority of farmland in Sudan and employs about two-thirds of the agriculture population

[36] Fish production is of small scale and is almost totally focused on local markets. Important fishing sites in Sudan are either suffering from overfishing (e.g., Jebal Awlia Reservoir) or nearly unexploited (e.g., Lake Nuba and Red Sea).
[37] Later data is not available.

BOX 3.1: Land Tenure and Land Policy

Competition over land and natural resources has long been a source of tension among pastoralists and between pastoralists and farmers in Sudan. The expanding investments in mechanized farming, oil industry-related development, and other land-based investments under conditions of the rapid transition to market economy, along with the increasing tendency towards climatic change, and large-scale environmental degradation have become new sources of tensions through appropriation of customary land rights, creation of landless rural groups, and blocking of stock routes.

Scarcity of resources has also contributed to the increase in intra-community competition and conflict over land and natural resources. The social landscape of present-day Sudan is littered with land-related and resource-based conflicts that have become a major cause of poverty, food insecurity, population instability, and a general rupture of the rural economy. Land issues are also widely regarded as being at the heart of conflicts in Eastern Sudan, Nuba Mountains, Blue Nile, and Darfur. Of the six recognized and agreed upon "root causes" of the war in Darfur mentioned in the 2011 peace accord between the government and one set of the Darfur rebel factions, three deal explicitly with land rights issues.

Land tenure in Sudan is either traditional (historically derived tribal territorial rights initially constituted during the successive indigenous kingdoms of pre-colonial Sudan) or modern under which land is registered. Young et al. (2013) argue: *"Aspects of the traditional model remain in place and continue to function, although there is a consensus in the literature that the Native Administration has been weakened, in part because of the development of a local civil government framework and administration, which was first introduced in 1932."*

Since independence of Sudan in 1956 a whole series of legislative changes were introduced that affected the authority and responsibilities of the tribal administration. The most pertinent elements of those reforms include: (1) De facto abolition of customary land use rights: This was the outcome of the shift to a property regime in 1971 with the Unregistered Land Act, which placed all unregistered land as "property of the government." (2) Strengthening of subnational government: The 1971 Local Government Act started the process of a shift in power to state authorities, which replaced the Native Administration and abolished the jurisdiction and administrative authority of the tribal leaders. The Native Administration was revived with the Native Administration Bill in 1987 (but with a more limited role) and strengthened further with the 1998 Local Government Act. (3) Further shift in authority from customary land use rights to authorizations by the state: The Civil Transaction Act of 1984 allowed the state authorities to impose restrictions on grazing as to time and place, and also allocate land for grazing.

Still, the tribal administration maintains a strong presence throughout the Darfur and Kordofan regions. It particularly maintains its role and importance as the principal local-level governance mechanism, connected through a hierarchical leadership structure which interfaces with systems of state-level government at all levels; hence the tribal leadership continues to wield considerable power and influence.

The legal framework for land tenure is perhaps the most complex natural resource legislation and governance in Sudan. The 1971 Unregistered Land Act, a de facto nationalization by the state, denies any formal legitimacy or juridical status to customary property rights. In effect, this implies the cancellation of all rights relating to land, water, and grazing as well as the suppression of any future income related to such rights (Egemi 2006). The Act was implemented indiscriminately over all the rain-fed agricultural lands of the country, even in places that had no previous system of land registration such as Darfur, Kordofan, and the East. The 1984 Act legalizes elements of Sharia (Islamic) Law while confirming the role of the state as landowner and manager. According to the Act *"No court of law is competent to receive a complaint that goes against the interest of the state."*

in the country. Traditional rain-fed agriculture is mostly subsistence farming, which occupies more than 60 percent of the total cultivated land (about 22 million feddan) and employs about 65 percent of the agricultural population. Private small-scale farms dominate the sector with access to considerable communal grazing areas that support extensive livestock production. Crop residues are used as animal feed, and the animals are taken to grazing areas when the land is cropped. Farming methods include animal traction, and use of animal manure for the fields through animals grazing stubble and being fed crop residues in the field. Farmers involved in this sub-sector usually have Acacia Senegal for gum arabic production in their fields.

Traditional rain-fed methods are primarily utilized in the Western areas of Sudan (Kordofan and Darfur states) as well as White and Blue Nile states. Primary crops are sorghum, sesame, millet, and pasture species. The sector is characterized by low crop productivity, in particular due to one of the lowest usage rates of chemical fertilizers in the world: The overall average fertilizer usage for Sudan is half of Ethiopia's, where the peasant community

BOX 3.1: Land Tenure and Land Policy (*continued*)

Other pieces of legislation impacting land governance are the Local Government act (1990), Forest and Renewable Natural Resources bill (2002), and the Investment Encouragement act (1999) and its amended version of 2007. (1) The Sudan Interim Constitution 2005 includes provisions that relate directly to land and natural resource management, and stipulates that: The regulation of land tenure, usage and exercise of rights thereon shall be a concurrent competence, exercised at the appropriate level of government. (2) All levels of government shall institute a process to progressively develop and amend the relevant laws to incorporate customary laws, practices, local heritage, and international trends and practices. (3) Persons enjoying rights in land are entitled to equitable compensation on just terms arising from acquisition or development of land for the extraction of subterranean natural resources. (4) The communities in whose areas development of subterranean natural resources occurs have the right to participate, through their respective states, in the negotiation of contracts for the development of those resources; and (5) The entitlement of the states for raising revenue or collecting taxes from different sources including state land.

Still, the present legal framework for land tenure is not able to overcome the apparent dichotomy between the statutory and customary rights. Specifically, it is not clear at all whether statutory or customary rights have legal status in terms of who owns, who controls, and how access to land can be made, remade, legitimated, and contested. As a consequence there is an apparent legislative gap to sanction the right of entitlement of pastoralists and small farmers to land and natural resources. In its present form and practice customary law is manifestly discriminative with apparent violation of the rights of large populations who have been for centuries living within the domains of the existing tribes without recognizable or legitimate rights to land. The migrants in Blue Nile and Gadarif States and the many Arab camel herders in Darfur provide typical examples. The rights of such groups seem to depend on the generosity of Native Administration leaders and their will.

Despite the importance of land to women, they are still largely discriminated against in customary and statutory laws in regard to their land rights. In addition, lack of title to land has denied traditional farmers and pastoralists the right to access public resources, namely formal credit, creating them as highly disadvantaged and marginalized groups. Women are particularly vulnerable within this group. Much more, the Investment Encouragement Act of 1990 and its amended version of 2007 do not cover the social dimensions and conflict sensitivity in relation to land. Finally, the land-related legal framework created during the past century has been rendered manifestly inadequate by the tremendous changes in the social, political, economic, and cultural circumstances of the country since then.

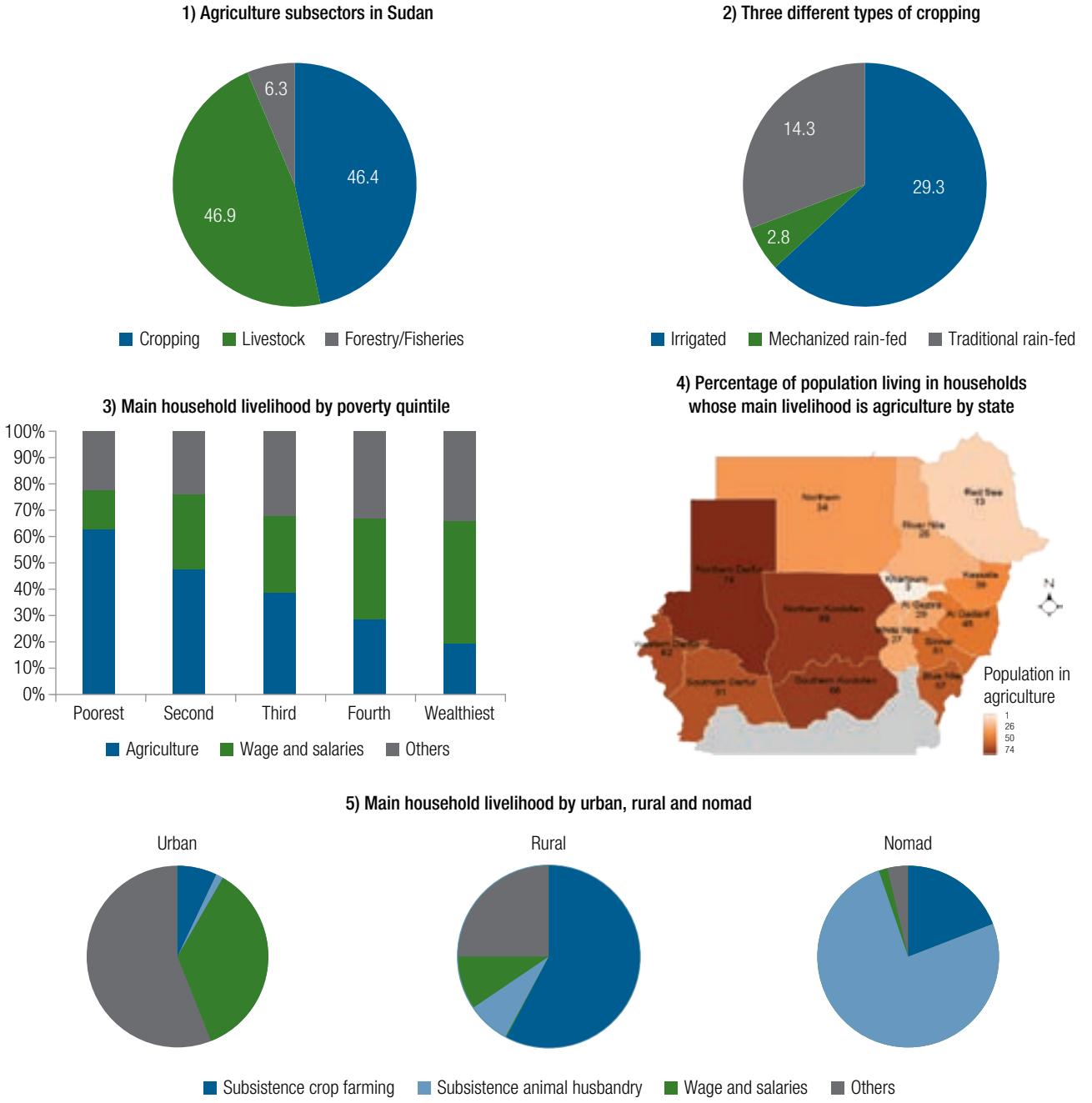
In sum, the existing land law and land policies have the following drawbacks for agricultural development. *First*, they limit access to credit especially for small farmers and women; *second*, they constrain sustainable and efficient agriculture and pastoral development, with no incentive for capital and land development, resulting in severe environmental degradation and low yields; *third*, they deprive a large number of small traditional farmers from access to their land as a result of government policies of leasing large holdings to investors in semi-mechanized agriculture, and (most recently) long term leases for foreign investors; and *fourth*, they create a source of tension and civil conflict between settled farmers and pastoralists. In turn, there is an urgent need for clear-cut land tenure and policy reforms with the objectives of providing secured tenure for farmers, reducing civil tensions, and protecting small farmers and foreign investor rights.

While reforms in land tenure would benefit all sub-sectors of agriculture it is important to note that reform in land tenure are difficult to manage. This study therefore follows the recommendations in World Bank (2015b), which proposes a gradual approach to reform in this area and to start in a few, easier to reform areas first. This is important since land tenure is a well-known and multi-dimensional policy issue that is also closely interlinked with conflict. Tensions over land polices are one driver of conflict, and it is very difficult to solve land issues in the midst of conflict (World Bank 2015b).

is much poorer than in Sudan. This is reflected in the low average contribution of this sector to GDP of only 14 percent during the 2006 to 2009 period (Figure 3.1.1). Still, the *per ha* yield for crops in this sector is slightly higher than in mechanized dryland farming; on the other hand, there is a declining trend in productivity due to loss of soil fertility. The traditional rain-fed sector receives few support services such as credit, research, and extension. Public investments in basic infrastructure for rural and agricultural development are also negligible. The result is low and declining or stagnating yields for most crops. The pastoralists and small farmers in the traditional sector are the most vulnerable to poverty.

The mechanized rain-fed sector coverings large parts of the former grazing land of Sudan and cover about 14 million feddan. The sector was originally promoted by the former colonial power, similar to, for instance, groundnut schemes in the Gambia and Tanzania to supply Great Britain with oil seeds and grain during the Second World War. Large-scale semi-mechanized rain-fed farming systems cover an area of about 14 million feddan in the

FIGURE 3.1: Overview of Agriculture in Sudan



Source: World Bank staff own calculations, based on data from Sudan Ministry of Livestock and Fisheries; Sudan Ministry of Finance and National Economy; Central Bank of Sudan, the Sudan Population and Household Census (2008), and the National Benchmark Household Survey (2009).

states of El Gadaref, Blue Nile, White Nile, Sennar, and South Kordofan. Crops such as sorghum, sesame, and recently sunflower are produced in this farming system. The semi-mechanized farming system accounted for only about 2.8 percent of GDP during the 2006 to 2009 period (Figure 3.1.2). Its share is declining because of low yields resulting from levels of input usage. Regular plowing has made the fragile sandy soils in the Savannah belt even more prone to wind erosion, and has changed

BOX 3.2: Studying the Rehabilitation of the Gezira Scheme

The Gezira Scheme is commonly regarded as the centerpiece of Sudan's agriculture but it is at the verge of collapse. The Gezira scheme was once the pride of Sudanese given the enormous size of the irrigation system (900,000 ha), close to both the capital (and metropolis) of an arid country (Khartoum), and its major port (Port Sudan). With its 90 years of history, three million inhabitants, and certain natural advantages (much of the scheme could be irrigated by gravity with proper infrastructure maintenance), it is obviously the heart of Sudan's agriculture. But over time its natural advantages encouraged many unsustainable shortcuts stretching back to the colonial days, in areas as diverse as repeated abrogation of landholders' rights, command cropping plans, exploitation of farmers' interests, skimping on spending both for routine maintenance (e.g., silt removal), and redesign of works to reduce maintenance needs. Most of those needs have accumulated in recent years to the point of virtual collapse of the Scheme's irrigation and drainage functions.

In 2014 the head of Gezira's Board of Directors resigned, while the President of Sudan has publicly declared the failure of the scheme. Almost all of the scheme staff, which once numbered 10,000, have been terminated and portable assets sold off. To turnaround its fortune, and to avoid a major loss to Sudan and its agriculture sector in particular, it would seem wise to design and implement a technical feasibility study of rehabilitating Gezira, including an initial benefit-cost analysis of rehabilitation of the scheme. Rehabilitating the scheme would no doubt be a large project, since it would have to compensate for decades of deferred maintenance.

While it is too early to provide any details of a rehabilitation program, there are a number of priorities emerging from the analysis in this study. On the *engineering* side, rehabilitation seems to require mechanized or hydraulic silt exclusion mechanisms at the inlets from the Nile. This may be less difficult than in the past, as, due to construction of the Renaissance Dam on the Blue Nile in Ethiopia, that reservoir will act as a giant upstream silt trap for decades, thus markedly facilitating silt exclusion at Gezira.

From an *organizational* perspective any rehabilitation would have to consider the following principles:

- **Land tenure:** Secure (and transferable) land tenure would have to be assured to all farmers in the scheme, with no differentiation based on when ancestors joined the scheme. The past allocation of land (8 ha equivalent to each family) was too large for intensive irrigated agriculture by peasant families. Under intensive conditions, a much smaller farm would produce good incomes to any family, as evidenced by experiences in countries like Indonesia, Thailand, Malaysia, where farm allocations are much smaller. This reduction in farm size would permit all existing residents (many of whom have been landless laborers for generations) to have their own farms.
- **Allow farmers free choice of crops:** Experience shows that farmers know best what crop to use to maximize yields and income. Thus rehabilitation should be built on a complete abandonment of coercion in cropping patterns. On the other hand, the scheme management would have to have the ability to schedule water deliveries internally to suit river flows and the needs of most farmers. Farmers would then simply have to plan cropping patterns to fit pre-announced water delivery schedules.
- **Principle of cost recovery:** Real cost recovery would have to be agreed upon by all farmers. The recovery rate could be based on accounted operation and maintenance costs. Collection of charges and distribution of water at field levels should be handled by to-be-established Water User Associations (WUAs). Areas where farmers do not form WUAs would receive water last. Such mechanisms have proven very effective in managing water in a sustainable way.

vast former rangelands into basically a stand of weeds and some crop residues. The latter is only of little use for livestock production. Also, the secession of South Sudan and gold mining has had a serious impact on availability of seasonal labor that led to a decline in the semi-mechanized farming areas, especially for sesame. The sector does not include substantial livestock production.

The irrigated farming system is the dominant force of agricultures' share in GDP. Irrigated farming is practiced along the river Nile and its tributaries and is considered one of the pillars of Sudan's strategy for agricultural development. There are between four and five million feddan of irrigated land within the Nile basin—in River Nile, Khartoum, Gezira, Sennar, Blue Nile, and White Nile States. The Gezira Scheme (2.1 million feddan), Rahad, Suki and New Halfa are historically managed by the Central Government, but currently some effort toward privatization has taken place, especially in the Gezira scheme. But overall the Gezira scheme is in urgent need for comprehensive rehabilitation to reach similar successes as in the past. Box 3.2 provides a short analysis of the possibility for rehabilitation of the Gezira scheme. In total, the irrigated sector accounted for about 29 percent of agricultural GDP over the 2006 to 2009 period.

Irrigation schemes started in the colonial time for smallholders (such as Gezira) and some large sugar cane plantations set up by government. The number and size of sugarcane plantations are now rapidly increasing in the form of joint ventures between government and foreign investors. In the last 10 years large concessions have been given out to yet another group of foreign investors for the establishment of forage production farms. These cover now large areas of the Nile and Ak Bara valleys. Wheat, cotton, sorghum, and groundnuts were the most important crops in irrigation areas during the 1990s. More recently, reductions in the areas of the traditional crops have led to opportunities for production of other crops such as vegetables, and a substantial increase in the production of livestock. In the irrigated schemes agricultural services are provided and supported by the government through facilitation of credit, input supply, and extension services. Irrigation schemes often suffer from management inefficiencies especially related to water supply, low productivity, and large debt burdens.

Poverty in the agriculture sector

Sudan's poor are predominantly active in the agricultural sector. More than 60 percent of households in the poorest quintile rely on agriculture as their main livelihood in contrast to only 20 percent of households in the wealthiest quintile (Figure 3.1.3). This disparity is linked with a geographical concentration of agricultural livelihoods in the rural southern parts of Sudan (Figure 3.1.4).

Most rural households rely on agriculture. About 58 percent of the population in Sudan lives in rural areas (excluding nomads). And more than every second rural household (58 percent) lives below the poverty line compared to only one in four urban households (27 percent). Thus, three out of four poor people live in rural areas. At the same time, rural areas rely predominantly on agriculture as the main livelihood with almost 65 percent compared to 8 percent in urban areas (Figure 3.1.5). Nomads rely almost exclusively on agriculture with 19 percent involved in crop farming and 76 percent engaging in animal husbandry.

A renewed growth of the agricultural sector can lift many households out of poverty. As most poor households engage in agriculture, policies supporting higher productivity will also improve livelihoods of the poor. In addition, increased production will reduce food imports improving Sudan's trade balance. In the medium-term, a flourishing agricultural sector can regain market shares in the regional and global market. Thus, tapping into the agricultural potential of Sudan can lead to shared prosperity and sustainable growth.

B. Production

Cropping

The story of cropping in Sudan is by and large a story of low productivity. This section will highlight some facts on various types of cropping, including cereals, oil seeds, gum arabic, and cotton. Cereal grains are the most important calorie source in Sudanese diets. Sorghum, millet, and wheat are the main cereals in Sudan. This section shows that yields are low in Sudan, particularly if compared to other countries with harsh climates.

Low crop yields are associated with low fertilizer usage in the country. In 2009 the average fertilizer use per hectare of cropland was 7.3 kg, which ranked Sudan at 129 among 155 countries. In the same year, Ethiopia, Sudan's poorer neighbor, used 17 kg (ranking 115). Available statistics indicate that Sudan used as much as 80 kg/ha in the mid-1970s, and 70 kg/ha in the 1980s. While it is not entirely clear how the low fertilizer usage came about, it is clear that the decline in agriculture is associated to fertilizer usage. Raising the bar of agriculture again in Sudan, therefore, requires efforts to stimulate fertilizer usage. All hindrances to fertilizer import and distribution, for whatever reasons, need to be lifted, and indeed current policy needs to be

replaced by government encouragement, and possibly even subsidization at first, of fertilizer usage, to restart the basic ingredient of modern agriculture; without this, yields of wheat and every other crop will remain at unacceptable levels.

Cereals

Sorghum is the main staple crop grown in Sudan, covering about 40 percent of the whole cultivated area of the country. The average area under sorghum cultivation was 21.2 million feddan between 2008 and 2014, occupying about 40 percent of the total cultivated area. The average annual production between 2008 and 2014 was around 3.4 million tons with an average yield of 160 kilograms per feddan (Figure 3.2.1). The irrigated farming system produced 20 percent of total output of sorghum in Sudan, while the mechanized rain-fed system and traditional farming systems produced 45 and 35 percent respectively. The production of the sorghum crop experienced continued fluctuations in area and yields due to dependence on unpredictable rains, recurrent occurrences of droughts, pest infestation, and the general lack of application of fertilizer and other inputs (Figure 3.2.1).

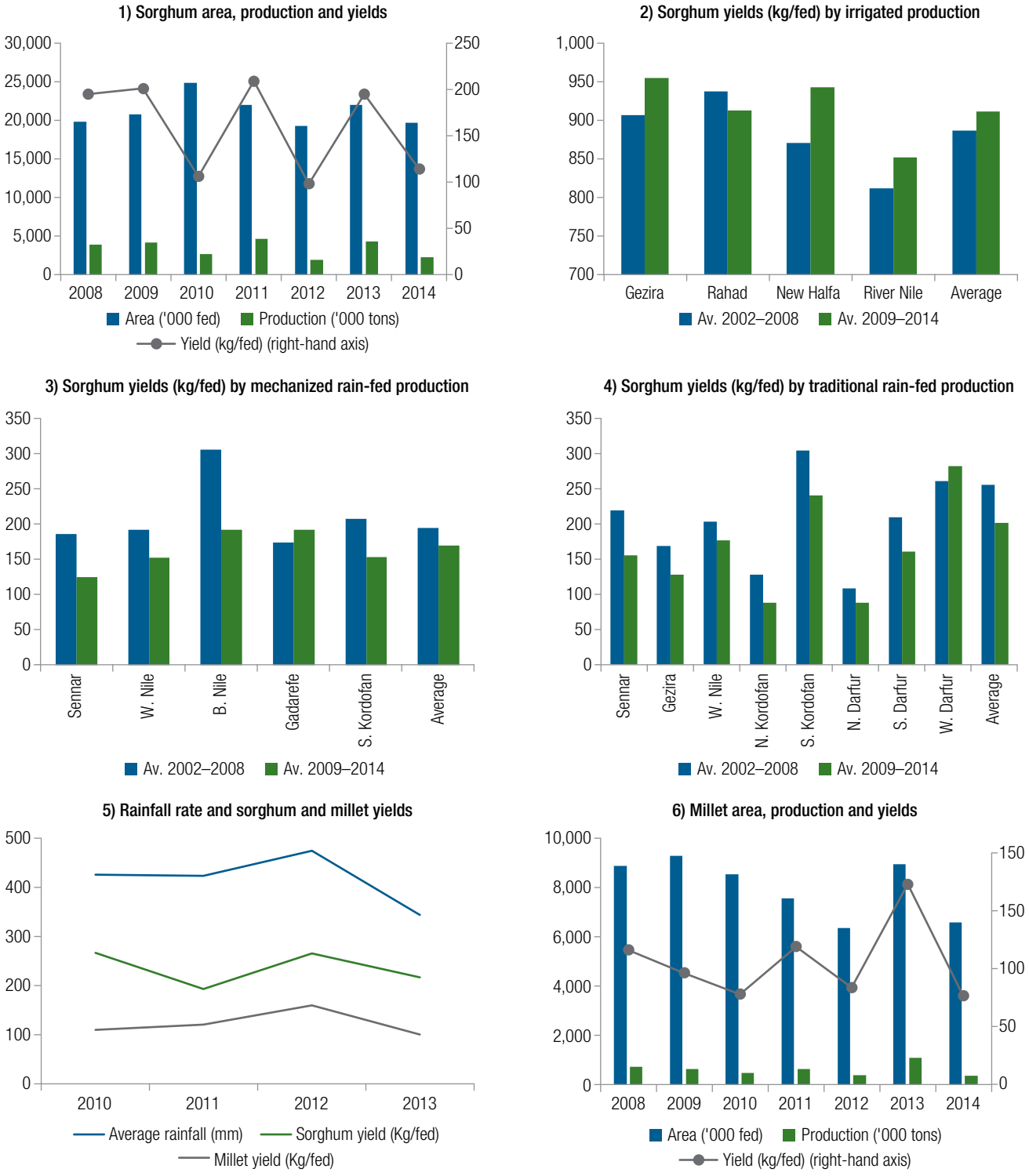
Sorghum yields are generally on a downward trend, however, farmers were able to slightly increase the yields for irrigated sorghum between 2002 and 2014. Irrigated sorghum has had some improvement in productivity from 887 to 918 kg/fed (+3.5 percent; Figure 3.2.2), but mechanized rain-fed sorghum yields decreased from 195 to 166 kg/feddan (–15 percent; Figure 3.2.3). Traditionally produced sorghum yields decreased also from 256 to 151 kg/feddan (–41 percent; Figure 3.2.4). Productivity of sorghum in the irrigated sector is far better than in mechanized and traditional systems due to use of improved varieties and plant nutrition technologies developed by the Agricultural Research Corporation (ARC) and fertilizer supply by production schemes, obviously in addition to the effects of water availability.

The declining productivity under rain-fed farming systems is attributed mainly to low and fluctuating rainfall (Figure 3.2.5). Natural resource mismanagement problems without a counteracting action on crop management practices such as the use of drought-tolerant varieties, water-harvesting techniques, or appropriate crop rotations add to the problem. There is also some impact from land and soil fertility degradation. This is to be expected due to the expansion of the cultivated area at the expense of natural vegetation cover and mono-cropping practices, especially under mechanized farming in Eastern Sudan.

Millet is the main staple food in Western Sudan and has an average area under production of about 8 million feddan located mostly in the lighter soils of Western Sudan. Millet production in 2014 is estimated at 359 thousand tones, which is very low compared to previous seasons, primarily due to low rainfall (Figure 3.2.6). Around 93 percent of the millet crop is produced by the traditional rain-fed sector, of which 66 percent comes from Darfur states and 24 percent come from Kordofan. These states have large sandy areas that are classified as marginal lands with low rainfall creating an environment unsuitable and unfavorable for the cultivation of crops other than millet.

Millet production is particularly low yielding in Sudan. The main problem related to millet is low productivity, which is averaging less than 100 Kg/feddan per year. Low productivity is a result of low inputs, which is not only a practice in Sudan but the entire Sahel region. Usually, there are no purchased inputs used (such as fertilizers) and also labor inputs for millet production are limited. The main determinant for production in such an opportunistic system is rain. Millet is one of the few crops that can thrive with such low levels of inputs, hence the practice has developed. However, under a program called "millet genetic sources," the ARC has developed new improved varieties of millet characterized by higher yields; extending them to farmers could improve yields significantly.

FIGURE 3.2: Agriculture Yields in Sudan, Sorghum and Millet



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; and the Sudan Ministry of Agriculture and Irrigation
Notes: (2), (3), and (4): Average 2008–2014 does not include 2011 and 2012 due to a lack of data.

Wheat is a crop that is not native to Sudan, but the government encourages its production to reduce imports and reliance on foreign suppliers. The wheat production area is small (with only 440,000 feddan), as is production and yields (Figure 3.3.1). In fact, it is clear that Sudanese wheat yields are among the lowest in the world, if not the lowest (Figure 3.3.2). Pavlodar in Kazakhstan is on the Siberian border with winter temperatures below –40 Centigrade and a very short growing season. Farmers there use almost no fertilizer, like the Sudanese, but their yields exceed Sudan's. Kyzlorda in southern Kazakhstan is a desert province, with irrigation; wheat is nominally irrigated in Sudan as well. The problem behind low yields for wheat in Sudan is most likely lack of day-length variation. Given those constraints to wheat production in Sudan, the government may want to rethink its policy emphasis on the crop.

Oil seeds

The major oil seed crops in Sudan are sesame, groundnuts, and sunflower, which are produced under irrigated and rain-fed conditions. Sesame production and exports are very important for Sudan's economy. Other oil seed crops, namely, groundnuts and sunflower are important for local consumption and processing; groundnuts share in total export in recent years is negligible, and most of the production is consumed domestically. The same is true for sunflower. Oil seeds are produced under irrigated and rain-fed conditions but the bulk of production is rain-fed.

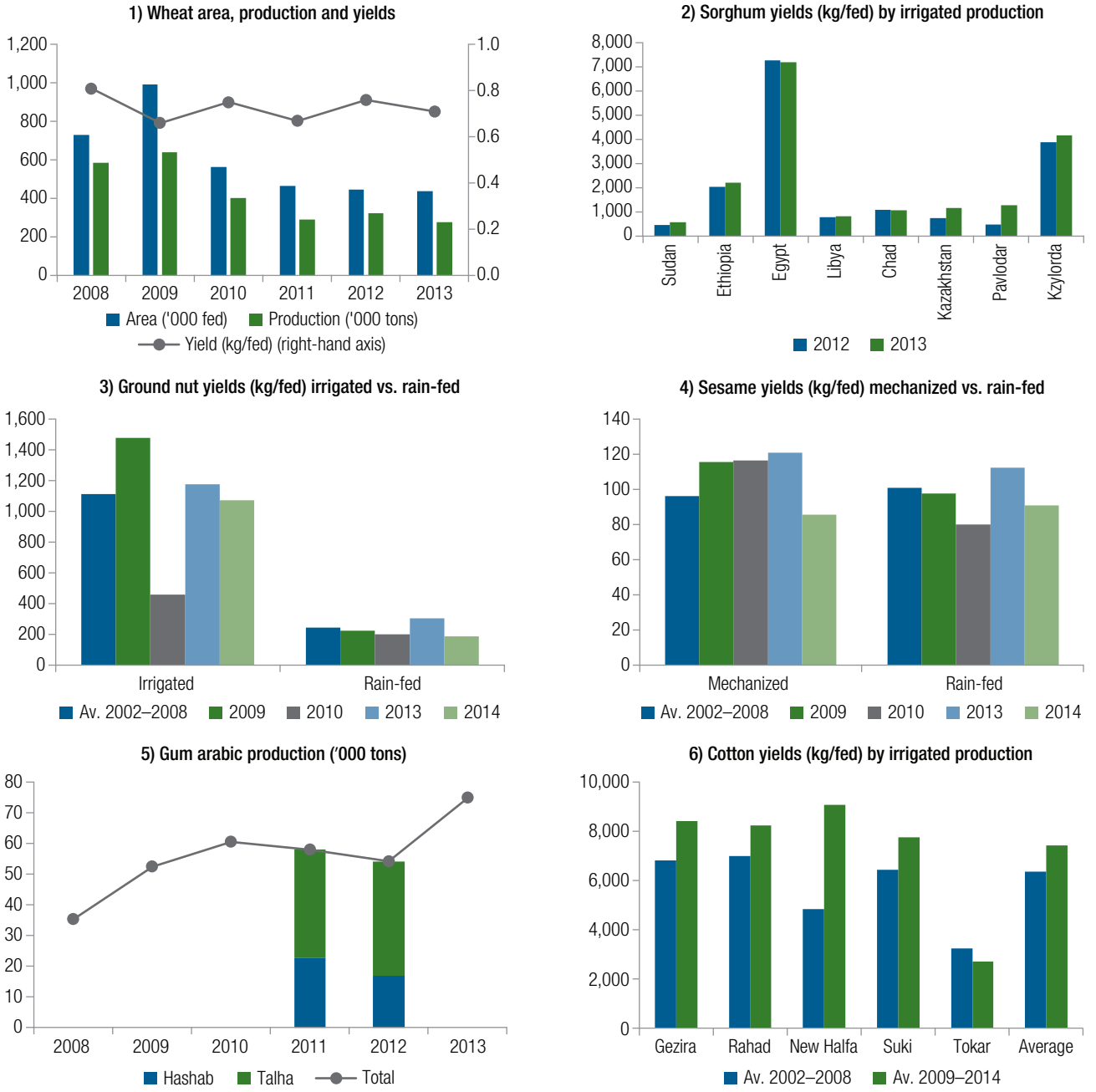
Groundnut is grown under irrigated and rain-fed systems and its yield patterns are indicative of the significant differences between irrigated and rain-fed productivity. The average yield under irrigation was 1,072 kg/fed compared with 187 kg/fed through rain-fed in 2014. However, productivity is fluctuating, and during the period 2002 to 2014 evidenced a declining tendency under both farming systems. Indeed the wide swings in yield in nominally irrigated areas like Gezira are indicative of serious deficiencies in irrigation effectiveness. Groundnuts were exported in large quantities in the past but their relative importance in export trade has declined substantially due to increase of local consumption and demand. In addition there are strict quality standards required by importing countries because of the Aflatoxin problem.[38] Any inability to meet those standards damages Sudan's reputation in the international market.

Sesame is produced under both mechanized and traditional production systems, but yields are low and fluctuating in both systems. The vast majority of sesame fields (about 80 percent) are about 5 feddan in area. In these fields, sesame is grown under the traditional farming system with little or no use of machinery or modern inputs. Figure 3.3.4 shows that mechanized sesame yields varied from 86 to 121 kg/fed compared with 80 to 112 kg/fed for traditionally produced sesame during the period 2002 to 2014. While yields of mechanized rain-fed sesame production are declining in most areas, overall mechanized production has still an average of 107 kg/feddan as compared with an average of 96 kg/feddan for the traditionally produced crop. Very low and fluctuating yields under both systems are largely due to lack of water and fertilizer.

Sesame yields in Sudan compared to other major producing countries are very low. Productivity is equivalent to 18, 27, 58, and 51 percent of productivity in China, Ethiopia, India, and Nigeria, respectively. Enhancement and stabilization of yields in both production systems would significantly improve the welfare of rural Sudanese. Sesame is a relatively high value crop, with a stable world market in which Sudan plays a relatively strong role. It is thus important that yields be lifted, first through higher fertilizer applications, then through supplemental irrigation where possible.

[38] Naturally occurring mycotoxins that are produced by Aspergillus flavus and Aspergillus parasiticus, species of fungi.

FIGURE 3.3: Agriculture Yields in Sudan, Wheat, Oil Seeds, Gum Arabic, Cotton and Livestock



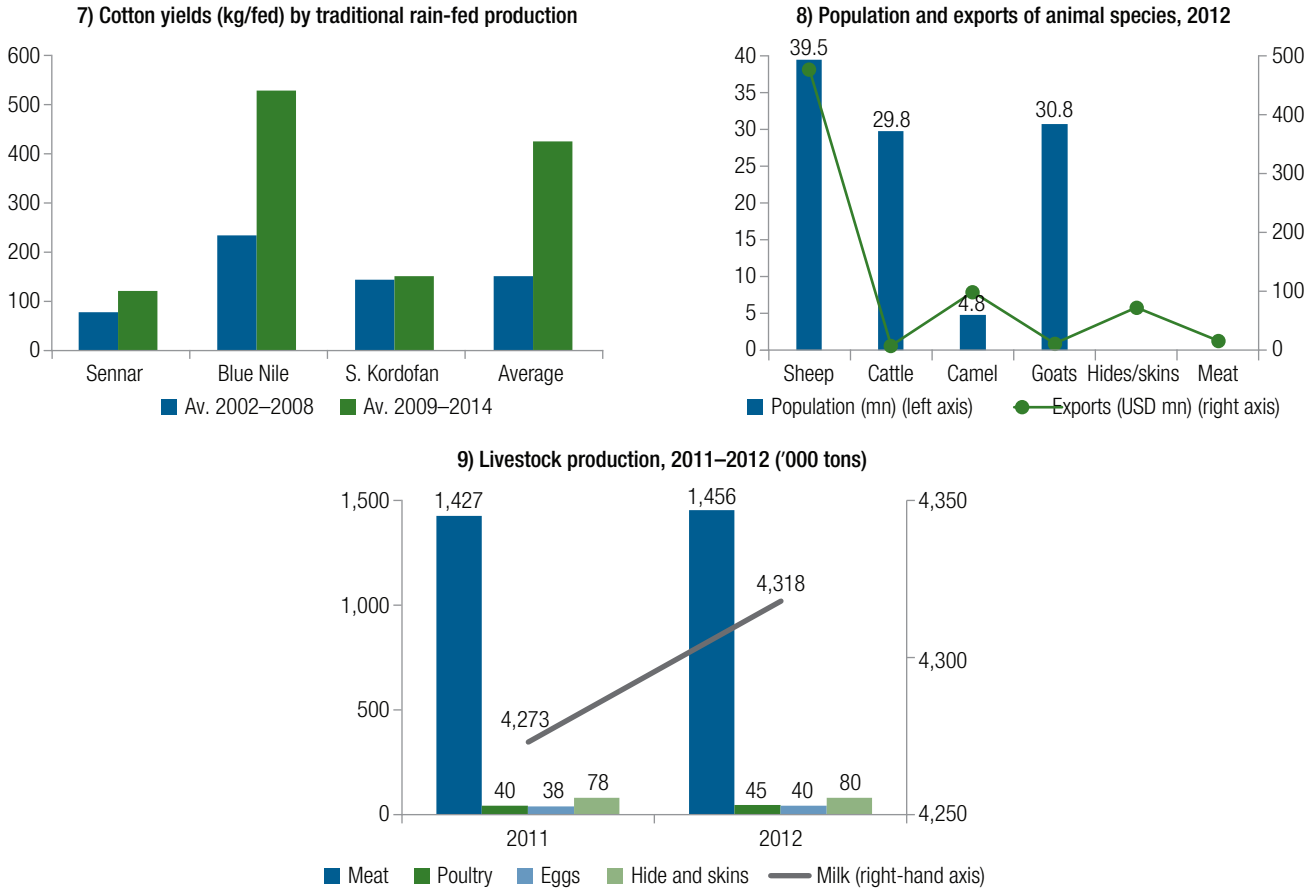
Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; the Sudan Ministry of Agriculture and Irrigation; and selected World Bank Agriculture Country Reports.
Notes: (6): Average 2009 – does not include 2011 and 2012 due to a lack of data.

(continued on next page)

Gum arabic

The gum arabic belt extends from the eastern borders of Sudan with Ethiopia to the Western borders with Chad and Central Africa, covering an area of 500 thousand square kilometers. Gum arabic extends over 12 states in Sudan, with some areas more productive than others, namely the traditional

FIGURE 3.3: Agriculture Yields in Sudan, Wheat, Oil Seeds, Gum Arabic, Cotton and Livestock (*continued*)



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; the Sudan Ministry of Agriculture and Irrigation; and the Sudan Ministry of Livestock and Fisheries.
Notes: (7): Average 2009–014 does not include 2011 and 2012 due to a lack of data.

farming areas in Northern and Western Kordofan, and parts of the Blue Nile state. There are an estimated five million people directly involved in forestry activities such as gum picking, gum collection, and charcoal and firewood collection. Sudan produces high quality (hashab) which comes from *Acacia Senegal*, and a lower grade (Talha) harvested from *Acacia seyal* but with the same unique properties as an emulsifier.

Sudan is the world's largest producer of gum arabic, but its domination has declined from once more than 80 percent of world production in the 1960s to about 50 percent now. In the 1960s and 70s production and supply was dominated by Sudan with annual production typically in the range of 40 to 50,000 tons per year, providing 80 percent of global supply. Back then, the remainder was supplied by Nigeria and French West Africa each providing around 5 to 10 percent of supply (3,000 to 6,000 tons). Sudanese gum arabic supply declined from the 1970s to the 1990s, falling into the range of 15–25,000 tons, with parallel increases in supply from West African origins, primarily Nigeria and Chad, which increased their export capacity to 10,000 tons (World Bank 2015a). In the mid-2000s, annual production of Sudan started to recover, bringing it closer to the averages of the 1960s and 70s.

Estimated production of Sudanese gum arabic has seen a renaissance since 2008. Staff estimates

suggest that production exceeded the 30 thousand ton mark in 2008, and further increased to 50 thousand tons and beyond between 2009 and 2012 (Figure 3.3.5). Latest estimates available for 2013 suggest that production reached 75 thousand tons. And this is probably still far below potential output of gum arabic in Sudan: The production potential with current gum arabic trees (hashab and talha), as speculated by Abdel Gadir[39] in 2013, can reach about 200 thousand tons, so there is considerable scope to expand production.

There is considerable scope to increase productivity in gum arabic, and potentially to move towards a higher level of processing within the country. Farm research results have shown that productivity per tree can be considerably increased by 47–60 percent, while quality can also be improved through better tapping methods. Improving the productivity of other crops will also be conducive to boosting gum arabic production due to the potential for longer rotations and expanded areas. With better technology and marketing policies, gum arabic production and export supply can be raised to its former levels in a sustainable manner. Box 3.3 provides some lessons from recent experiences in policy changes in Sudan on gum arabic production. In addition, gum arabic is one of the few current agriculture products that potentially could be used to advance agriculture processing for higher value addition (World Bank 2015a). Chapter 4 of this report will look into this in more detail.

Cotton

The commercial cotton industry in Sudan dates back to the colonial period, where cotton was grown to provide ginned cotton to the British textile industry. Cotton is grown under various topographical and environmental conditions, utilizing various methods of irrigation and using different applications of chemical inputs. The major producing areas in Sudan are Gezira, Rahad, New Halfa, Suki, Blue Nile, White Nile, Tokar of Eastern Sudan, and in the Nuba Mountains area of Western Sudan. The bulk of Sudan's cotton production is in the irrigation schemes, especially the Gezira Scheme.

After a number of years with declining yields and production of cotton, cotton production has been on the rise again since 2010. In the years 2006–2010 area, yields, and production of cotton sharply declined (Figure 3.3.6). There has been a remarkable recovery of cotton yields, area, and production in the years 2010 to 2014, which coincides with the break-up of the monopolized (and extortionate) marketing of cotton by the Sudan Cotton Company. There is reason to believe that the recovery was triggered by the break-up of the monopoly, particularly since there were no other noticeable improvements in irrigation performance, for instance, or agricultural credit, extension, and research/breeding. Still, national average yields doubled from 500 kg/fed in 2009 to 1,014 kg/fed in 2014. Both the experiences of cotton and gum arabic suggest that no technical improvements will make a difference until incentives to farmers are right.

Livestock production

Livestock are raised in almost all parts of Sudan, but mostly concentrated in western Sudan (Kordofan and Darfur states) and owned by nomadic tribes. There are three systems of livestock production in Sudan; 1) animal production under natural range systems; 2) animal production in the irrigation schemes and riverine farms; and 3) animal production under commercial systems, e.g., ranches, dairy and poultry farms, and feedlots. However, most of the livestock population in Sudan is raised on the natural range, which is hence the focus of this section.

There are three main livestock species raised and marketed in Sudan with a total of over 100 million heads. The pastoral system of animal production is no longer a quaint residual of the distant past, but a serious economic business well worth

[39] Secretary General of the Gum Arabic Council

BOX 3.3: Recent Policy Changes in Gum Arabic and Their Impact

Over the past decade gum arabic trade was successfully liberalized. The gum arabic trade was liberalized with the removal of the Gum Arabic Company (GAC) concessions on the marketing and export of raw gum arabic and the suspension of the floor price system. The Gum Arabic Board (GAB) was established to coordinate reform measures and support the regeneration of the sector. The main objectives of the GAB are similar to the former GAC, without monopoly power or concessions. GAB is responsible for promoting gum arabic exports, opening new markets, and providing finance services and quality control. Further reform measures have eliminated 13 taxes and charges that had been levied on gum arabic (World Bank 2014e). Following these reforms there is a sign of production recovery with production estimated to have reached 75 thousand tons in 2013 (Figure 3.3.5). The key incentive for the farmers was their ability to get a more significant share of the final FOB export price when selling at central market auctions. This said, there is still a concern that profitability is reduced through individual States levying taxes and other charges without providing a service.

A Government project to provide microfinance and technical assistance to the poorest gum arabic producers was established in 2010. The Government in 2010 established the Gum Arabic Project, known as "Revitalizing the Sudan Gum Arabic Production & Marketing Project."[a] This project aims to improve the earning capacity of the poorest gum producers through providing microfinance and technical assistance. The main purpose of the Project is to support members of Gum Arabic Producers Associations (GAPAs) in five states (South Kordofan, North Kordofan, White Nile, Sennar, and Blue Nile). The project adopted the strategy of building up GAPA members' technical, managerial, and financial capabilities to increase production through access to new markets, micro-finance, and more opportunities for up-to-date knowledge via exchange visits and cross fertilization of ideas. About 130 associations in five states are participating in the project, with a membership of 11,346 farmers, 25 percent of whom are women.

Preliminary results of the project show that it has been very successful and the income levels of beneficiary households have increased by 65 percent. The percentage of the gum price received by small gum producers has increased from 15 to 50 percent due to the exclusion of middlemen from the chain. Other positive impacts include higher production levels and better gum prices. The project also enhances the knowledge and skills of gum producers, resulting in well-organized GAPAs with active members. All of this is leading to a noticeable improvement in the living conditions of producers and their families, as well as the crucial reforestation of the gum belt.

The question now is how to replicate the activities of the 2010 project in other states in order to reach the highest possible number of potential gum arabic producers. In 2014, the government signed for a new agreement with the French development agency to finance activities similar to the projects. But more is needed to maximize impact across states. Another avenue of support also comes through the Gum Arabic Council, which has many programs and efforts to develop gum arabic production and trade. Support includes: the formation of export finance portfolios (export finance increased from SDG50 million in 2009 to SDG250 million in 2013); promotion of quality assurance through symposia, local media and printed materials; promotion of the use of gum arabic in local industry (local consumption increased from 500 tons in 2008 to 10 thousand tons in 2013); opening-up of new international markets such as China and Malaysia; and support of gum arabic research. The Gum Arabic Council has also followed-up the implementation of a presidential decree of planting 10 percent area in each rain-fed agricultural project with gum arabic trees. The program is progressing in Gedaref state as 50 thousand feddan was covered, and another 50 thousand feddan is expected to be covered in 2014. The council is working to promote the implementation of the decree in other states.

[a] The project is financially supported by World Bank (Multi Donor Trust Fund (MDTF)) and International Fund for Agricultural Development (IFAD).

being preserved and nurtured. Figure 3.3.8 shows the three main species sheep, cattle, and camels and Figure 3.3.9 shows the associated output from them. Together with the smallest and easiest to manage small ruminants (goats), the total population is over 100 million head of live animals. A few unique trends emerge from Figure 3.3.8: First, there is an enormous export of live sheep with an export value of almost US$500 million in 2012. Somewhat lower, but still impressive are the exports of camels and hides and skins, together worth almost US$175 million.

Contrary to commonly held belief the rationale for pastoral livestock is less grounded in satisfying basic needs, such as searching for water to drink, and more due to the unique economic benefits of engaging in pastoral production. The basic reason for the existence of pastoralism that drives herders to take their herds to different regions is less absolute necessity, in terms of water to drink and vegetation to eat, simply to keep them alive. The reality is more complex than that, at least according to a study several decades ago (Wilson and Clarke

1976), but in the same Darfur region which still figures as one of the heartlands of Sudanese pastoralism. These results, reported by the Tufts University team in 2013, include the following (Tufts, 2013):

a. The animal calving rate was 65 percent in migratory herds and 40 percent in sedentary herds;
b. Sixty-five percent of all migratory heifers calved at under four years of age, while only 29 percent of sedentary heifers did so;
c. Total mortality was 15 percent per annum in migratory herds and 35 percent in sedentary herds, while calf mortality was 11 percent in migratory and 49 percent in sedentary herds; and
d. Meat production per kg of migratory breeding females was about twice that of sedentary breeding females.

In other words, pastoralism is an effort to maximize, rather than merely survive, and in this it appears to be successful. The superiority of pastoral livestock in Sudan appears to be in that pastoralists consistently use natural resources more intensively and hence are able to produce more livestock products per unit of land area. Later studies replicated similar findings to the ones reported by Wilson and Clarke (1976) for Sudan and the rest of Africa. Superiority of pastoralists over sedentary farming may be due to the constant optimization by experienced herders of the pasture forage their herds graze. Behnke (2012) found that fenced pastures south of Nyala (now in South Darfur) lost 75 percent of their feed value (largely due to consumption by termites and loss of digestible protein due to volatilization) if left ungrazed from September to the end of the dry season in May. Similar findings are available for Mali, Ethiopia, Kenya, Botswana, Zimbabwe, and Uganda. As a result, pastoralists consistently use natural resources more intensively and produce more livestock products per unit of land area than do sedentary farmers, indeed even commercial ranchers.

Given the unique performance of the livestock sector in Sudan and the fact that pastoralism is so successful there is surprisingly little policy attention on the sector. This is important in part due to the interlinked issues of land tenure and land policy (Box 3.1), which need to be solved to sustain pastoral livestock production into the future. But there are also other issues, such as inherent volatility of the sector and the possibility that it could be negatively affected by droughts and diseases. Hence there is a need for more policy focus on a better, forward-looking management of the sector (World Bank 2015b).

A large source of value-added from pastoralists, which is generally unaccounted for, is the usage and trade of surplus milk. Surplus milk arises from the fact that there is milk that is beyond the needs of the calves of the herds. Anecdotal evidence suggests that this milk is carried out primarily by women and used not only for family subsistence. It is also sold, or exchanged with farmers, often for grain. Informal estimates of the economic value of this trade suggest that this activity is worth beyond US$1 billion a year.

Processing of meat and meat products for exports would be desirable as a higher-value added activity, but with only four large slaughterhouses in Sudan and none of them certified to international standards, exporting meat is impossible. There is also likely that there is insufficient current foreign demand for meat. The lack of certified slaughterhouses is one important factor behind the fact that most of Sudan's livestock exports are exported live. Exports consist primarily of sheep to Saudi Arabia and camels to Egypt. But an important other factor is also that a large share of the exports have to be live, since they are used to fulfill the religious obligation for families to sacrifice a sheep for Eid ul Adha. Many of the sheep will also be slaughtered for the Hajj season, for the millions of pilgrims to Saudi Arabia's west coast. So there is considerable uncertainty about the size of the potential export market for meat, at least when considering the current two main destinations: Saudi Arabia and Egypt.

C. Markets and Trade

Agriculture trade has increased significantly between 2008 and 2013. After many years of decline (World Bank 2009b), agricultural exports are regaining their position after the large decline of oil exports since 2011. Agricultural exports values showed an increasing trend from US$329 million in 2008 to US$1,626 million in 2013 (Figure 3.4.1), and its share in total export rose from only 3.3 percent in 2008 to almost 23 percent in 2013 (the relative increase is of course also a consequence of declining total exports since oil's fall). This improvement is mainly led by good performance of major agricultural export products like livestock, sesame, gum arabic, and cotton. However, the agricultural trade balance remains negative due to the high food imports bill, which mainly goes for imports of wheat and wheat flour, sugar and vegetables, and animal oil.

Livestock exports

Livestock exports have rapidly become an important part of Sudan's foreign trade and reached a total export volume in excess of US$670 million per year in 2013. Figure 3.4.2 summarizes Sudan's recent export values of livestock products. There has been more than a tenfold increase by 2013 compared with 2008 (which was an outlier due to an imposed export ban and quarantine measures). Live sheep exports dominate the picture, representing more than 70 percent of livestock export. Next in importance is the export of live camels and hides and skins, which both are about 14 and 10 percent, respectively, of livestock export. Meat export fluctuate greatly which is largely a reflection of the inability of Sudanese meat to compete with other suppliers especially to the Gulf region, due to high cost, lack of modern export facilities, quality considerations, and unsustainable supply.[40]

Livestock exports is a growing business for existing exporters. An examination of statistics from the World Bank's Exporter Dynamics Database shows that the average size of live animals exporters grew from US$500 thousand in 2008 to US$2.6 million in 2012, almost doubling between 2011 and 2012. Most of the growth in exporter size was due to the size of incumbents, i.e. existing exporters, rather than growth of new active exporters. This suggests that new entrants may find it difficult to enter the market, possibly due to market entry barriers and costs associated with getting into the livetsock export business.

The international markets for Sudanese livestock exports are concentrated in Arab countries. Most of live sheep exports go to Saudi Arabia, which accounts for more than 50 percent of livestock exports from Sudan. Egypt is the main destination of live camel export (primarily as beasts of burden), primarily through border trade. Meat is destined mainly for the United Arab Emirates, Egypt, Qatar, and Jordan, but with a downward trend due to high competition, especially from Australia and Brazil. Hides and skins are sold to a wide range of countries including United Kingdom, China, United Arab Emirates, Turkey, and Saudi Arabia.

The fact that there is no recent registered ban imposed on the import of sheep and goats from Sudan by Saudi Arabia reflects progress. Bans on Sudanese exports were in place prior to 2007, but not since (World Bank 2014e). This is an achievement of the health program adopted by the Government of Sudan and recognized by the Government of Saudi Arabia regarding vaccination and inspection for exported sheep (Table 3.1). Recognition of the programs extends to the 17 GAFTA markets (World Bank 2014e).

But a number of major constraints to livestock exports persist (Tufts 2013; and World Bank 2014e). *First*, numerous animal migration/transport routes are blocked by allocations of land

[40] No cold or frozen meat is exported from Sudan because of inadequate abattoirs, handling, and transport facilities for chilled meat. Small assignments of whole carcasses of sheep and goats and quarter carcasses of beef are exported through special arrangement between exporters and importers.

Table 3.1: Vaccination and Inspection Regime for Sheep Exports

Location/timing	Activities
Inspection and vaccination close to production area	First veterinary inspection and vaccination. Animals held in an inspection center under observation for 7–10 days.
Entry into a quarantine area	Second inspection at inland quarantine station by veterinarians. Blood sample taken from every animal for brucellosis testing. Animals held for 7–10 days.
Inspection on the way to the port	Third animal inspection in quarantine area by veterinarian. The group of animals receives three certificates: for number of animals, free from infectious and noninfectious diseases, and for animals in good health.
Prior to loading on ships	Fourth inspection seven days prior to shipment. Animals are held in quarantine and inspected to verify that they have no evidence of infectious or noninfectious disease and not generally weak.

Source: World Bank (2008b); and World Bank 2014e.

to mechanized farming, which is often unprofitable. *Second*, the reliance on local breeds lowers relative productivity and increases cost. However, these local breeds are also in great demand in importing countries. *Third*, multiple charges and fees imposed by local authorities also raise cost of production in Sudan. *Fourth*, weak services for transportation, storage and cooling, packaging and technology for meat processing. *Fifth*, there is a shortage of skilled human resources and administrative capability to provide extension and veterinary services to reduce the spread of diseases that may affect exports. *Sixth*, domestic marketing is inefficient and there is only a handful of international markets. The domestic market is dominated by broker's men who impose multiple fees and charges, while international markets are concentrated in few countries in Gulf region. *Seventh*, the availability and access to finance for small producers is not sufficient.

Sesame exports

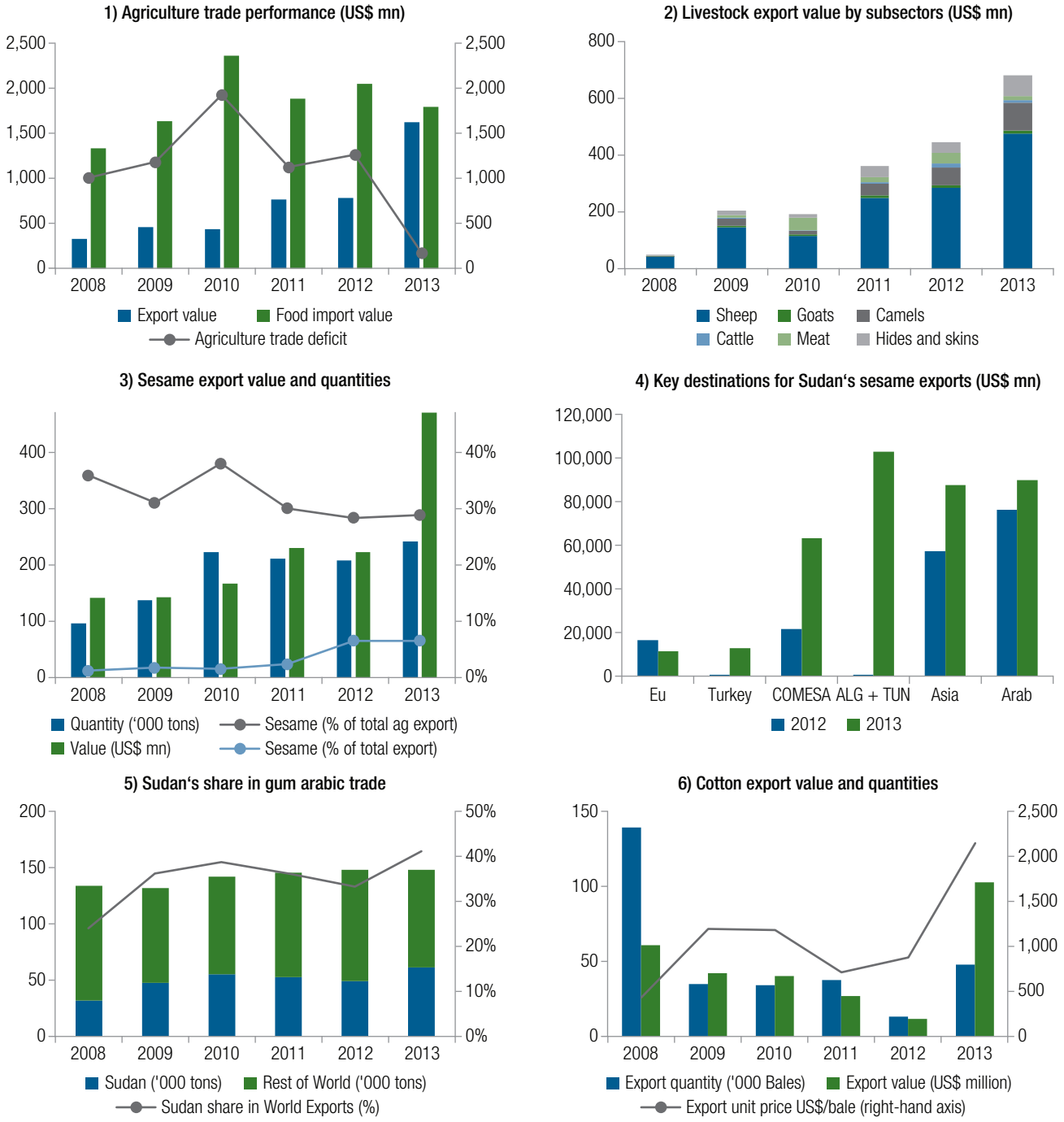
Sudan exports about two thirds of its sesame production, and is among the main exporters of sesame seeds worldwide. Sesame exports in 2008–2013 accounted for about 32 percent of agricultural exports and about 3.3 percent of total export (Figure 3.4.3). Sesame exported from Sudan received favorable prices compared to other African exporting countries because of high quality and grading e.g., world prices declared by Sudan Trade Point in 2014 are US$2,135/ton for sesame from Sudan compared to US$2,050/ton for sesame from Ethiopia and US$1,900/ton for sesame from Nigeria.[41]

Sesame exporting, like any other oil seed, is a business dominated by large existing exporters; new entrants into the markets are facing real difficulties. Sesame accounts for about 50 percent of Sudan's oil seed exports. Looking at the World Bank's Exporter Dynamics Database shows that not only the number of entrants into oil seed exports declined between 2009 and 2012 but the entrants' share in total oil seeds exports also fell dramatically from 78 to 28 percent. This implies that entrants in 2012 were fewer and substantially smaller than in 2009. This indicates—similar to the livestock sector—that new entrants may find it difficult to enter the market, possibly due to market entry barriers and costs associated with getting into the oil seed and sesame export business.

Sudan's export markets for sesame are relatively well diversified and Ethiopia may be considered the major competitor for Sudan (for exports of African sesame producers). Sudanese sesame has penetrated China, Europe, and African countries as well as traditional markets in the Gulf and Arab countries (Figure 3.4.4). Gulf and Arab

[41] The Sudanese sesame crop is distinguished for its high quality compared to the sesame produced by other countries due to the country's suitable environment and climate. Sudanese sesame seeds are characterized by higher oil content and less acidity.

FIGURE 3.4: Sudan's Agriculture Exports: Livestock, Sesame, Gum Arabic, Wheat and Cotton



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; the Sudan Ministry of Agriculture and Irrigation; the Gum Arabic Council; and UNCTAD.

countries are the major importers of sesame from Sudan with a share of more than 34 percent in 2012, followed by China with a share of 25 percent.

The marketing of oilseeds from farm gate to the final consumer depends on the Sudanese state of origin. Sesame is produced in different qualities

and can be sold as grain (usually white sesame) or crushed for oil (usually produced from the lower quality red sesame). For sesame produced in Sennar, and in North Kordofan, the majority of sesame growers sell their seeds within two or three weeks after harvest to an assembler or village collector who is also often a trader. Only a small portion of sesame growers (large commercial farmers) have storage facilities and can wait for better prices. The village collector then sells the seeds to local processors of sweet sesame paste (Tahania) or to traditional local oil processors. The rest of the sesame seeds are delivered to auction markets where traders buy the seeds to sell it either to the export market or to local oil and paste processors, or producers of livestock cake. The processed products[42] are sold to the wholesalers or retailers before reaching domestic consumers.

Sesame farmers receive about 78 percent of the final FOB export price. In Gadarefe the sesame farmers receive about 78 percent of the final FOB export price if they sell to local village assemblers. The major marketing costs between "farm gate" and the export point at Port Sudan consist of transport costs (28 percent), various certificate fees (5.2 percent), state tax (1.8 percent), and port charges (3.2 percent). The handling costs at Port Sudan and Gadarefe are about 18 percent of all marketing costs.[43]

The buying prices at the central market are very high, allowing farmers to receive about 93 percent of the final FOB export price, and reduce exporter return to only 2.4 percent. This is a very specific feature of the Sudanese market, which potentially affects the overall competitiveness of Sudanese sesame in the world markets. Imagine a situation where the buying price at the central market increases by 5 percent above the current level. This would then exceed FOB price valued at the official exchange rate (SDG5.9/US$, at time of 2014 fact finding), hence, negative net return for exporter. However, the sesame exporters can compensate lower net return by using part of foreign exchange to import other commodities into Sudan.

Gum arabic exports

Gum arabic falls under the trade embargo imposed by the U.S. sanctions, but trade with it is possible through a specific license (World Bank 2015a). While gum arabic is not covered by either an exemption or general license, American companies wishing to import gum arabic from *Sudan* can apply for a specific license. In November 2000, Congress adopted legislation to require the Secretary of the Treasury to consider approving licenses for the import of gum arabic from Sudan. As a result, Gum arabic became an exception to the comprehensive trade restrictions imposed by the United States Executive Branch.

Gum arabic exports performed strongly between 2008 and 2013. Figure 3.4.5 shows the good gum arabic export values and quantities since 2008. This was mainly because of increased domestic production stimulated by reform measures (liberalization of gum arabic market and removal of monopoly) adopted by the Government, and also the increase in local processing of gum arabic. The sharp increase in gum arabic export in 2013 was due largely to the boost in domestic production as a result of a good rainy season and expanded production and export finance, better world prices and promotion efforts exerted by the Gum Arabic Board via participation in international fairs and membership in the AIPG.

The market for gum arabic trade is dominated by a few countries. The European Union is the biggest importer of gum arabic with France, Germany and UK as major importers and re-exporters of processed gum arabic. The United States is the second large importer of gum arabic followed by Japan. There are emerging new markets for gum arabic in India, China and South Korea. In 2012,

[42] Local processors (*asarat)* that cater to local needs are found in different regions and states. The rural population usually prefers the sesame oil from local sesame processors, because of its higher quality.
[43] World Bank staff were able to partly analyze the supply value chain for sesame produced in Gadarefe and numbers reported here are from this (incomplete) analysis.

France was by far the main importer of gum arabic from Sudan with a share of more than 30 percent (33.6 percent) followed by India 7 percent, Italy 6.6 percent and United States of America 6 percent (Central Bank of Sudan, Annual Report 2012). There are other small importing countries of gum arabic distributed between Arab countries (Saudi Arabia, Emirates), Asian countries (Pakistan) and African countries (Egypt and Algeria).

For decades export marketing of gum arabic was under the sole responsibility of the monopolized Gum Arabic Company. From 1969 to 2009 the Gum Arabic Company (GAC) had the sole concession to export raw gum arabic. The main role of the GAC was to preserve and monitor the quality of raw gum arabic exported and to support producers with production and extension services. The GAC had implemented a floor price system for gum at buying centers (auctions). However, the monopoly of the GAC in gum arabic trade was widely regarded as the main reason behind the deterioration of gum arabic production and export in Sudan. Over many years, the low prices paid to producers (about 10–15 percent of export price) accompanied by poor support services led farmers to cultivate crops other than gum arabic. The GAC also faced administrative problems that led to inadequate international promotion and marketing of gum arabic. In addition there were other factors outside the company such as low involvement of banks in the gum arabic trade, multiplied fees and taxes, and lack of strategic stocks.

A decision was made in 2009 liberalizing the gum arabic trade and removing the concession that granted monopolistic power to the GAC. This bold move by the government liberalized the marketing and export of raw gum arabic. The floor price system was also suspended. Meanwhile, a decision was taken to establish the Gum Arabic Board (GAB) to coordinate reform measures and support the revival efforts of the gum arabic sector. The main objectives of the GAB were somewhat similar to the former GAC, but without monopoly power or concession. Since then, GAB is responsible for promotion of gum arabic export, opening new markets, and providing finance services and quality control. The adopted reform measures have had positive impacts on improvement of production, prices, and income of gum producers as many taxes and charges imposed on gum arabic have been abolished (about 13 out of the 18 taxes and charges) (World Bank 2013c).

As a result, gum arabic trade, production, export and domestic prices were greatly enhanced after 2009. Liberalization has led to an increase in production, export, and domestic prices (Figures 2.3.5 and 2.4.6). Looking at the value chain for gum arabic marketing from El Obeid to Port Sudan in 2012 is informative. In 2012, gum arabic producers received about 84 percent of the final FOB export price if sold at central market (auctions). The major marketing costs from El Obeid to the export point at Port Sudan consist of transport costs (48 percent), fees (19 percent), and port charges (23 percent). These cost ratios have been declining since 2009 as suggested by anecdotal evidence. As a result, there is an improvement in the ratio of buying prices to the FOB prices reflecting higher prices at auctions, which has a favorable impact on producers.

Cotton exports

The share of cotton in agricultural export sharply declined from 15 percent in 2008 to only 1.5 percent in 2012, but 2013 saw a sharp recovery. This is a result of a decrease in quantity exported from 139 thousand bales to only 13.4 thousand bales in 2012, despite improvement of world prices (Figure 3.4.6). In 2013, the cotton export largely recovered. But only short- and medium-staple cotton is exported despite the fact that Sudan in the past was famous in production and export of extra-long staple cotton. The sharp decline in export is due mainly to a reduction in area and production of cotton, especially in the Gezira Scheme. The deterioration of cotton production and export has led to loss of traditional markets for Sudan's cotton, especially Europe. Sudan's current markets for cotton are concentrated in a few countries

especially China and Egypt with a 2013 import share of 33 and 19 percent respectively.

Similar to the marketing of gum arabic, cotton marketing was in the sole hands of one state-owned entity—the Cotton Public Corporation (CPC)—for many decades. CPC was established in 1970 to undertake marketing of all cotton produced in Sudan. In 1986 CPC was closed and the Sudan Cotton Company Ltd (SCCL) was formed. In 1993 the ownership structure of SCCL was changed to let some private influence in, but the Government remained in charge. The then-new mixed shareholders were made up of the Ministry of Finance, cotton farmer groups from the Gezira, Rahad, and New Halfa irrigation schemes, the Sudan Pension Fund, and the Farmers' Commercial Bank.

But the role of central marketing in cotton exports is declining and the influence of market pricing has become stronger since 2011. Almost all cotton grown under irrigation over the last 35 years has been sold on the world market by the Sudan Cotton Company or its predecessors. This marketing mechanism meant that prices received by cotton farmers in irrigated schemes were usually one uniform price for each variety, after costs of handling, ginning and marketing had been subtracted. But pricing policies have now changed and cotton producers are paid on delivery at the "farm gate" according to grade and type of cotton. There were two triggers for this policy change: 1) the deterioration of cotton production; and 2) the changing environment of production relations especially in the Gezira Scheme. At the same time, the infrastructure of the cotton industry is largely diminished e.g., the number of spinning factories is estimated to be 15, only five of which are working, and there are 17 textile factories, of which only one or two are working.

Agriculture imports and attempts for import substitution

Sudan's food consumption pattern has undergone a profound shift over the past decades, away from sorghum and millet to wheat, often imported. This has led to a significant increase in wheat imports, in quantity and value (Figure 3.5.1). Sudan imported 1.9 million tons of wheat on average during 2008–2013 with average value of US$829 million representing about 43 percent of total food imports. Wheat imports have exerted a heavy burden on Sudan's meager and deteriorating foreign exchange resources and have worsened its negative trade balance.

In response, the government of Sudan promotes domestic wheat production to reduce the reliance on imported food and to reduce expenditures on wheat imports.[44] See Box 3.4 for a discussion of the interlinkages between food security, wheat self-sufficiency, and grain storage. The government also indirectly subsidizes wheat imports through using the official exchange rate (SDG2.9/US$) which is much lower than the official rate (SDG5.9/US$), let alone the black market rate (between SDG8–9/US$). However, the current Government policy is intending to gradually remove the subsidy and exchange rate distortions from imported wheat, which may increase prices and reduce consumption.

The gradual phasing out of wheat subsidies considered by the Government is a good first step. World Bank (2015b) finds that the Government is not (yet) fully prepared to seize its policies in support of the wheat sector. While the ultimate goal should be to discontinue all subsidies for wheat in place and let the market decide whether wheat production is efficient in Sudan, an initial compromise may be needed. To this end, this study follows World Bank (2015b) in its recommendation to first shift the focus of subsidies on domestically produced wheat and then, second, to gradually reduce the extent of subsidies on domestic production.

Sudan currently pays too high a price for wheat imports and there are indications that by changing the import sources the government

[44] See, for instance, the 3-Year Salvation program set-up in 2012.

BOX 3.4: Food Security, Wheat Self-Sufficiency, and State-Level Grain Storage

Over much of the past decade, common discussions about food security in Sudan have conflated the concept that wheat self-sufficiency adds to food security. However, the reality is that the two concepts do not have much to do with each other. Examples from other countries are illustrative: *First*, Jordan produces virtually no grain at all, and yet has a high degree of food security, due to a substantial volume of modern storage (silos) distributed around the country, and efficient and transparent procurement of grain from the cheapest sources on the world market. *Second*, Indonesia has long considered itself food insecure, despite the fact that it is the third largest producer in the world of its staple grain (43 million tons of rice).

Sudan consumers have changed their taste of grain and shifted to an emphasis on wheat. This gradual shift is taking place from the traditional dryland crops of sorghum and millet to wheat. In 2001 grain consumption per capita was 140 kg: 90 kg of sorghum, 10 kg of millet, and 40 kg of wheat. Now it is closer to 96 kg of sorghum (plus about 10 percent for animal feed) and 54 kg of wheat. Since wheat production has declined, there is now a noticeable gap between production and consumption, which must be filled by 1.7 million tons of wheat imports. Actually, Sudan was 24 percent self-sufficient in wheat in the 1980s, 49 percent in the 1990s, and reverted to 25 percent in the 2000s (Data from the Sudan Ministry of Agriculture and Irrigation).

Consumers continue to change their taste (and demand) and grain consumption patterns may be significantly different again over the next decade. Assuming that the change in taste of the population is permanent, changing the cropping pattern will be a long gradual process, and indeed may only be partial. So the shift in production will not provide increased security for perhaps 10 years, and perhaps never in total.

The greater part of current modern storage available now in Sudan is for wheat, not for sorghum and millet. In fact, current storage is usually either attached to flour mills or owned by flour millers at Port Sudan. The nature of the current grain storage is rather short-term, perhaps a week or two of buffer supplies between arrival of trucks, trains, and ships, and slow steady progress of the mills. Table 3.2 provides an overview of the known modern storages of Sudan.

Current wheat storage capabilities exceed millet and sorghum and are in the range of two months of wheat consumption. Yet, since the wheat stores are fully private and are dedicated to the milling of flour for the various companies their effect as strategic storages is limited. Still, they represent the equivalent of over two months of current consumption. Compare this with the government's stores of sorghum and millet, which only represent 20 days of consumption of those two commodities. Much more, they are all in the far eastern part of the country, whereas consumption is mainly in the west.

Sudan today is more secure in wheat than in sorghum and millet. So food security does not reflect the fact that the wheat stocks are mainly imported, and the sorghum and millet are mainly produced domestically. The private sector as noted above is already carrying the capacity for 69 days of reserves of wheat, and it may be prudent to let this continue at no cost to the government. But there would be a need to add a more strategic look at the current storage. The difficult case involves the traditional crops, where only perhaps 20 days of modern reserves exist. This would be extremely expensive to raise to international levels, indeed even just to two months' reserves status. Both capacity and stock of 490,000 tons would be required, as two months demand would be 740,000 tons in total, 490,000 more than now exist. At a minimum of US$220/ton for new capacity, this would be over US$100 million for new silos, and probably the same amount for the required sorghum. It is not clear that Sudan will soon have such investment funds for this purpose.

Although a full-fledged national reserve system for all of Sudan's residents may not be affordable at present an intermediate approach to introduce more storage could be designed.

- To begin with a focus on the more vulnerable areas, perhaps in the west, could be selected to balance the current preponderance of facilities in the east (Port Sudan, Gedaref, etc.).
- Then one could basically design a modern storage facility with the following credentials: Construct a 50,000 ton standard facility, designed for unloading and loading trucks up to about 25 tons. Assuming a generous daily ration of grain of 1/2 kg per day per

Table 3.2: Modern Grain Storage in Sudan, 2013

	Wheat	Sorghum	Millet
Dal Group Port Sudan Silos	240,000 tons		
Port Sudan Silos	50,000 tons		
Flour mills (8) Silos	140,000 tons		
Gadarif Silos	100,000 tons		
New Gadarif Silos	100,000 tons	380,000tons	250,000 tons

Source: World Bank staff estimates, based on data from Dal Group; and the Sudan Ministry of Agriculture and Irrigation.

(continued on next page)

BOX 3.4: Food Security, Wheat Self-Sufficiency, and State-Level Grain Storage (*continued*)

person, the facility's 50 million kg of grain would cover 100 million days rations. If one assumes a ration period of 14 days, or at least until ships could arrive from other countries, unload, and have new grain distributed around the country, then this silo could serve 7 million people, or perhaps two states.

- At US$220/ton of new capacity, and US$220/ton of sorghum, this facility could be built and filled for about US$22 million.
- With proper fumigation and ventilation (all modern silos have these capabilities), the grain would last a very long time safely. However, if normal operations did not move the grain within perhaps six months, and to make sure to keep mechanical systems (and worker skills) up to par, long-term deals with local traders could be made, which would constantly refill the bins as they emptied.

Apart from capital cost there is no anticipated significant other cost to be budgeted for the silos. As running costs of such silos are low, and the silo operation has a real opportunity to make a small profit when buying low (e.g., right after harvest) and selling high, it would be assumed that virtually no budget funds would be allocated after establishment. If the first regional reserve established a good track record, the government could add others, benefiting region after region, gradually creating a national system of food security.

Operation of the silos could have the following features to maximize the impact of the proposed system: (1) Each silo would be in business for itself, perhaps with a bonus system through which staff could legitimately earn a small share of the profit. (2) As staff would be entrusted with a substantial amount (up to US$11 million) of liquid assets, and as those assets are meant for emergency situations, there would be random lightning audits of their contents. (3) There would be regulations of minimum levels, say 30,000 tons right before regional harvest, but then silos would be expected to fill up and stay full. This is feasible for a truck-served silo, rather than a port one, which needs to achieve empty space before arrival of a 50,000 ton ship to avoid demurrage. The key point here is to create space at harvest time, to maximize impact on (slightly) raising harvest prices for the farmers. Similarly, the silo could reduce peak prices to consumers shortly before harvest.

could reduce the price paid significantly. Wheat imports are being carried out primarily through flourmill companies. Examples are SAYGA, Weita, and Seen. The main exporting countries of wheat to Sudan are now Australia, Canada, Germany, and more recently India (Figure 3.5.2). The cost of wheat imports could be significantly reduced if Sudan imports wheat from other cheaper sources such as Argentina, Russia, Kazakhstan, and the U.S. (Figure 3.5.3).

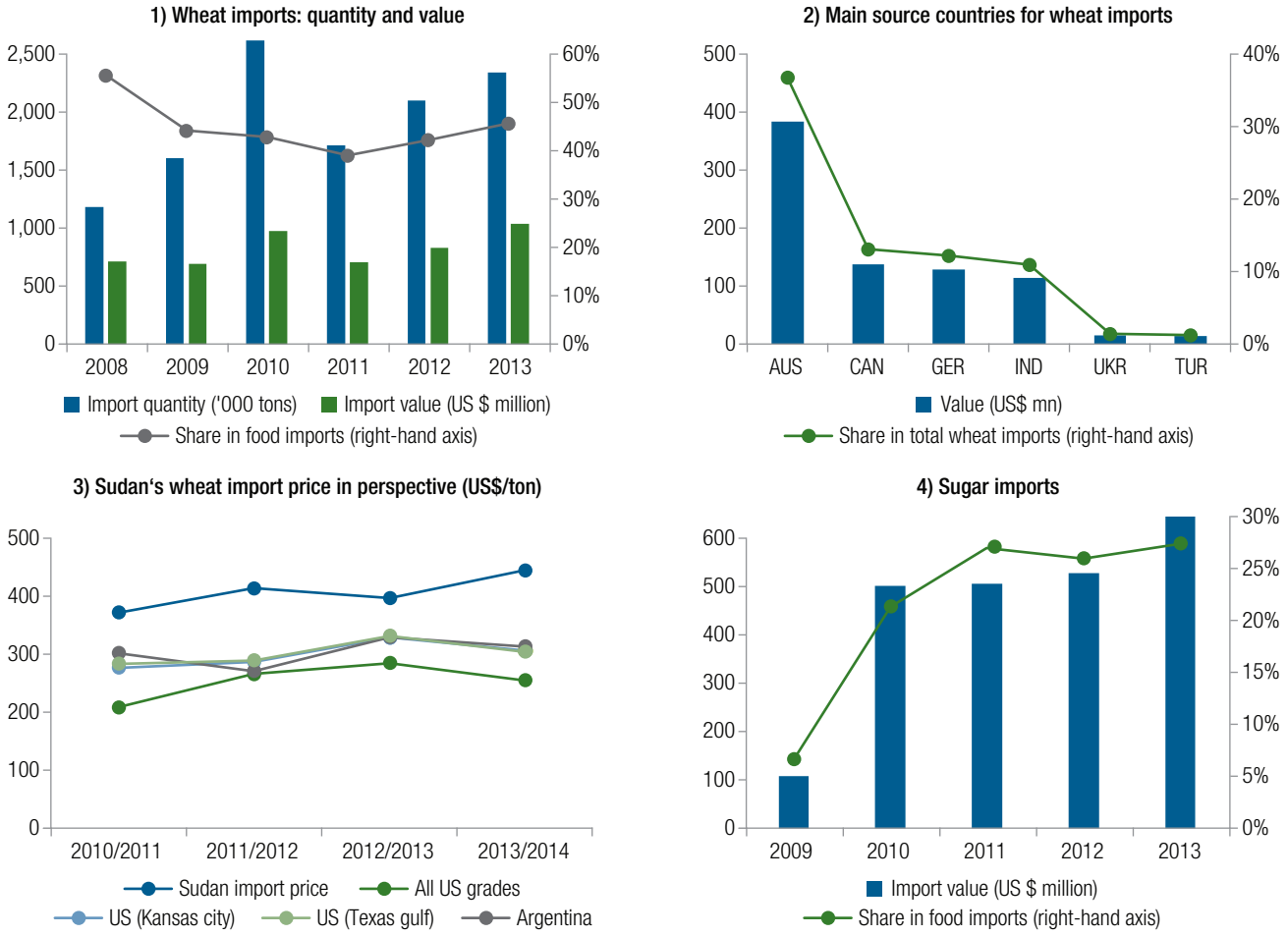
Sugar is another important food item for Sudan. Figure 3.5.4 shows the development of sugar imports over the period 2008 to 2013. There is an increasing trend of sugar imports during the last five years: from US$108.9 million in 2009 with 6.6 percent share in total food imports to more than US$645 million in 2013 with a 27 percent share of food imports. This sharp increase naturally seems due to the increase of local consumption of sugar.[45]

It is government policy to boost domestic production of sugar to achieve self-sufficiency and become a sugar exporter.[46] Sudan is actually already one of the biggest African producers of sugar with average production of 700 thousand tons. Sugar in Sudan is produced in six sugar factories, four publicly owned (Sennar, Elgoneid, Assalya, and New Halfa Sugar companies) and two joint venture (Kenana and White Nile Sugar Co). The gap in domestic sugar supply in Sudan on average is about 600 thousand tons per year. Total consumption is about 1.3 million tons in any given year.

The goal of self-sufficiency in wheat and sugar to reduce imports is problematic. Foremost is the argument that the opportunity cost of producing wheat and sugar are very high. They in fact compete for the same limited irrigated land (e.g., two million ha) near the Nile, where farmers also grow the more traditional crops, such as sorghum. In fact, anecdotal evidence suggests that farmers know the wheat and sugar crops quite well but they have walked away from producing them over time because there is little profit to make in those crops under current

[45] Sudanese people consume about 33kg per capita per year, a little less than the average citizen of the EU (38 kg/cap) (World Sugar Council).
[46] See, for instance, the 3-Year Salvation program set-up in 2012.

FIGURE 3.5: Sudan's Agriculture Imports: Wheat and Sugar



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan; the Sudan Ministry of Agriculture and Irrigation; and the United States Department of Agriculture (USDA).

conditions. Low yields in wheat are particularly pronounced. On the other hand, sugar is a cheap, low profit crop, and almost all sugar-procuring countries offer some sort of protection to their sugar industry. To be able to compete on the world market, hence, Sudan would likely also have to offer similar levels of protection (World Bank 2014g).

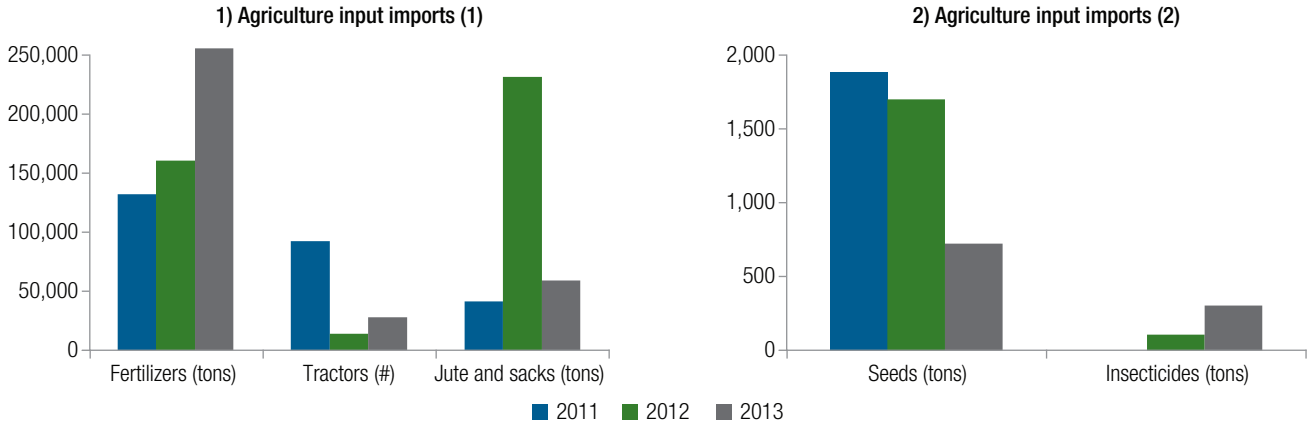
D. Agricultural Support

Agricultural inputs

Availability and access to agricultural inputs is largely considered one of the main factors affecting productivity, profitability, and competitiveness of agricultural production. Inputs are products such as seeds, fertilizer, pesticides, machinery, and post-harvest material like packaging. The supply of agricultural inputs depends on the extent that there is a market for such products and the degree of government involvement. The current government policy on agricultural inputs in Sudan is to exempt them from custom duties and use of the official exchange rate for their imports, which is a form of indirect subsidy as there is a definite gap between official, commercial, and parallel market rates.

The supply of agricultural inputs is organized mainly through the Agriculture Bank of

FIGURE 3.6: Sudan's Agriculture Input Imports



Source: World Bank staff own calculations, based on data from the Central Bank of Sudan.

Sudan (ABS) and the private sector. The federal Ministry of Agriculture and Irrigation is responsible for qualifying companies for agricultural inputs imports through tenders. The Ministry also provides services to the farmers through an extension unit, and a subsidy to the small traditional rain-fed farmers (in kind), and is responsible for setting agricultural standards for imported and exported commodities through its Plant Quarantine Department.

The import of fertilizers, tractors and jute and sacks constitute the major part of imported input value for agriculture inputs. While there are many seasonal effects playing a role in agriculture input imports, there is a trend emerging for increased fertilizer inputs (Figures 3.6.1 and 3.6.2). This is a positive sign given that fertilizer usage is among the lowest in the world and urgently needed to increase yields in the sector (see Section B of this chapter).

The irrigated sector makes the most use of improved seed. Local seed, either kept from the previous year or bought from local markets, is the main seed source outside the irrigated sector; such seed, comprising second generations of improved varieties, is marketed without quality control other than local knowledge of source. Some improved seeds are used in the rain-fed sector, notably in Blue Nile State.

Improved seed technology is essential for bridging the gap between yields in demonstration trials and farmers' fields. In this regard, the Federal Ministry of Agriculture and Irrigation distributed about 3.9 thousand tons of improved seeds, mainly sorghum, millet, groundnuts, and vegetables in different states in 2012, in addition to 1,500 tons provided by the FAO. Until recently, seed production and certification were handled by the central government through the Seed Unit of the Extension Department in the Ministry of Agriculture and Irrigation. National seed production was limited to field crops, while horticultural crop seeds were usually imported. In a move to improve production of good quality seed and boost the use of improved seed, the Arab Sudanese Seed Company was formed through public-private partnership. The government donated physical assets and has a share of 42 percent of the company's capital. The remainder was financed by the Arab Authority for Agricultural Investment and Development (AAAID).

Among the main constraints for providing agriculture inputs in Sudan are the fact that the market is distorted and there is a shortage of storage capacity. Many constraints face agricultural input supply in Sudan, some of them are the following: *First*, the distorted agricultural inputs

market. One factor is the exchange rate policy because part of agricultural inputs are imported at official exchange rates (SDG2.9/US$) through the ABS and part at other adopted exchange rates (SDG5.9/US$) through the private sector. Also, shortage of supply and improper timing of delivery, accompanied by low quality and standards, lead to other distortions. The private company involved in the import of agriculture inputs gets the authorization through bids controlled by the Ministry of Agriculture and Irrigation. Due to a lack of transparency, real or perceived, this has resulted in importing lower quality inputs, as happened in season 2012/13 when imported wheat seeds had a low or zero germination rate in some places. *Second*, the widespread use of deferred payment options increases the cost. *Third*, there is a real shortage of storage capacity and unspecialized input stores. *Fourth*, the very low local production of inputs (for example the local production of seeds covers only 10 percent of domestic needs). And *fifth*, delay of inputs supply, lack of substitutes, and high insurance cost.

Agricultural Research

Agricultural research, which is the responsibility of the central government, has been underfunded for decades. The annual budget allocated to Agricultural Research Corporation (ARC), the Animal Resources Research Corporation (ARRC) and universities is only about 0.3 percent of GDP. This level of funding has proven to be totally inadequate for a country that is so heavily dependent on agriculture. In fact, Sudan spends significantly less per unit of value of agricultural output on agricultural research than the average of African countries or developing countries as a group. The limited budget has resulted in a decline in staff numbers, reduced resources for funding research activities in the field, and a deterioration of the research facilities because of a lack of maintenance.

The allocation of resources across various lines of research is primarily a policy decision. In 2008, 28 percent of Sudan's agricultural researchers were involved in crop research, 25 percent in livestock research, and 8 percent for forestry and natural resources (El-Siddig and Stads 2010). The remaining researchers concentrated on postharvest, socioeconomic, fisheries, and water and irrigation research, or other matters. Horticultural crops are the most researched crops in Sudan, accounting for 10 percent of the country's total crop and livestock research. Sorghum accounted for 7 percent, and cotton, legumes, oil crops, and wheat for 5 percent each. Sudan's research on rain-fed crops is relatively understaffed compared with research on irrigated crops (El-Siddig and Stads 2010).

The Agricultural Research Corporation (ARC) is, in addition to the universities, the principal research arm of the government for agriculture. Despite difficulties, ARC still has a staff of 446 researchers (170 PhD), 13 national programs, 48 subprograms, 120 research projects, 10 research centers, 3 research units, 25 research stations and 54 laboratories. The ARC over the last year invented, implemented, and tested a number of technologies dealing with land preparation, irrigation, cultural practices, plant nutrition, pest control, agricultural engineering, range and pasture and others. More recently the ARC released high yielding sorghum varieties and breeds for heat tolerant wheat. However, few of these technologies and the many other technologies already "on the shelf" have been tested under field conditions.

The current arrangement of fully designating agricultural and livestock research to the Ministry of Science and Technology needs to be revisited. Institutional reform in agricultural research is required. Responsibilities of the Ministry of Science and Technology should be confined to policy coordination and frontier research, while the functional responsibility is to be designated to the relevant ministries. Coordination between the agricultural research institutions is very weak. A

closer collaboration between these research institutions can be achieved through the establishment of the National Agricultural Research Systems (NARS), an umbrella which determines research themes to be carried out by ARC, ARRC, universities and other relevant research institutes. This should lead to a more efficient use of resources and more relevant technology outcomes, which will in turn increase growth and development of the agricultural sector.

Extension services

Agricultural extension services in Sudan are provided by the government through the Ministry of Agriculture and Irrigation and the Ministry of Livestock and Fisheries. Increasing agricultural productivity requires extension services to be improved. Given the fiscal constraints facing the Government it is recommended that private companies selling inputs (seeds, fertilizers) and major marketing/buying companies be encouraged to deliver technical advice through extension services and the increased use of contract farming.

The Technology Transfer and Extension Administration (TTEA) is responsible body for agriculture extension services. The objectives of TTEA include: the development of agriculture, improvement in the production quality, enhancement of farmers' income through rational exploitation of natural resources, comprehensive human prosperity via profitable, sustainable agriculture, and making agricultural products competitive in international markets with the aim of assuring food security and increasing agricultural revenues. TTEA has four main thematic programs: improving crop productivity, promotion of improved seeds, integrated mechanization, and rural women development. The TTEA established administration networks in the state ministries responsible for agriculture and worked closely with the states, ARC, and universities to facilitate the transfer of technology to farmers. The TTEA also maintains a Technology Transfer Center and relevant Stations whose mandate is to transfer technical information to stakeholders including farmers.

The government delivery of Livestock and Fishery extension services do not appear to be contributing to significant increases in productivity. For livestock extension services, the General Directorate of Extension, Technology Transfer and Pastoralists' Development is responsible for extension matters related to livestock owners, pastoralists, and fishermen. The Directorate runs its grassroots programs based on the needs of pastoralists, animal owners, producers, and fishermen. It develops strategies and programs of animal resources sector that concentrates on livestock, and trans-boundary and zoonotic disease control, in addition to the promotion of animal production and fisheries.

There is a need to do a better job of involving the private sector in the delivery of extension services. In addition to the Federal Government, state Ministries of Agriculture and state Ministries of Livestock and Fisheries[47] also provide extension services. Some universities make a contribution to extension mainly through training. Examples include the Extension and Rural Development Department at Sudan University of Science and Technology and Department of Agricultural Extension and Rural Development at University of Khartoum. Famer based organizations, including the Farmer Union and the Pastoralist Union, play key roles in farmer-to-farmer extension activities, influencing extension policy, assessing extension performance, and helping in setting extension priorities. Extension services remain weak and more attention needs to be given to using "tried and tested" approaches with well-trained professionals, including the private sector.

[47] In some states, both ministries have been merged to form a single ministry

4 GOODS AND SERVICES TRADE TO BUILD ENDOWMENTS

A. Goods Trade

Sudan has a revealed comparative advantage (RCA) in agriculture, meat and dairy, and seafood, as well as in extractive industries. Although the EU was once the main trading partner, the share of Sudanese exports destined to the EU has declined significantly over the past 15 years. At the same time, China has experienced a spectacular increase in its share of Sudanese exports since 2000. Sudan's export basket is very concentrated, as shown the large shares of its top three and five export products, but the degree of product concentration decreases when looking at non-oil export. The lack of product diversification of Sudanese exports also stands out when compared to peer countries, as evidenced by its comparatively much higher Herfindahl-Hirschman index. The diversification of Sudan across destination markets is low, and has remained approximately constant. A few multi-product multi-destination exporters typically amass the majority of total exports in a country, but less so in developing countries; this is also the case in Sudan.

Services and trade-in-services have an important role in economic diversification. But Sudan's share of services Value Added (VA) in GDP is lower than expected for a country at its level of development. Services export growth remains below that of goods exports and GDP growth. Sudan registers more dynamic growth rates for other commercial services exports than for exports of travel or transport services, a fact that suggests the existence of some modern services. But Sudan's services imports are undiversified in nature. Ensuring efficient access to a wide range of services is a key determinant in international competitiveness and efficiency.

Diversification today needs to consider the changed competitiveness over time of products Sudan once produced. And there are a variety of products, including manufactured exports, which Sudan has exported in significant quantities in the recent past, or in small quantities today. In addition, there are ten "emerging champions." products, which are now being competitively exported from Sudan that were not so in the early 1990's. Gum arabic, one of Sudan's most well-known export product of agricultural origin, could serve as a starting point to showcase how to increase value-addition through both adding new processing steps into the value chain and increasing the value of the raw material through smart production-enhancing decisions. Reforms in services should focus on the development of framework conditions that facilitate the growth of professional services and address skills shortages and skills mismatches. In addition, regional integration and multilateral negotiations offer opportunities for implementing regulatory reforms and reducing the skill gap through services liberalization.

a. Overview

Export growth, base and size

Sudan enjoyed very strong growth of non-oil exports between 2008 and 2012, but this was largely driven by gold. In fact, Sudan's 2012 total non-oil exports were four times the level in 2008 (Figure 4.1.1). Sudan exhibits the fastest growth in total non-oil exports relative to its regional comparators Ethiopia, Tanzania, and Zambia. While this is a good development for Sudan, especially since the non-oil sector is in the spotlight with the 2011 secession of South Sudan, the rise of non-oil exports needs to be seen in the context of a very rapid rise of gold exports, especially in 2012 and 2013. This will be shown in subsequent sections of this chapter.

Sudan's number of non-oil exporters is significantly smaller than that of its comparators. This is even after controlling for income per capita, size, and time trends. Figure 4.1.1 shows that Sudan has, on average, substantially fewer non-oil exporters than all of its regional comparators. To account directly for country size, Figure 4.1.2 shows the numbers of exporters per 1,000 people and Sudan again appears as an underperformer in terms of the number of exporters per capita (Figure 4.1.3). Sudan experienced an important expansion, though, by 28 percent in the number of exporters from 2008 to 2009—from 660 to 846—(Figure 4.1.4). But between 2009 and 2012 the number of non-oil exporters declined again, despite Sudan's consistent total non-oil export growth over that period.

The average and median non-oil exporter in Sudan is relatively larger than in most regional benchmark countries. Still, the *average* size of exporters is not significantly different in Sudan (US$2.5 million) from countries like Cameroon (US$2 million) and Tanzania (US$1.6 million) (Figure 4.1.5). The *median* size of exporters, however, is much higher than most comparator countries in Africa (Figure 4.1.6). This relative difference between the average and median sizes suggests the existence of a skewed distribution of exporter size in Sudan, with a heavy presence of small firms combined with a few very large firms. Yet, this skew is less so than in other countries. Please also see the Sudan DTIS Update (World Bank 2014e), a parallel study to this Country Economic Memorandum that specifically analyzed trade and trade-related issues in the country. Box 4.1 provides a short snapshot of the main findings.

Departure of crude-oil exports after 2011

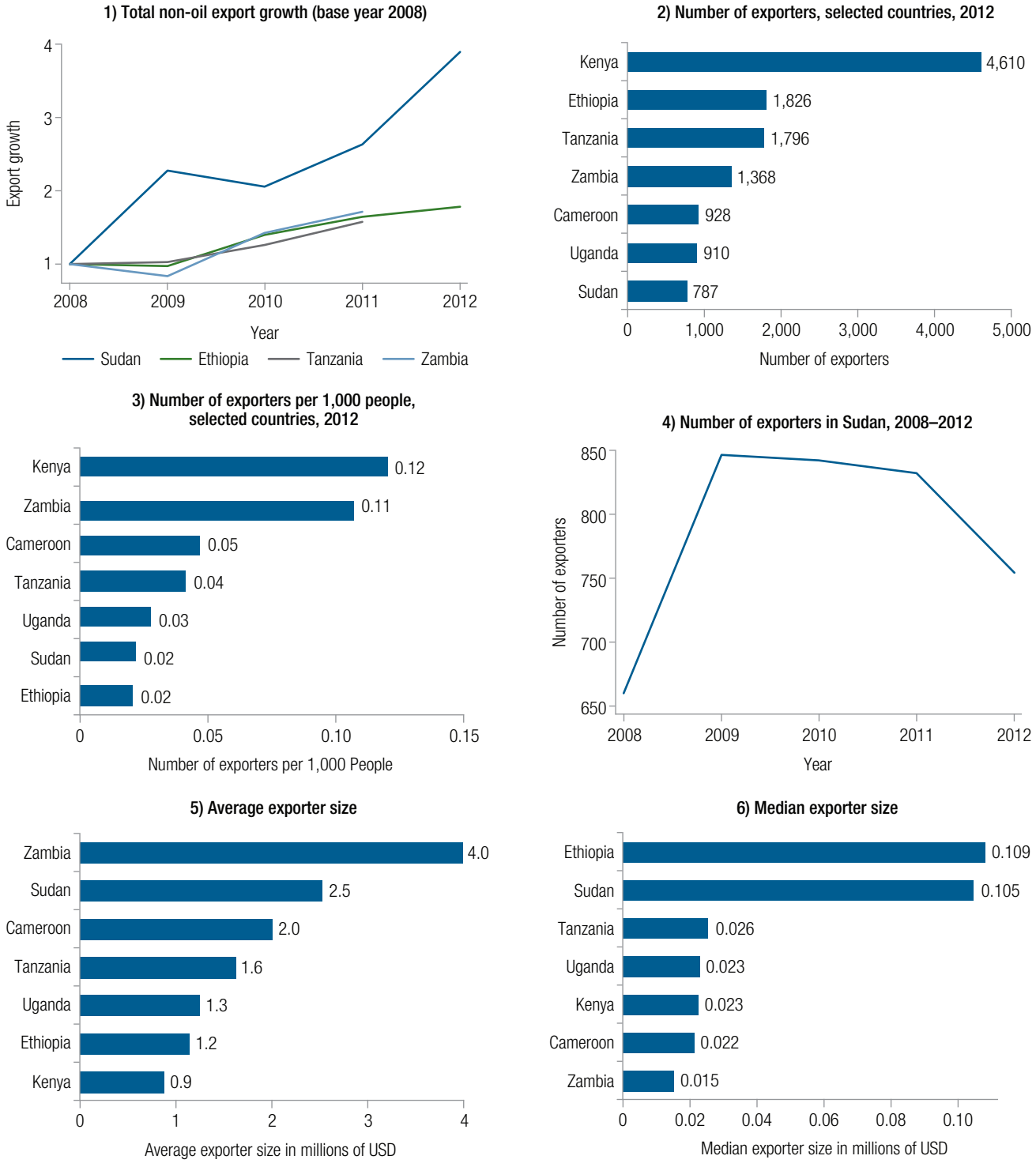
The secession of South Sudan in 2011 significantly and adversely affected exports[48] from both the North and the South, and both oil and non-oil exports. Non-oil exports of Sudan appear to have originated primarily from the North, and can thus be treated as comparable over a long period of time.[49] In 2012 and 2013, oil exports from Sudan and South Sudan together (red plus blue) fell significantly short of pre-partition levels, and in 2013 were still nearly 60 percent lower than those of united Sudan in 2011, but still recovering (Figure 4.2.1). Oil exports from Sudan in 2013 were nearly 80 percent lower than those reported for Sudan in 2011. In 2013, non-oil exports were also 52 percent lower than their 2011 peak.

Sudan's non-oil exports grew steadily through 2010, decreased slightly in 2010 and then picked up very rapidly in 2012 due to the

[48] Throughout this note, "exports" refers to exports of goods.

[49] Due to lack of reporter data for South Sudan (SSD), South Sudan is always represented through mirror data sourced from UN COMTRADE. The export data used for Sudan come from the mirror as well, except in the case of HS71 which includes gold, for which reporter data from Sudan was preferred. These include data for both "former Sudan (SDN)" and Sudan (SUD) in COMTRADE. The mirror is adopted for several reasons. First, for most years the mirror data are modestly larger, suggesting more complete coverage. Second, reporter data from Sudan is missing for several years (1996, 1997, 1998, 2007, and 2013). Reporter data are used for HS71, including gold, as these are more consistent with available data on Sudan's production of gold. Given that other countries report receiving very little imports from South Sudan except crude oil, one can reasonably attribute exports of other products to the region comprising present-day Sudan. For further discussion of the issues surrounding measurement of production and exports of oil and gold, see the sections of this document pertaining to those commodities.

FIGURE 4.1: Exporter Base and Size, Sudan and Selected other Countries



Source: World Bank staff own calculations, based on data used for the World Bank Exporter Dynamics Database.
Note: (2), (3), (5), and (6)—the following averages were used: 2008–2012 for Ethiopia and Sudan, 2007–2011 for Tanzania and Zambia, 2007–2010 for Botswana and Uganda, 2006–2009 for Kenya, and 2007–2009 for Cameroon.

BOX 4.1: Main Findings of the Sudan DTIS Update

The Diagnostic Trade Integration Study (DTIS) Update of 2014 identified priority Actions in support of the Government's commitment to increase trade and diversify the economy. The study built on the earlier 2008 DTIS by identifying the major factors holding back the increase of agricultural exports and economic diversification.

The DTIS Update found that high tariffs and other trade taxes on imports create incentives to produce for the domestic market and actively discriminate against exporters and potential exporters. But enabling exporters and potential exporters to obtain their inputs at internationally competitive prices would stimulate investment and growth and encourage diversification. Reducing trade costs and increasing trade represent the most powerful policy package available to the Government for reducing poverty and putting the economy back on a sustainable path.

The DTIS Update recommended to stimulate exports through the implementation of a package of (difficult) reforms that lower the barriers to trade through reducing trade taxation, simplifying border and regulatory policies, and improving transport and logistics. Concretely, the following key reforms were recommended to stimulate exports:

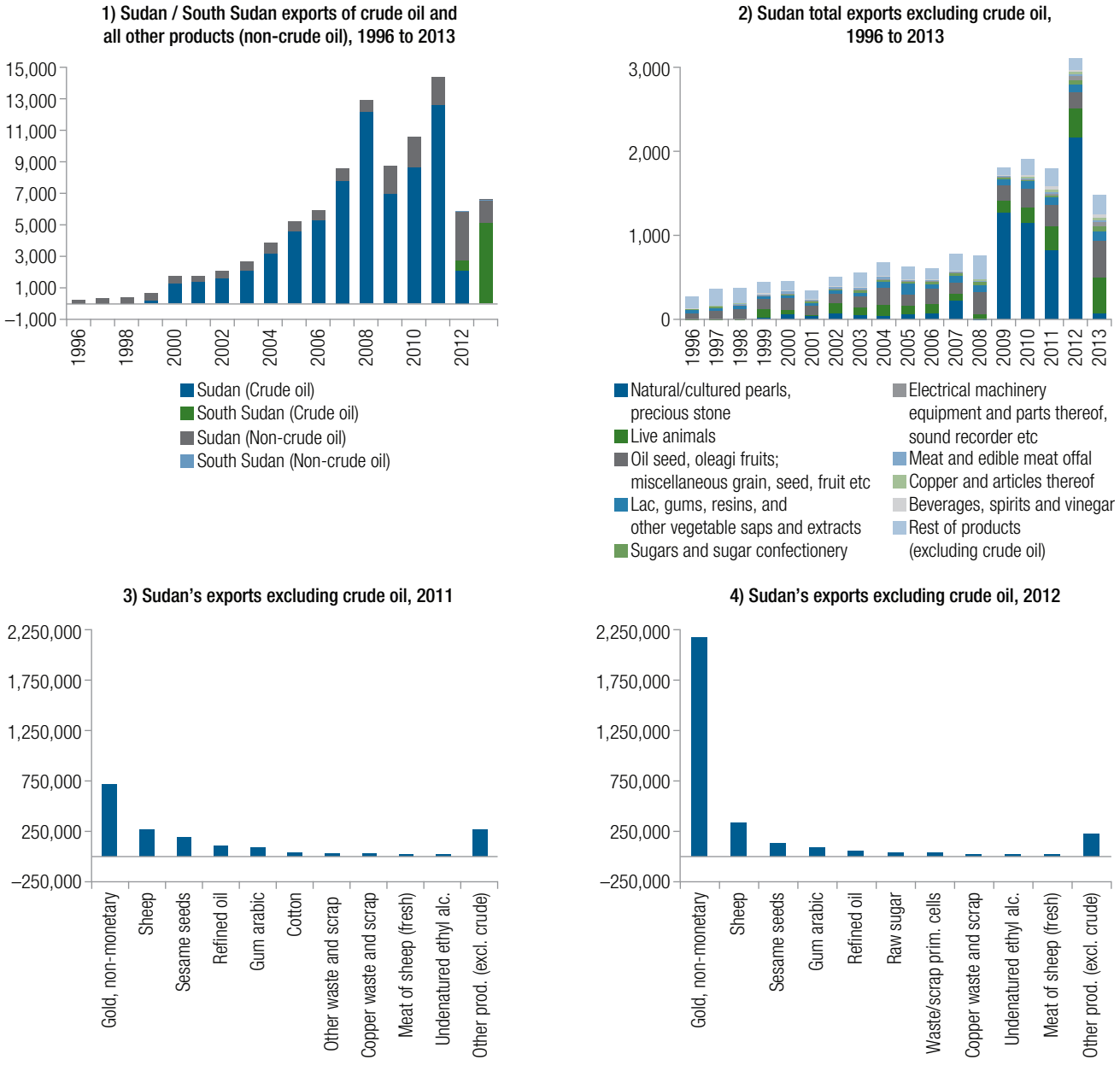
- **Revise trade policy to simplify the tariff schedule, reduce the proportion of peak tariffs, and adopt a transparent and well-publicized policy on eligibility for duty rebates**. The tariff schedule is characterized by a high proportion of peaks (15 percent and above), discriminatory excise duties and a Development Tax of 13 percent, which is a para-tariff. A comprehensive tax reform strategy that reduces reliance on trade taxation and promotes growth and investment should be revenue neutral and in many cases will results in increased government revenue.
- **Simplify and streamline border and regulatory policies**. Sudan imposes many Non-Tariff Measures (NTMs) that increase the price of imports and the ex-factory price of Sudanese products. Many of these result from the high proportion of products that are required to be tested for mandatory standards. The testing frequently duplicates tests already carried out by qualified laboratories in the country of origin. Reducing the number of mandatory standards and replacing them with voluntary standards should be a priority.
- **Modernize customs clearance procedures.** Multiple border agencies undertaking duplicative and redundant checking and repeated requests for the same information all serve to increase costs and reduce competitiveness. Prioritizing the establishment of a National Trade Portal will bring together all the information and forms required for moving goods across borders. It is a proven technique for reducing red tape and increasing transparency. Increased transparency regarding the correct application of trade policies and administrative procedures would increase the predictability of trade costs and transit times, making it easier for companies to integrate into regional and global value chains.
- **Reduce the price of transport and improve the quality of logistics services.** In the short term, improvements in road transport will bring the highest returns. Priority actions include ensuring 24/7 access to the dry port of Khartoum through either relocation or constructing a by-pass. Further investment in infrastructure along the Port Sudan-Khartoum route would increase safety and reduce delays. Modernizing the regulatory framework for logistics services will facilitate increased reliability and reduce transport prices.

Looking specifically at agriculture, the DTIS Update found that high input costs stemming from inefficient marketing and transport networks, and regulatory restrictions, all contribute to the observed low productivity underperformance of the sector. Sudan has the potential to be a major producer and exporter of agricultural products to their neighbors, traditional trading partners in the Middle East and globally. Despite the potential and recent positive growth the sector continues to underperform. Recent positive reforms in the policy environment, including the removal of the Gum Arabic Commodity Council monopoly, increasing the role of the private sector, privatizing previously state owned companies, and removing duties on agricultural inputs are all delivering results. The DTIS Update highlighted three areas where further reforms will reduce trade costs. These include streamlining the procedures for the registration of seeds and other agricultural inputs, removing the uncertainty over export licenses for staple crops (specifically sorghum), and improving productivity in the livestock sector.

Finally, the DTIS Update highlighted that Sudan has the opportunity to deliver significant growth in the tourist sector, but that this requires both supply- and demand-side measures. In the short run the DTIS Update recommended that the Government of Sudan sends a positive signal that it is open for tourism by reforming the Visa regime, lifting in-country bureaucratic procedures, and updating the National Tourism Plan. A comprehensive development strategy, on the other hand, would take several years to evolve and requires improvements in policy and planning, human resource development, transport access, and product development and marketing. The recently updated National Tourism Plan addresses these issues and provides a useful road map for raising the profile of the sector and mobilizing resources for implementation. Box 4.2. provides more details on the DTIS update analysis of the tourism sector.

Source: Excerpt from World Bank 2014e.

FIGURE 4.2: Sudan's Export Performance Overview



Source: World Bank staff own calculations, based on data from UN Comtrade.

expansion of gold.[50] Exports of gold increased abruptly in 2012 after the secession of South Sudan the previous year, accounting for most of the expansion of non-oil exports in 2012 (Figure 4.2.2). The share of crude oil and mineral fuels has been dropping steadily since 2008, when it peaked at 94 percent of total exports. Indeed, exports of gold were slightly higher than exports of fuels in 2012, this outcome being driven by the simultaneous drop in crude oil exports and the increase in those of non-monetary gold.

[50] This refers to HS Chapter 71 data from the Harmonized System (HS) of tariff nomenclature. Because Sudan has not yet reported export values for 2013, the figures corresponding to that year are all taken from the mirror, which in the case of HS Chapter 71 are likely to largely underestimate the real export value.

Comparing Sudan's export data (excluding crude oil) before and after the secession of South Sudan shows the main difference being the considerable rise of non-monetary gold in 2012. Figures 4.2.3 and 4.2.4 display Sudan's exports excluding crude oil, immediately before and after the secession of South Sudan. As can be readily seen, the top export products are roughly the same, as well as their export values, with only the exception of non-monetary gold, whose exports rise considerably in 2012. Other differences with 2011 data include moderate drops in the exports of sesame seeds and refined oil. At the same time exports of sheep expanded as well, consistent with the presentation in Chapter 3 of this report.

b. *Export orientation and growth*

Between 2007 and 2012, Sudan showed a revealed comparative advantage (RCA) in agriculture, meat and dairy, and seafood, as well as in extractive industries (Table 4.1). The lack of competitive advantages in other industries, together with the low complexity and value added of these product categories, points out to a structural weakness in the country's export performance. Also, the fact that both the share and the RCA of the category comprising agriculture, meat, dairy and seafood products increased between 2007 and 2012, at the same time that those of extractive industries decreased, reflects the drop in crude oil exports following the secession of South Sudan, which was partially compensated for by the rise in exports of non-monetary gold. Annex 6, Table 0.14 provides an additional more detailed analysis of the RCA at HS-6 level exports

The share of Sudanese exports destined to the European Union has declined significantly over the past 15 years. The EU used to receive more than half of the country's exports until 1998, which then abruptly dropped to very low percentages, staying below 10 percent since 2003, though it picked up slightly after 2011. The U.S., the rest of Europe and Central Asia, as well as the rest of the world, also decreased their shares as Sudan's export destinations between 1996 and 2013. Canada's share has been negligible until 2005 and is still very low since then, even though it increased substantially after the separation of South Sudan (Figure 4.3.1 and Table 4.2).

Table 4.1: Change in Sudan's Shares of Exports by Broad Productive Sectors, 2007–2012

	Sectors	(1) Exports 2007 (US$ '000)	(2) Share 2007 (%)	(3) RCA 2007	(4) Exports 2012 (US$ '000)	(5) Share 2012 (%)	(6) RCA 2012	(7) CAGR
1	Abriculture, meat and dairly, seafood (HS 1–10, 12–14)	350,292	4.08	1.09	691,607	13.23	4.89	14.57
2	Food, beverages, tobacco, wood, paper (HS11, 15–24, 44–48)	44,359	0.50	0.09	92,120	1.76	0.49	15.74
3	Extractive industries (HS 25–27, 68–71)	8,038,058	93.61	5.79	4,290,219	82.07	3.50	–11.80
4	Chemicals, plastics, rubber (HS 28–36, 38–40)	5,021	0.06	0.00	8,589	0.16	0.02	11.33
5	Textiles, apparel, leather, footwear (HS 41–42, 50–65)	71,782	0.84	0.15	30,799	0.59	0.19	–15.57
6	Iron, steel, and other metals (HS 26, 72–83)	50,368	0.59	0.06	55,389	1.06	0.21	1.92
7	Machinery, electronics, transportation equipment (HS 84–89)	20,644	0.24	0.01	56,293	1.08	0.05	22.22
8	Other industries (HS 37, 43, 49, 66–67, 90–97)	2,852	0.03	0.01	1,308	0.03	0.01	–14.43
9	HS 99	7,241	0.08	0.02	1,269	0.02	0.01	–29.41

Source: World Bank staff own calculations, based on data from UN Comtrade.

Table 4.2: Sudan's Total Exports Across Aggregate Destinations, 1996–2013

	DESTINATIONS								
Sudan's Total Exports (US$ '000)	EU28	Rest of Europe & Central Asia	China	Rest of Asia	MENA	USA	Canada	ROW	World
1996	144,379	8,040	38,483	55,467	43	19,635	65	4,113	270,225
1997	194,635	13,610	23,005	70,112	21,590	12,931	52	19,806	355,741
1998	208,384	15,584	1,467	90,987	36,701	3,350	429	15,489	372,391
1999	161,020	9,340	53,294	173,897	181,790	63	92	47,730	627,226
2000	246,569	7,560	731,728	608,550	141,921	1,913	87	24,781	1,763,109
2001	219,306	4,643	938,127	491,311	95,556	3,592	484	32,334	1,785,353
2002	230,910	18,485	1,157,585	434,971	238,962	1,458	154	20,027	2,102,553
2003	243,586	13,498	1,441,821	715,593	226,741	3,061	159	38,216	2,682,674
2004	208,496	14,173	1,705,877	1,633,919	318,436	3,839	11,555	30,552	3,926,848
2005	184,741	9,799	2,614,462	2,073,633	263,425	14,082	66,409	67,086	5,293,637
2006	145,141	13,585	1,943,482	3,466,392	304,680	6,501	63,137	96,519	6,039,436
2007	200,789	19,347	4,171,239	3,712,186	352,068	8,072	60,513	59,569	8,583,783
2008	190,918	24,914	6,325,890	5,940,921	549,862	5,404	64,504	193,158	13,295,571
2009	147,697	11,259	4,684,822	2,285,461	916,546	10,732	60,105	89,371	8,205,993
2010	128,918	6,830	6,671,907	2,137,653	1,700,399	8,801	80,596	135,241	10,870,344
2011	476,714	11,886	9,541,534	2,892,705	2,476,802	11,238	118,343	176,517	15,705,740
2012	190,383	14,306	1,554,267	679,768	516,851	6,991	106,421	92,335	3,161,322
2013	237,749	29,593	2,100,023	949,589	715,081	10,904	70,696	17,003	4,130,638
CAGR whole period	2.98	7.97	26.52	18.18	77.16	–3.40	50.88	8.71	17.40
CAGR since 2000	–0.28	11.07	8.45	3.48	13.25	14.32	67.48	–2.86	6.77
CAGR since 2011	–29.38	57.79	–53.09	–42.71	–46.27	–1.50	–22.71	–68.96	–48.72

Source: World Bank staff own calculations, based on data from UN Comtrade.
Note: CAGR=Compounded annual growth rate.

Sudan's level of exports to the EU has been steady but erratic, with some diversification. The EU's reported imports from Sudan have fluctuated in a band from US$100 million to US$250 million since 1996. It is significant to note that unlike the United States, the EU has not engaged in significant import bans but has participated in the financial sanctions. The variety of imports from Sudan has fluctuated over the years. As of 2013, 90 percent of the EU's imports from Sudan have consisted of gum Arabic, sugar and sugar products, sesame seeds and undenatured ethyl alcohol. The first three of these products have been consistently and historically sold by Sudan to the EU, while undenatured ethyl alcohol emerged as a significant product in 2009. Cotton and raw hides and skins, which were a large part of the EU's exports to Sudan in the late 1990s, have declined in relative importance. Over the period 1997–2001, the largest classification of EU imports from Sudan is "aircraft, spacecraft, and parts thereof" (HS 88), for which the story is not obvious.

China has experienced a spectacular increase in its share of Sudanese exports since 2000. In

2000 China's share reached 42 percent, which increased thereafter—with some fluctuation—until it reached over 60 percent in the two years preceding the secession of South Sudan. Afterward, its share decreased moderately, but nevertheless continued to be the destination of over one half of Sudan's exports (Figure 4.3.1 and Table 4.2). The shares of the rest of Asia and of Middle East and North Africa have been more variable, though relatively important throughout the whole analyzed period. Asia peaked at 41 percent in 2004 and then slowly got back to its lower shares of the initial years (around 20 percent). In turn, Middle East and North Africa reported its highest share in 1999, when it absorbed 29 percent of Sudan's exports, and then abruptly fell below 5 percent and remained at around that level for ten years. Since 2009 its share slowly picked up again, getting to 17 percent in 2013, probably driven by the increases in livestock exports in that region as described in Chapter 3.

The spectacular rise and recent fall of Sudan's exports to China is driven by oil. During the period 1996 to 1998, and perhaps earlier, the dominant Sudanese export to China—based on China's mirror data—was cotton. Sudan's exports of oil to China began in 1999, and from 1999 to 2011 exceeded 98 percent of total Sudanese exports to China in most years. Even after the departure of Sudan, China's imports of Sudan were still around 90 percent oil in 2013. The remaining exports of Sudan to China consist largely of oilseeds (i.e. sesame seeds), worth US$115 million in 2015, and cotton (US$44 million), with some role for metallic ores (US$17 million) and (very recently) food industry residues and fodder (US$11 million) as well as plastics and plastic products (US$6 million). Non-oil exports from Sudan to China have recently grown dramatically, from around US$40 million in 2009 to US$200 million in 2013.

Sudan has significant market power in global export markets for gum arabic and sesame seeds. Sudan's power in global markets for gum arabic and sesame seeds allude to its role of being a global price setter in those areas. In regional markets Sudan plays a similar role for sheep and sheep meat, and on an emerging basis in waste and scrap of primary cells (Figure 4.3.2).[51]

Sudan is likely a price taker in its other export markets, with market shares small or negligible in recent years (Figure 4.3.3). Sudan's global market share of crude oil abruptly fell to 0.12 percent after the split in 2011. At that time, the share of raw sugar returned to its historic percentage range it had had since 2003 (around 0.2 percent), which even more than doubled and reached 0.5 percent in 2013. The share of non-monetary gold sharply increased above its historic trend in 2009, when it reached 1.2 percent, and after a brief fall in the two subsequent years it escalated to 1.3 percent in 2012.

Sudan's main export products[52] tend to exhibit very low diversification across destinations, with only four of them having been exported to more than seventeen countries between 1996 and 2013. These more global products are: gum arabic, which was exported at least once to 87 different markets; sesame seeds, exported at least once to 75 different markets; refined oil, sold in 38 markets; and cooper waste and scrap, sold in 27 markets (Figure 4.3.4). The EU is the primary market for gum arabic, MENA for sesame seeds, and China and the rest of Asia for copper waste and scrap. Most refined oil is destined for "Rest of World," which includes SSA.

Meanwhile, the remaining seven top export products were sold in fewer markets, ranging between three and 17 individual countries. Indeed, between 1996 and 2013, crude oil was exported to 17 countries, raw sugar not containing added flavor was exported to 14 countries,

[51] "Waste and scrap of primary cells" refers primarily to used auto batteries shipped mainly to South Korea, which likely recycles the lead and other heavy metals to incorporate them, possibly, into batteries for Korean-made autos.

[52] These are the 11 products with the largest export values in Sudan's export data for year 2012. See Table 4.3 for the list.

Table 4.3: Destinations of Sudan's Primary Non-Crude Oil Exports

Product	# destinations ever sold to (1996–2013)	Primary destinations (2012–2013)
Gum arabic	87	European Union 76%
Sesame seeds	75	Middle East/North Africa 51%, China 27%
Refined oil	38	Rest of World 95% (includes SSA)
Copper waste and scrap	27	Rest of Asia 62%, EU 22%, China 16%
Crude oil	17	China 72%, Japan 18%
Raw sugar	14	EU ~100% (Poland, Spain, Romania, Finland)
Waste and scrap of primary cells	10	South Korea 93%
Ethyl alcohol, undenatured	10	EU ~100% (Netherlands, Italy, France)
Gold, non-monetary	8	United Arab Emirates 78%, unspecified 17%
Sheep meat, fresh & chilled	6	Jordan 100%
Live sheep	3	Saudi Arabia 100%

Source: World Bank staff own calculations, based on data from UN Comtrade.

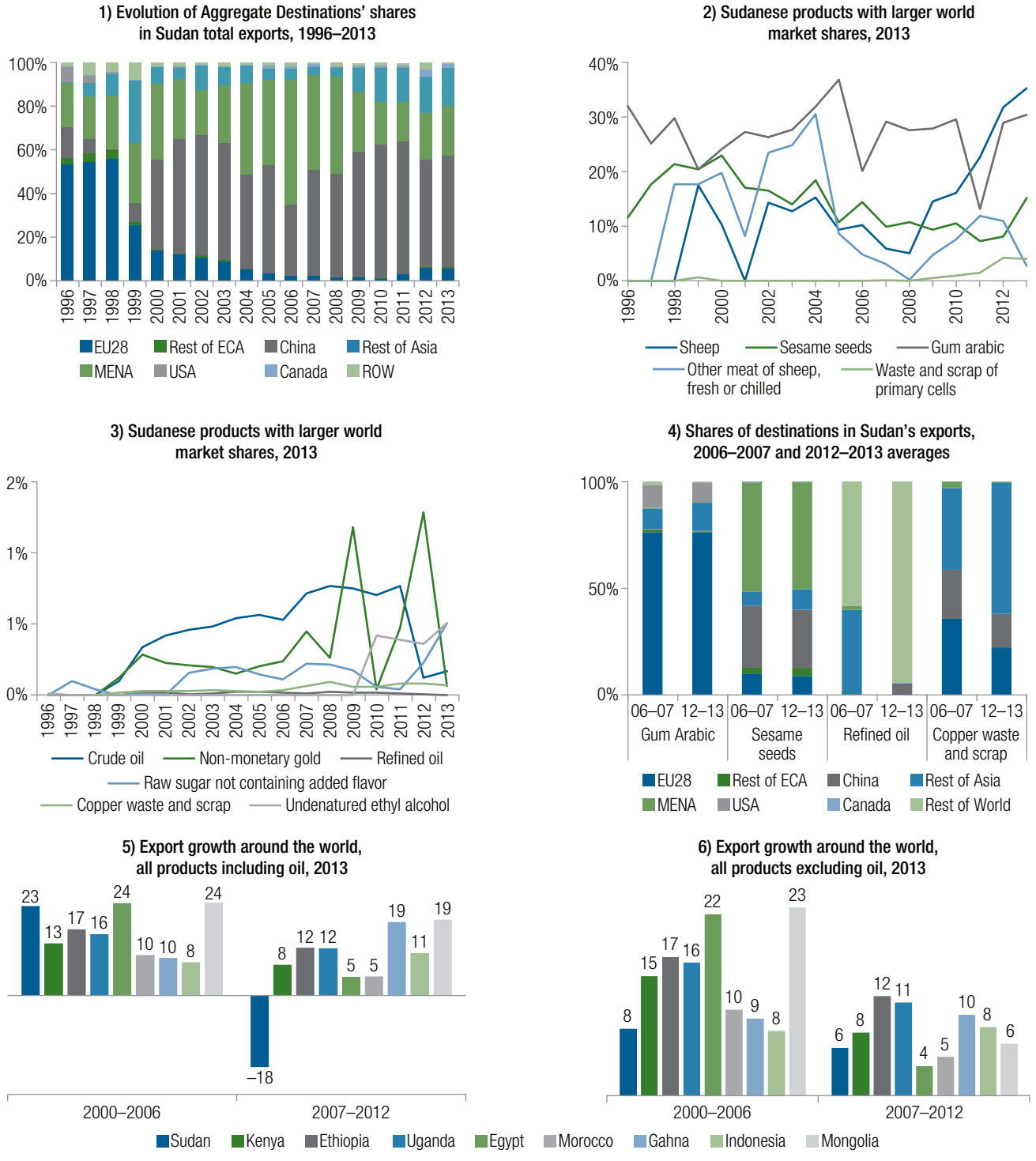
undenatured ethyl alcohol, and waste and scrap of primary cells to 10 countries, non-monetary gold to eight countries, fresh or chilled meat of sheep to six countries, and sheep to only three individual countries in the gulf states (see also Chapter 3 on livestock exports).

There is considerable variability in the important destinations for each of Sudan's less market-diversified main export products (Table 4.3). Indeed, whereas sheep and sheep meat are exported mainly to countries in the MENA, raw sugar and undenatured ethyl alcohol are sold primarily to European Union countries. Crude oil is exported mainly to South and South-Eastern Asian countries, and the same is true for waste and scrap of primary cells, especially in recent years. Exports of non-monetary gold are more geographically diversified, even though still concentrated in a small number of targeted markets.

The analysis provides evidence of the strong recent dependence of Sudan on oil export and the vulnerability associated with a lack of diversification. As can be seen from Figures 4.3.5 and 4.3.6 the loss of South Sudan and its indirect effects has brought an end to Sudan's strong export performance, both in absolute terms and relative to comparator countries. Non-fuel exports have grown very slowly both recently (just 0.8 percent between 2007 and 2012) and even less further in the past (0.09 percent between 2000 and 2006), evidencing the strong recent dependence of the country on oil export and the vulnerability associated with lack of diversification

Sudan has exhibited slower growth than the world's average in most of its top export products in recent years. The notable exception is crude oil (before 2011), which was by-and-large its main export product, and of a few other products, such as cane molasses between 2000 and 2006, and non-monetary gold, sheep, sheep meat, and copper waste, between 2007 and 2012. This behavior can be seen from Figure 4.3.7, where the size of the bubble reflects the share of Sudan's export value of such product in the final year, reflecting its importance in Sudan's export basket. When a bubble is above the red line, it implies that Sudan's exports of the product it represents have grown faster than the world exports of the same product, and similarly that Sudan has increased its market share for that product. The top panel shows that most of the main export products of Sudan grew more slowly than world exports of the same products between 2000 and 2006. In the second period (2007–2011), which comprises the split of the country in 2011), sheep, sheep meat, copper waste, and especially

FIGURE 4.3: Export Growth and Orientation



Source: World Bank staff own calculations, based on data used from UN Comtrade.
Note: (4) and (5): Data for Sudan in the second period were built by appending 2012 data for the new definition of Sudan (SUD). Data for Mongolia in the second period only span 2007–2010 due to lack of export data covering 2011 and 2012.

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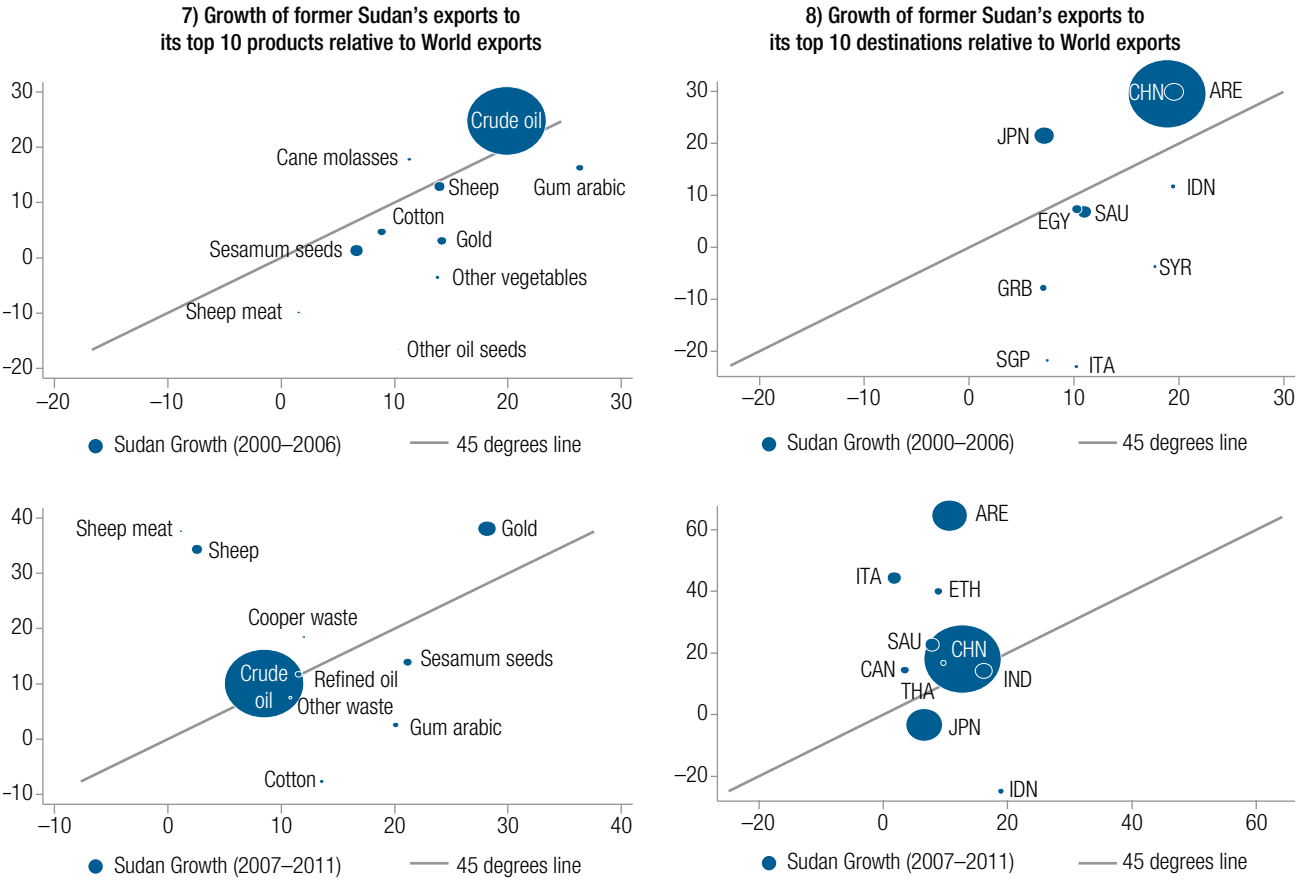
FIGURE 4.3: Export Growth and Orientation (*continued*)



Source: World Bank staff own calculations, based on data used from UN Comtrade.

gold improved their growth performance outpacing the global average, at the same time that exports of crude oil slowed down, performing approximately par to the world average.

On the other hand, Sudan has shown a relatively better performance in terms of market diversification, which has markedly improved in recent years. This is shown in Figure 4.3.8, where the size of each bubble reflects the share of Sudan's export value to such destination in the final year, accounting for its relative importance. When a bubble is above the red line, it implies that Sudan's exports to that destination have grown faster than the world exports to it, and similarly that Sudan has increased its market share in such market. Whereas Sudan's world market share only increased in China, United Arab Emirates, and Japan between 2000 and 2006, between 2007 and 2011 its exports to seven of its top ten destinations grew faster than the world average, thus expanding Sudan's market share in all of them. It is worth noting that exports to China, which is by far Sudan's most important destination in both sub-periods, have always grown faster than the world average, even though this advantage is less marked in more recent years.

c. *Export diversification and survival*

Export diversification

Sudan's export basket is very concentrated, as shown the large shares of its top three and five export products, but the degree of product

concentration decreases when looking at non-oil exports. Even though these measures have tended to decrease after the split of the country, especially in the case of the top three products, the figures still evidence a severe dependence of Sudan upon few commodities. However, the degree of product concentration decreases considerably when only non-fuel products are considered (compare Figure 4.4.1 with Figure 4.4.2). As figure 4.4.2 also shows, the measured concentration of non-fuel exports has increased markedly in the last few years. This is explained by the emergence of gold exports, which became Sudan's second largest export in 2009 (and largest non-oil export). This implies that after the secession of South Sudan, the country may have been forced into a path of higher product diversification, which could work to its advantage in future. Even though the share of the top three and five non-oil products have increased after the secession of South Sudan, they are still relatively low. However the number of products, which always had been low, showed a mild increase between 2006 and 2011, but fell again after the split of the country.

The lack of product diversification of Sudanese exports also stands out when compared to peer countries, as evidenced by its comparatively much higher Herfindahl-Hirschman index.[53] This has furthermore increased in recent years, while in many of its comparators it has actually decreased. This points out to a comparatively disadvantaged position, both static and dynamic. Figure 4.4.3 presents the index comparing Sudan and some comparator countries.

Using exporter-level data and calculating the Herfindahl index confirms the observed high level of concentration. The Herfindahl index of exporter market shares is similar to Figure 4.4.3 and shows that in Sudan is significantly higher than in other countries (Figure 4.4.4). Indeed, again, Sudan exhibits the highest level of concentration among its regional comparators. In addition, there is actually an observable increase in the Herfindahl index of Sudanese exporter shares particularly between 2010 and 2012 (Figure 4.4.5). This confirms the conjecture suggested by the indicators on exporter size that the concentration among Sudanese exporters is increasing substantially during this period (see the previous discussion of Figure 4.1).

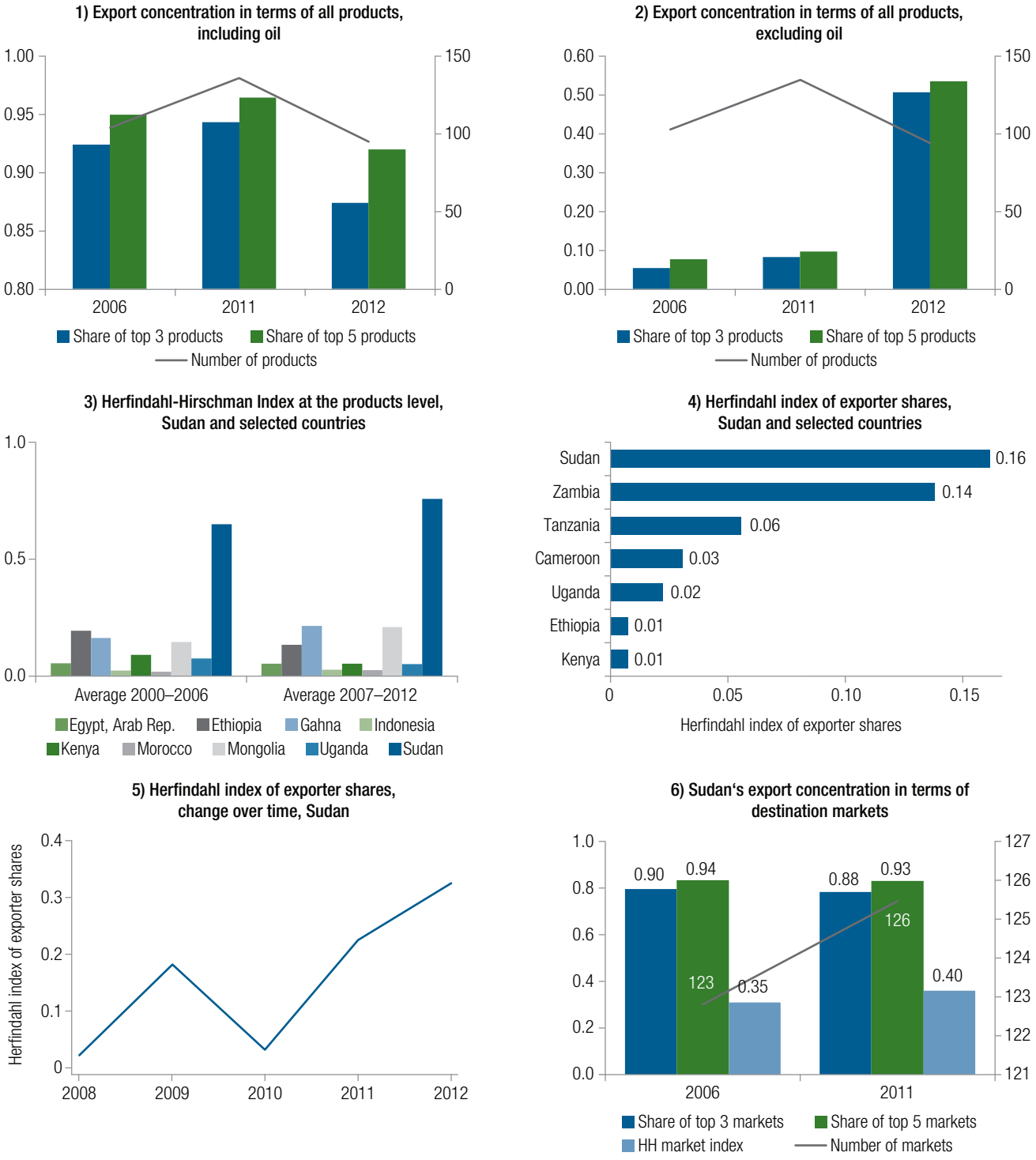
The diversification of Sudan across destination markets is also low, and has remained approximately constant (Figure 4.4.6). It is also much lower than that of most of its comparators, with only Mongolia exhibiting a worse performance than Sudan in this respect. Together with the low product diversification of the country, this evidences a highly vulnerable situation of the country in its integration into global markets.

Using exporter-level data confirms both findings of low diversification in product and destination markets. In fact, it shows that the degree of diversification of Sudan's non-oil exporters is low in absolute and in relative terms. Firm-level evidence suggests that most exporters have a very limited portfolio of products and destination markets. Interestingly, Sudan's non-oil exporters are quite homogenous in their low product diversification as the standard deviation of the number of products per exporter in the country is 3 compared to standard deviations of 6 and 9, respectively, in Ethiopia and Tanzania. In terms of destination market diversification, most of the African comparators are similar, with a median number of destination countries per firm of 1 and a standard deviation of close to 3. Sudan falls closely within those ranges (World Bank Exporter Dynamics Database).

A few multi-product multi-destination exporters typically amass the majority of total exports in a country, but less so in developing countries including Sudan. Large firms often define exports from one country; well-known examples include Nokia in Finland, Samsung in Korea,

[53] The Herfindahl-Hirschman index is calculated as the sum of the squared market shares for all products. Higher values indicate increasing concentration, with a maximum score of 1.0 when there is a single product.

FIGURE 4.4: Export Concentration and Survival



Source: World Bank staff own calculations, based on data used from UN Comtrade; and the World Bank Exporter Dynamics Database.
Note: (4) and (5) is based on exporter level data. It shows the same trend as UN Comtrade data.

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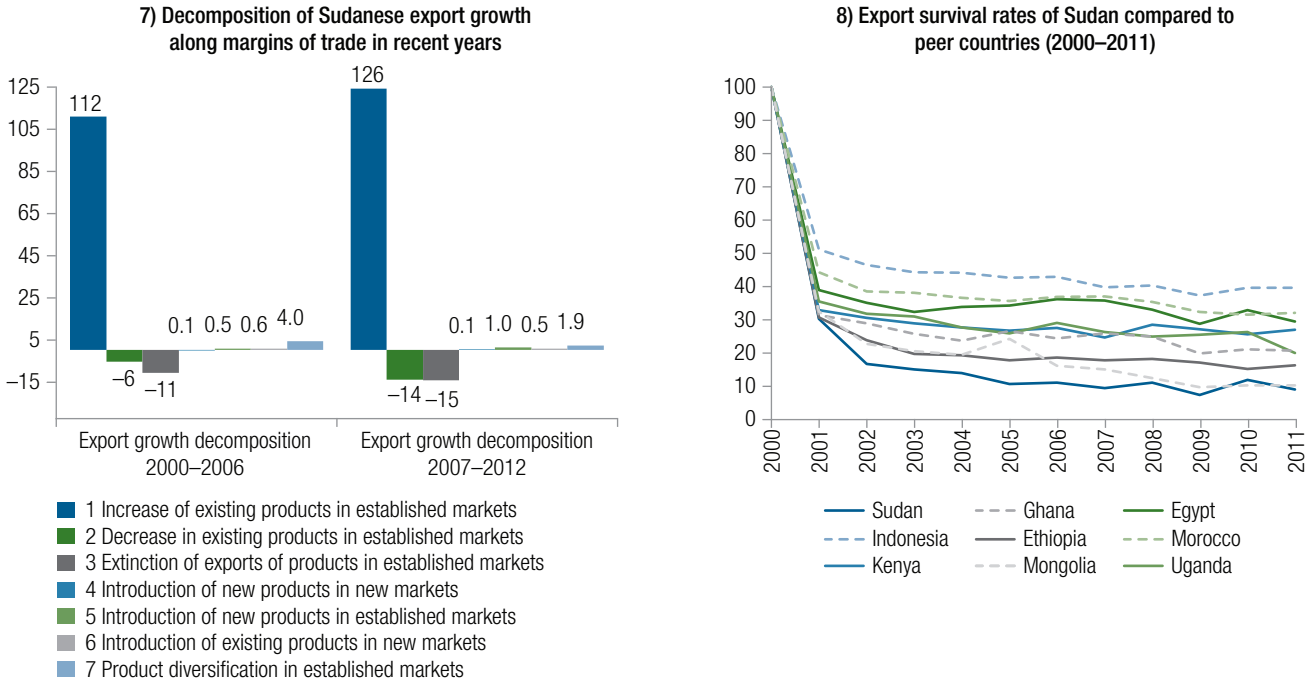
FIGURE 4.4: Export Concentration and Survival (*continued*)



Source: World Bank staff own calculations, based on data used from UN Comtrade.

and Intel in Costa Rica (Freund and Pierola 2012). But Sudanese exporters are poorly diversified both in terms of products and destinations. They exhibit significantly lower numbers of HS 6-digit products exported per firm and significantly lower number of destination markets per firm than comparable countries. This poor diversification performance is also explained by the absence of a few highly diversified multi-product multi-destination export superstars dominating exports, a phenomenon commonly observed in other countries. In Sudan in 2012, only 2 percent of Sudanese exporters sold more than ten products and surprisingly they accounted for just 3 percent of total non-oil exports. See also Annex 6, Table 0.15 for details on the distribution of exporters across products and destination.

Export survival

The analysis of Sudan's exports across the extensive and intensive margins of trade evidences the lack of capacity of the country to expand its range of exported products and to explore new destination markets. Indeed, not only has the country had almost no other export increases beyond those attributed to the expansion of existing products to established markets, but also has even experienced decreases and even the extinction of such traditional products in traditional markets. Furthermore, these last indicators have worsened in recent years (Figure 4.4.7).

When compared to peer countries, the survival rates of Sudan are almost always the lowest since the early 2000s (Figure 4.4.8). This shows a very fundamental weakness of the country and follows naturally from the low performance it has shown in all the indicators that have been evaluated so far, both in absolute terms and compared to its peers.

B. Services Trade

a. *Overview*

Services and trade-in-services have an important role in economic diversification. Services are

essential intermediate inputs and have the potential to enhance productivity and increase technology and skills transfers through significant positive spillover effects throughout the economy. Services sectors can help Sudan diversify its economy and reduce poverty. For example, while the agricultural sector is viewed as an important engine of growth, it has remained far below its potential and the country has stayed a net importer of agricultural products. The productivity of farms will have to improve to increase agriculture production. That means better transport infrastructure, agricultural technology, and support services including financing.

Sudan's economy faces numerous challenges that hamper the development of the services sector. While services such as transport and logistics, financial services, or energy are addressed in the context of various World Bank or other development partner projects, higher-value knowledge-intensive services such as business services remain largely neglected.

Weak regulatory frameworks characterize most business services sectors. While regulatory self-assessments by ministries and regulators seem to suggest that the frameworks in place are adequate, the private sector points to numerous regulatory weaknesses. Also, stakeholders from both the public and the private sectors mentioned the absence of adequate regulations and standards. There seems to be a strong interest in developing the necessary regulatory framework using "good practice" from the region or elsewhere as guidance. Additional constraints in business services sectors are skills shortages and mismatches.

This section focuses on professional services, a set of higher-value knowledge-intensive services sectors that are characterized by high regulatory intensity and are crucial for skills generation, which in turn are essential for diversifying the human capital endowment of a country. A diagnostic of professional services markets in Sudan based on a recent World Bank Survey on Professional Services highlights the demand and the constraints to the provision of adequate professional services in Sudan. The section shows the importance of both exports and imports of high-value added, sophisticated services and professional skills for export diversification and increased competitiveness. The chapter also illustrates how regulatory and trade policy reforms can be coordinated as part of regional and multilateral negotiations. Policy recommendations call for action in four areas: education, regulation of professional services, trade policy, and labor mobility at both the national and international level.

There is also potential for Sudan to develop its Tourism sector based on its rich history, but there are also great challenges. Box 4.2 describes the potential, but also the great challenges for tourism. From the analysis, which was originally carried out for the DTIS Update in 2014, it is clear that developing the tourism sector is a long-term endeavor that is closely linked to the country image of Sudan and the fact that sanctions imposed on Sudan prevent tourism technology to facilitate the sector's development.

b. *Trade-in-Services in Sudan*

Sudan's share of services Value Added (VA) in GDP is lower than expected for a country at its level of development. A comparative assessment of the share of services VA in GDP for Sudan and selected Sub-Saharan African countries reveals that Sudan's falls below the fitted curve in 2000–2 and 2010–12, implying a smaller services sector than expected for the country's level of development (Figure 4.5.1).

Services export growth remains below that of goods exports and GDP growth. Sudan stands in stark contrast with most neighboring countries regarding growth of services exports compared to that of goods exports and GDP. While most Sub-Saharan African countries register more dynamic growth rates for services as compared to goods exports or GDP growth, Sudan's services exports performance remains below potential (Figure 4.5.2).

BOX 4.2: Tourism in Sudan: Great Potential, Great Challenges

Rich history and great potential

Sudan has an opportunity to become an important global tourism destination. While largely unknown, Sudan has compelling attractions that could be of strong interest to tourists that seek out culture, adventure, wildlife, and scuba diving opportunities. Realizing this potential requires the removal of regulatory and policy constraints, ensuring stability and security, and improving the country's image in international markets. Addressing these issues will provide the foundation for a productive and dynamic tourism sector in Sudan that can make significant contributions to economic growth, employment generation, cultural and environmental preservation, and social inclusion.

Sudan is home to a number of world-class tourism attractions based on its unique cultural and natural resources. However, the reality of a country rich in natural and cultural resources has been overshadowed by the negative consequences of a lengthy civil war and social conflict culminating in the secession of South Sudan in July 2011. Even after South Sudan's secession in July 2011, Sudan continues to suffer from insecurity, be it the conflicts in the states border South Sudan (South Kordofan, Blue Nile), the Darfur areas, or Red Sea states, which all, at various intensities show some level of conflict.

In terms of culture, the country is well endowed with temples, monuments, and tombs dating back to the time of ancient Egypt, with which the Sudanese lands were closely connected. In fact, Sudan hosts a collection of pyramids that even outnumbers those found in Egypt. The influences of Christianity (6th century) and Islam (7th century) are also reflected in churches, mosques, and numerous religious antiquities.

The country has a diversity of natural attractions in line with its varied ecosystems. The West is characterized by semi-desert conditions, the North is dominated by the arid Nubian Desert, the East contains over 700km of Red Sea Coast, and the South contains forested mountains, swamps, and rainforest. The country has eight national parks, two of which are marine-based. Some of the land-based parks have pockets of terrestrial wildlife that attract tourists interested in safaris. There is also a small hunting market. Yet the country's top nature tourism product is scuba diving along the well-preserved coral reefs that line the Red Sea Coast.

Great challenges ahead

But issues related to the Sudan's country image prevail as the key obstacle to further development of the tourism sector. Addressing those issues requires a demonstrable commitment to tourism by enacting key policy changes. Image problems are particularly prevalent among post-conflict countries. Yet many countries, particularly in Africa, have seen success in their post-conflict tourism development efforts. Sudan needs to take some critical initial steps, firstly reducing the bureaucracy and red tape required for obtaining visas, permits, and licenses. Sudan needs to show that it is open to tourism and truly work towards its facilitation. Without stability and security, tourist development efforts will yield limited returns. With them, and in combination with effective sector stewardship, the country's image will improve.

The current visa regime is not conducive to tourism. Unlike most other export sectors, tourism depends upon the customer coming to the place where the products and services are supplied. As this entails cross-border movements of tourists, immigration and entry/exit control regulations play an important role in the sector. Travel to Sudan is bureaucratic, time consuming, and expensive for the tourist. Unlike nearly every other country in Africa, no tourists are eligible to obtain visas on arrival in Sudan. Instead, all tourists need to procure visas prior to arrival (or work with a registered local tour operator who can arrange for a counter visa for an additional cost). This process is not only expensive (approximate visa cost is US$100) but also requires the additional logistical burden of having to acquire a letter of invitation/introduction. Those not living in cities with a Sudanese consulate must bear the additional costs of sending application materials to a Sudanese consulate through a courier service.

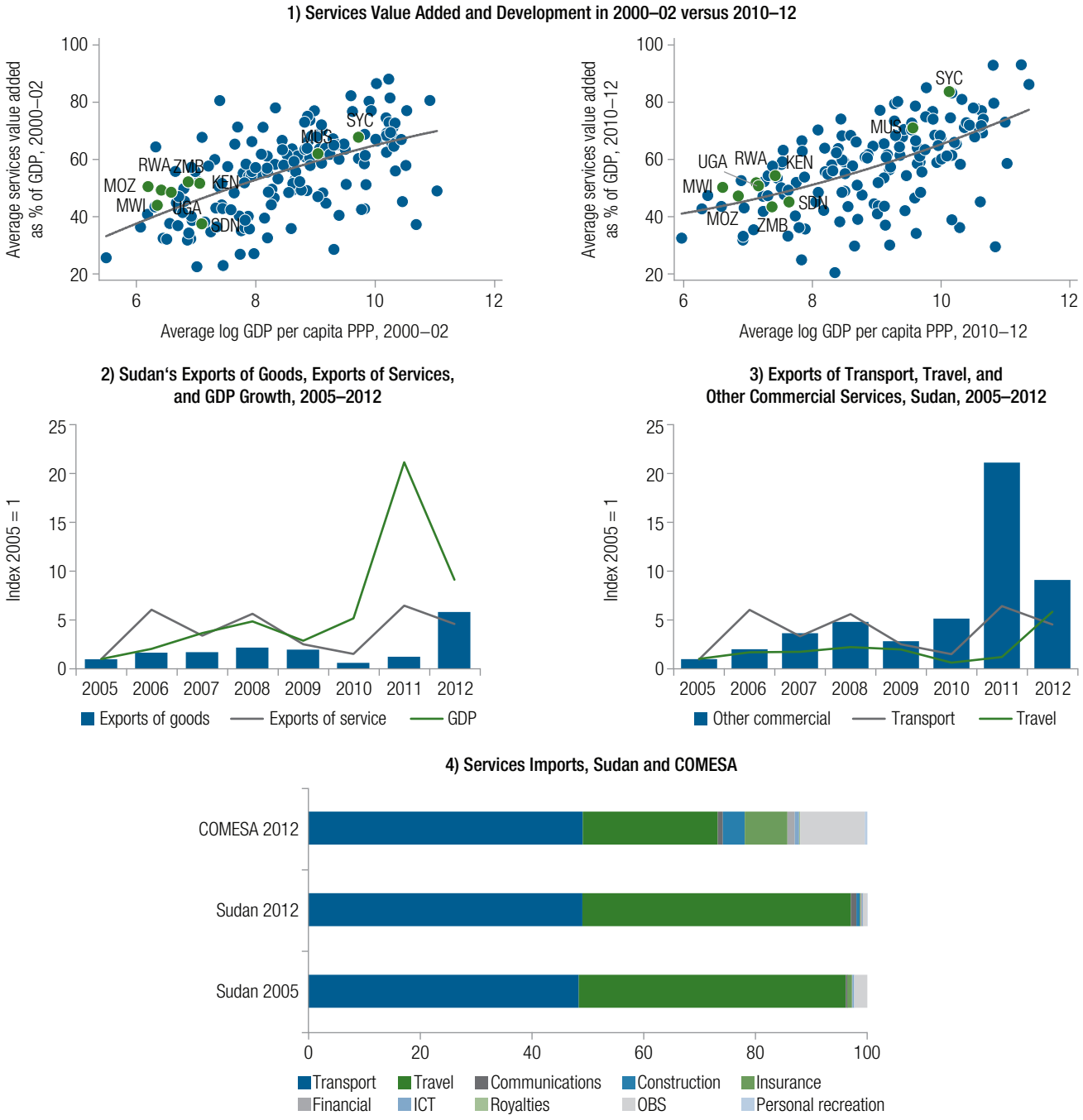
In-country bureaucratic procedures are an impediment to the free flow of tourists. Visitors are required to register with the Ministry of Interior within three days of entering the country. Registration costs US$60 in Khartoum and can consume the better part of a day. Alternatively many hotels will complete the registration on behalf of the tourist, but this still entails the tourist spending at least 24 hours in Khartoum before proceeding to the desired destination. Registration can be also done at the Red Sea for tourists that fly directly into Port Sudan. Additionally, tourists are required to obtain permits from the Ministry of Tourism for land travel and photography of any kind (at no cost). These extra burdens and costs, for which no parallel can be found within countries trying to promote tourism, act as a strong deterrent to prospective tourists.

U.S. sanctions against Sudan blocks access to tourism technology and use of credit cards. The U.S. embargo has had a negative impact on tourism to the country, both in terms of creating a much more challenging business environment for operators as well as creating a major inconvenience for tourists. Tourism businesses face major challenges when trying to obtain essential equipment such as commonly used front desk and restaurant management systems. Without the ability to use credit cards, they must spend time and money to obtain licenses in order to make international transfers of funds. The embargo also results in high transactional costs for tour operators and hotel owners to receive funds sent by international tour operators via non-commercial banking systems such as Western Union or wired through third-party accounts in neighboring countries.

Most importantly, international tourists are accustomed to using a credit card to guarantee services prior to arrivals or paying for services once in the country. Many also rely upon being able to withdraw local currency through ATM machines. Yet, as ATM and credit cards are not accepted in Sudan, tourists are forced to bring all the funds needed for their trip in cash. For example, a family of four visiting the country for 10 days (at an average expenditure rate of US$150 per person) would need to carry US$6,000. This is not only a major inconvenience, but also creates safety concerns. Likewise, it represents an added risk to tourism businesses, which have to ensure services (accommodations or tours) without a guarantee of being paid in case the tourists do not appear.

Source: Excerpt from World Bank 2014e.

FIGURE 4.5: Trade-in-Services in Sudan



Source: World Bank staff own calculations, based on data from World Bank, World Development Indicators.
Note: (1) The figure shows scatter plots of average services value added as a percentage of GDP against the log of average GDP per capita in purchasing power parity (PPP, current international US$) for the periods 2000–2002 (left panel) and 2010–2012 (right panel). The line indicates the fitted values obtained by a linear prediction of the relationship between share of services in total value added and income per capita.

Sudan registers more dynamic growth rates for other commercial services exports than for exports of travel or transport services, a fact that suggests the existence of some modern services (Figure 4.5.3). This suggests that some modern, high-value-added services sectors already contribute

to export diversification and provide new opportunities for export development. Indeed, a recent survey of providers of professional services carried out by the World Bank shows that about one-third of respondents in Sudan reported exports of services in 2011 (19 out of 60), a higher proportion than in most COMESA countries (15.7 percent at the COMESA level). These exports of professional services concerned, for the most part, regional clients, and represented on average a third of exporters' total revenue. This suggests that there is potential to develop Sudan's services exports provided an appropriate trade policy and regulatory framework are put in place and obstacles faced by professionals are lifted domestically and at the regional level.

Sudan's services imports are undiversified. Imports of services can drive Sudan's competitiveness. Imports of intermediate inputs such as transport services, construction, insurance, and other business services can improve the productivity of manufacturing and services firms. Also, services can help address shortages in crucial sectors of the economy. For example, imports of professionals help alleviate Sudan's skills shortages in healthcare, education, or professional services. However, at this stage Sudan's services imports are for the most part comprised of transport and travel services (Figure 4.5.4). Sudan's access to competitive services from which to draw high quality services inputs is inadequate. Poor access to such critical services translates into a competitive disadvantage in any sector, be it services, manufacturing or agriculture. The fragmentation (by restrictive regulatory policies and regulatory heterogeneity) of regional markets for these services prevents Sudan from fully benefiting from the potential gains from greater trade-in-services. Again, regional cooperation to facilitate the movement of various professionals could help address skills shortages or gaps in relevant sectors.

Ensuring efficient access to a wide range of services is a key determinant in international competitiveness and efficiency. This chapter identifies the constraints to the development of professional services, showing how inadequate domestic regulations in conjunction with a lack of regional cooperation holds back the development of the national markets for services, and creates skills shortages and skills mismatches, all of which have negative implications for competitiveness and limit exports.

c. *Professional services matter for Sudan's growth*

Professional services contribute directly and indirectly to economic growth, including lowering transactions costs and creating spillover effects of knowledge to other sectors. For example, engineering and IT services are knowledge-intensive sectors essential to the productivity and sustainability of other economic activities, including the oil sector. Civil engineering is critical for the development and maintenance of a country's physical infrastructure, while electrical engineering is important to the operation of public networks such as utilities or commercial facilities and communication systems (Cattaneo et al. 2010). IT-based services including application services (such as application development and maintenance, system integration, IT infrastructure services, and IT consulting), or IT engineering services (such as manufacturing, engineering, and software product development) also have an important impact on productivity and growth. Accountancy is critical for accountability, sound financial management, and good corporate governance (Trolliet et al. 2003).

Users of professional services in Sudan are more productive than non-users. Data from the World Bank Survey of Users of Professional Services in Sudan show that firms that use accounting services—whether externally outsourced or provided in-house—have higher average labor productivity than firms without such professional services linkages (Figure 4.6.1). Also, the labor productivity gap between users and non-users of accounting services is higher in Sudan as compared to the COMESA average.

Respondents to the World Bank Survey of Users of Professional Services listed a number of channels through which professional services affect their productivity and performance. While many respondents indicated that they use accounting services because of statutory requirements, they also name accounting services as useful for maintaining and improving existing activities within enterprises and as helpful in accessing loans. Accounting and audit services also help manage costs, expenses, and income of the firm, disclose the company's financial health, undertake future planning, and comply with tax laws and requirements. Engineering services help firms understand technological advancements and how to use them effectively to construct, install, and maintain their machinery in normal operating condition. Still, such knowledge-intensive services remain largely neglected and their development and export potential remains overlooked.

The business surveys undertaken in Sudan report a high level of demand for professional services by the surveyed firms. The results of the user surveys (Figure 4.6.2) suggest that accounting, engineering, and legal services are important intermediate inputs in the production of many sectors with more than 50 percent of all interviewed enterprises using such services at least once per year. Demand for these services is expected to increase with economic growth in Sudan.

There is demand for basic and more sophisticated professional services. The surveys show that there is demand for all types of services, from accounting and auditing, to tax advice and management consulting. Financial auditing is the main source of revenue for accounting and auditing firms in Sudan, followed by accounting/bookkeeping and management consulting and tax advice (Figure 4.6.3). Engineering firms in Sudan earn, on average, the largest fraction of their revenues from providing planning and managing maintenance, survey sites, other services related to engineering, and project management services (Figure 4.6.4). The high usage of professional services and the higher productivity of Sudanese firms that use professional services than that of non-users may suggest that professional services are equally important for the development of the economy as they are in more developed economies.

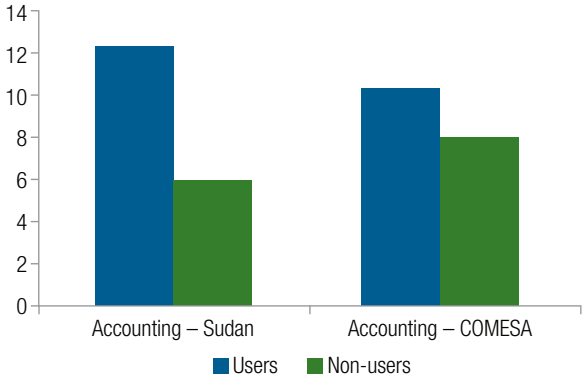
Despite demand for professional services Sudan is characterized by limited availability of professionals and skills mismatches in engineering and accounting services. While detailed data on the exact magnitude of professional skills shortages in Sudan is unavailable, consultations with practitioners confirmed that the current demand for qualified accountants or engineers in Sudan is growing and is much larger than the available supply.

Supply of professional services is limited by rent-seeking opportunities. Even though professionals in Sudan receive high nominal wages relative to their counterparts in other African countries, reflecting their scarcity relative to demand for their services, interviews revealed that there are limited incentives to become and practice as a professional in Sudan given rent-seeking opportunities in the public and the oil sectors. A more severe scarcity of engineers as compared to that of accountants in Sudan is reflected by the earnings differential between those two types of professionals (compare Figures 4.6.5 and 4.6.6).

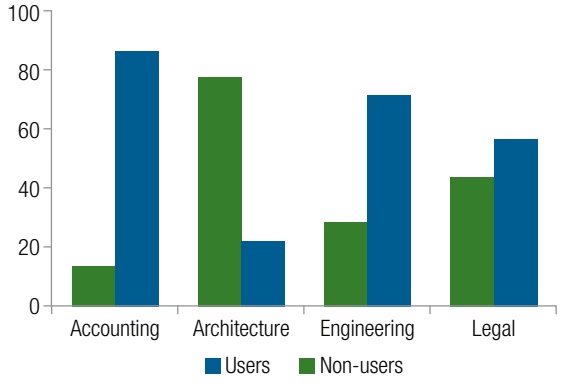
It is worth noting that discussions with the private sector revealed that Sudan is facing not only a shortage of highly skilled professionals but also middle-level skills shortages. Middle-level professionals who can provide services to underserved client segments and produce large economic gains are sometimes an underappreciated category of professionals. For example, accounting technicians can provide basic recordkeeping services needed by SMEs. Engineering technicians can provide basic or standardized engineering services and are crucial in supporting engineering projects. Thus, the absence of middle-level professionals in Sudan needs to be addressed. In the context of the shortages of professionals at all levels and given

FIGURE 4.6: Professional Services in Sudan

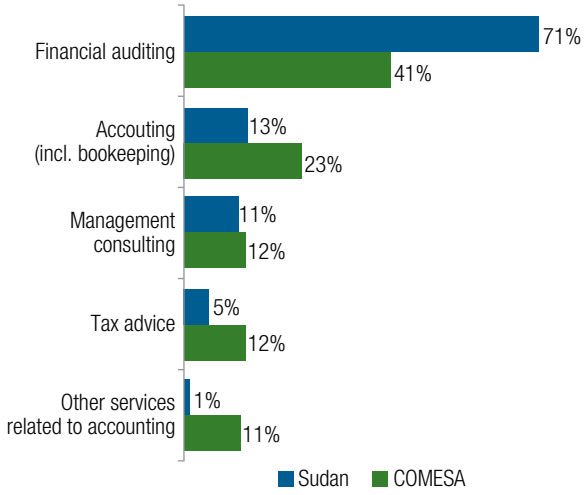
1) Average Productivity of Users vs. Non-Users of Accounting Services, Sudan and COMESA



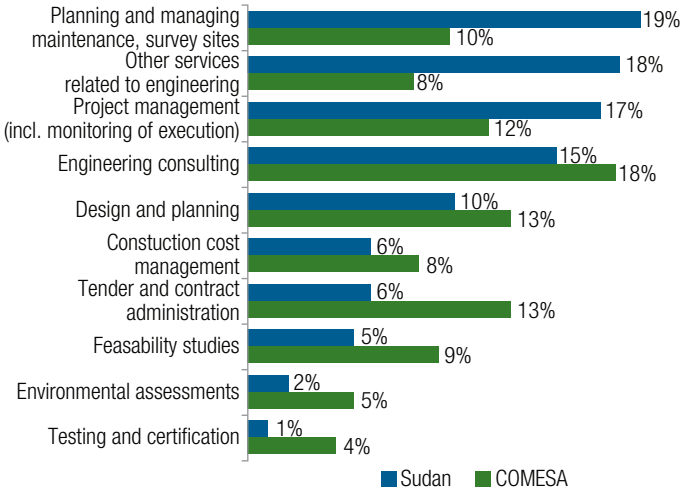
2) Usage of Professional Services, Sudan



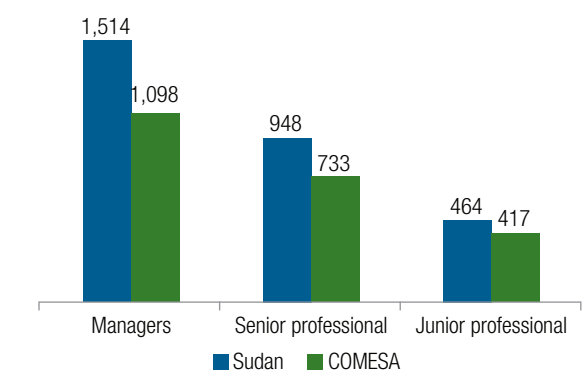
3) Demand for accounting services in Sudan



4) Demand for engineering services in Sudan



5) Average Gross Monthly Salaries in Sudan: Accounting professionals



6) Average Gross Monthly Salaries in Sudan: Engineering professionals

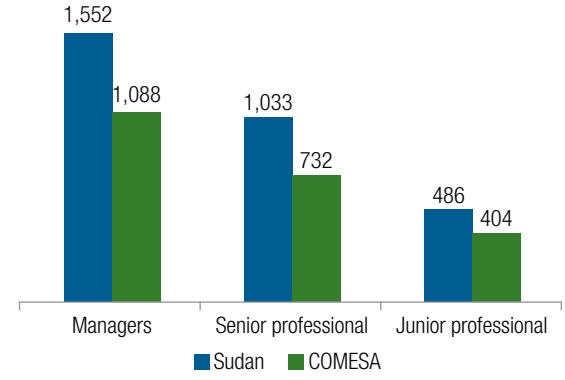


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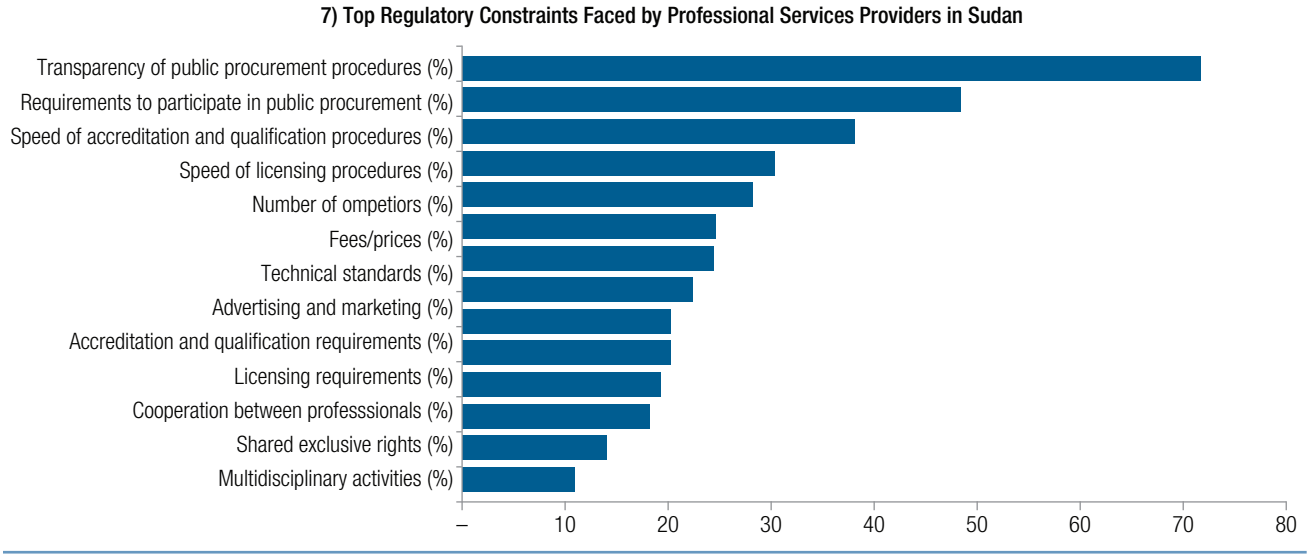
FIGURE 4.6: Professional Services in Sudan (*continued*)



Source: World Bank staff own calculations, based on data from World Bank Surveys of professional services in COMESA (2013).

that it is less costly and less time consuming to train middle-level professionals, the development of middle-level/technical professionals should be Sudan's priority in terms of skills formation.

Weaknesses in primary, secondary, and tertiary education limit the ability of students to acquire professional skills. Factors related to education, domestic regulation, trade, and labor mobility explain skills shortages and skills mismatches in professional services in Sudan. From a regional perspective, enrollment in higher education is higher in Sudan than in other Sub-Saharan African countries and is similar to that in Middle Eastern and North African countries, but the education sector shows weak learning outcomes at all levels (World Bank 2012). Given the relatively high enrollment rate in higher education, it is important that students acquire the skills that match those needed by the labor market.

A weak regulatory framework can explain the underdevelopment and the segmentation of markets for professional services. Professional services have traditionally been subject to a high degree of regulation, as a result of direct governmental regulation and of rules adopted by self-regulatory bodies (professional associations). These regulatory measures affect the entry and operation of professionals and professional services firms, and can undermine competition and constrain the growth of the sector.

Based on the results of a regulatory self-assessment performed by Sudanese ministries and professional associations, Sudan seems to have a moderate regulatory framework for professional services. Entry requirements, such as prequalification requirements, licensing or membership in a professional association, as well as regulations affecting the conduct/operations of professional service providers such as price regulations, advertising prohibitions, or restrictions on multidisciplinary activities, tend to be less stringent in Sudan than in neighboring countries. For instance, according to the interviewed authorities, the range of exclusive activities reserved for engineering and legal professionals in Sudan are among the least restrictive in Sub-Saharan African countries.[54] Also, there are no

[54] Highly skilled professionals in the different professional services sectors generally have exclusive rights to perform certain activities (e.g., auditing, representation of clients before courts, advice on legal matters, feasibility studies, design and planning).

price regulations affecting professional services, and advertising prohibitions concern only accounting services. A more detailed description of the regulatory frameworks in all examined professional services in Sudan is presented in Box 4.2.

The private sector identifies several regulatory barriers affecting professional services in Sudan. Additional information on the severity of regulatory barriers comes from the 2012–13 World Bank business surveys and is presented in Figure 4.6.7. This suggests that transparency and requirements to participate in public procurement as well as the speed of accreditation and qualifications procedures are among the top regulatory constraints faced by professional services providers in Sudan. Restrictions affecting competition such as advertising prohibitions and fees/price regulations are also important barriers for business.

Trade barriers and immigration regulation can explain the segmentation of markets for professional services. Trade barriers can limit competition and the efficiency of professional service providers. In general, foreign entry restrictions include: i) restrictions on the movement of natural persons (nationality and residency requirements, quotas, economic needs test, limits on the length of stay, and recognition of academic and professional qualifications); ii) restrictions on the establishment of commercial presence (restrictions on foreign ownership, limits on the type of legal entry, and limits on the scope of business); iii) restrictions on cross border trade (entry restrictions and limits on the scope of business); and iv) restrictions on labor mobility (procedures for hiring a foreign worker).

Trade restrictions in professional services are quite severe in Sudan. Explicit barriers to trade cover foreign entry restrictions and discriminatory conduct restrictions. Key barriers relate to regulations pertaining to licensing and qualification requirements. The accounting and legal sector uses the labor market test or economic needs test for license application by foreign services providers. Other explicit trade barriers affecting professional services in Sudan include: nationality requirements to provide certain professional services, prohibitions against using the name of the parent company, requirements to employ a certain percentage of nationals, and restrictions on the composition of management of foreign professional firms established in Sudan. Foreign professional degrees are recognized on an ad-hoc basis. Similarly, work permits are allocated and extended on a case-by-case basis. The public procurement of government contracts for accounting and legal services are also quite rigorous in Sudan—foreign providers to the government cannot sell numerous services. There are ownership and control limits and restrictions on the form of entry for foreign firms in all professional services sectors. In terms of trade restrictions on importing professional services through mode 1—cross-border trade—there is little possibility for a domestic resident firm/individual to obtain professional services directly from a foreign professional services firm or office located outside the country.

The national markets for professionals and professional services in Sudan remain underdeveloped. The main priorities relate to coordinating the needed regulatory reforms with trade liberalization, and addressing the skills shortages and the skills mismatches affecting professional services. This suggests policy action in the following areas: education, regulation of professional services, trade policy, and labor mobility at the national and regional levels.

C. Potential for Future Trade Diversification: Goods and Services

Successful economic development has typically been accompanied by structural transformation, in which manufacturing and industry's share of output and employment rises at the expense of agriculture, but this has not (yet) been seen in Sudan (McMillan and Rodrik 2011; and see Chapter 2.A). Manufacturing and industry typically display higher productivity, higher wages, and faster rates

BOX 4.3: Domestic Regulation in Professional Services in Sudan

In Sudan's accounting sector there are mandatory continuing education requirements for members of the profession, while for both the accounting and the legal sector there are additional requirements include passing the professional examinations to become a full member of the profession. There are practical training requirements to become a full member of the accounting, engineering, and legal professions: one year for law practitioners, three years for accounting professionals, and five years for engineers. In addition, the accounting and the legal professions are also subject to other educational or vocational requirements over and above the academic degree to enter the profession (for example, the legal profession requirement is a one-year post-graduate course).

All three sectors also regulate access to the profession through compulsory licenses or authorization granted by the Sudan Bar Association in legal services, the Accountancy and Audit Profession Organization in accounting services, and the Engineering Council for engineering services. Licenses are renewed periodically (for example, every two to five years for engineering).

In the engineering sector, although there are no requirements for passing a professional examination to become a member, there are requirements pertaining to practical training (a few years for engineering technicians and five years for engineers). All these requirements are in addition to the mandatory university degree obtained to practice legally.

In Sudan, engineering and legal services are not subject to exclusive rights of practice by engineers or lawyers; the scope of exclusive rights is broader in accounting services. Highly skilled professionals in professional services sectors have exclusive rights to perform certain activities (e.g., auditing, representation of clients before courts, advice on legal matters, feasibility studies, design and planning). The argument in favor of exclusive rights is that they can lead to increased specialization of professionals and guarantee a higher quality of service. But the negative price and allocation effects of exclusive rights, which act as monopolies, can be substantial, especially if they are granted for standardized services that can be provided at a lower cost by less-regulated or non-regulated providers, such as the middle-level professionals in these sectors.

In the accounting sector, except for matters related to management consultancy services, investment advice, legal advice and representation, and expert witness in accounting, all other accounting type works fall under the exclusive rights domain of certified accounting professionals. The following activities are specifically provided by accounting professionals only: traditional accounting (bookkeeping); statutory audit; non-statutory audits; audit of mergers and of contributions in kind; insolvency practice; international audit; tax advice, and tax representation

Regulation affecting the conduct/operations of professional services providers in Sudan seems to be less severe than in many neighboring countries. In all professional services, fees tend to be negotiated freely between practitioners and clients, but there is a Fee Committee at the Bar Association that deals with complaints from clients.

All types of legal entities are permitted in engineering. By contrast, only sole proprietorship and general partnerships are permitted in accounting. Also, advertising is prohibited in accountancy but seems to be allowed in engineering and legal services.

Source: Regulatory surveys undertaken in Sudan in 2012 and 2014.

of technology adoption, but Sudan's challenge is to find ways to grow these sectors, and particularly to shift younger and more educated workers into higher productivity jobs.

At present, however, the agriculture and services sectors account for the vast majority of employment in Sudan, with manufacturing providing an almost negligible number of jobs. This is even though both wages and labor productivity are much higher in industry and manufacturing than in agriculture. The sector that employs most people in the economy—agriculture—is also the sector that employs most people without education. Almost two in three workers in this sector have no education and less than one in fifty has post-secondary education. Workers in the remaining three sectors, manufacturing, non-manufacturing industry, and services, have relatively similar levels of education (see Chapter 2.A).

There is a real lack of educated work force to allow for effective diversification into new and higher value-added product areas. Half of the population in Sudan has never attended a formal school and only a tiny portion has some post-secondary education. Only 15.8 percent of the population has at most secondary school education, and only 3.8 percent has some post-secondary education. Not surprisingly, education levels are substantially lower in rural than urban areas and substantially lower for women than men (see Chapter 2.A).

But there are higher education levels in younger cohorts, which represents an

opportunity for Sudan to shift employment into more productive sectors. Older parts of the population have lower education than younger parts and the gender gap in education is smaller in younger cohorts than in older ones. Individuals aged 20–29 have substantially higher levels of education: one in ten has some post-secondary education and a further one in three has some secondary education. Yet, at present younger workers are no more likely to work in industry, manufacturing, or services than their older compatriots, indicating that there is little current capitalization on this opportunity (see Chapter 2.A).

Sudan's income level is below the expected income level based on countries that export goods found in Sudan's export basket. This is primarily a reflection of Sudan's past oil richness that only insufficiently led to broader rises in income levels. But it is also a reflection of Sudan not taking full advantage of its export basket to boost export growth and income. Figure 4.7.1 shows the cross-country relationship between EXPY—a measure of the sophistication of a country exports that represents the income level associated with a country's export basket—and economic growth as well as the trend in the income potential of national export baskets for Sudan and comparator countries. The past dominance of oil is reflected in the increased value of Sudan's export basket measured by the EXPY measure. See Annex 6 for details on EXPY and other product space terminology.

Sudan's concentration of exports has risen significantly over the past three decades, which indicates there may be scope for renewed diversification. Figures 4.7.2 and 4.7.3 show a representation of Sudan's exports in the product space for the time periods 1991–93 and 2009–11, and reflects the country's transition to a highly concentrated export basket. Products manufactured competitively (i.e., with RCA>1) are marked in red in Figure 4.7.2 and 4.7.3 and the evolution of the number of products with an RCA>1 can be seen in Figure 4.7.4. Comparison of the two product space maps shows that primary products such as sesame seeds and live sheep and goats were competitively exported in the early-1990s, and continued to be exported competitively during 2009–11. However, in the most recent period there is significantly lower number of competitively exported goods in more "connected" parts of the network, implying a lack of development of capabilities that allow easier diversification into new products (i.e., in contrast to products in the core).

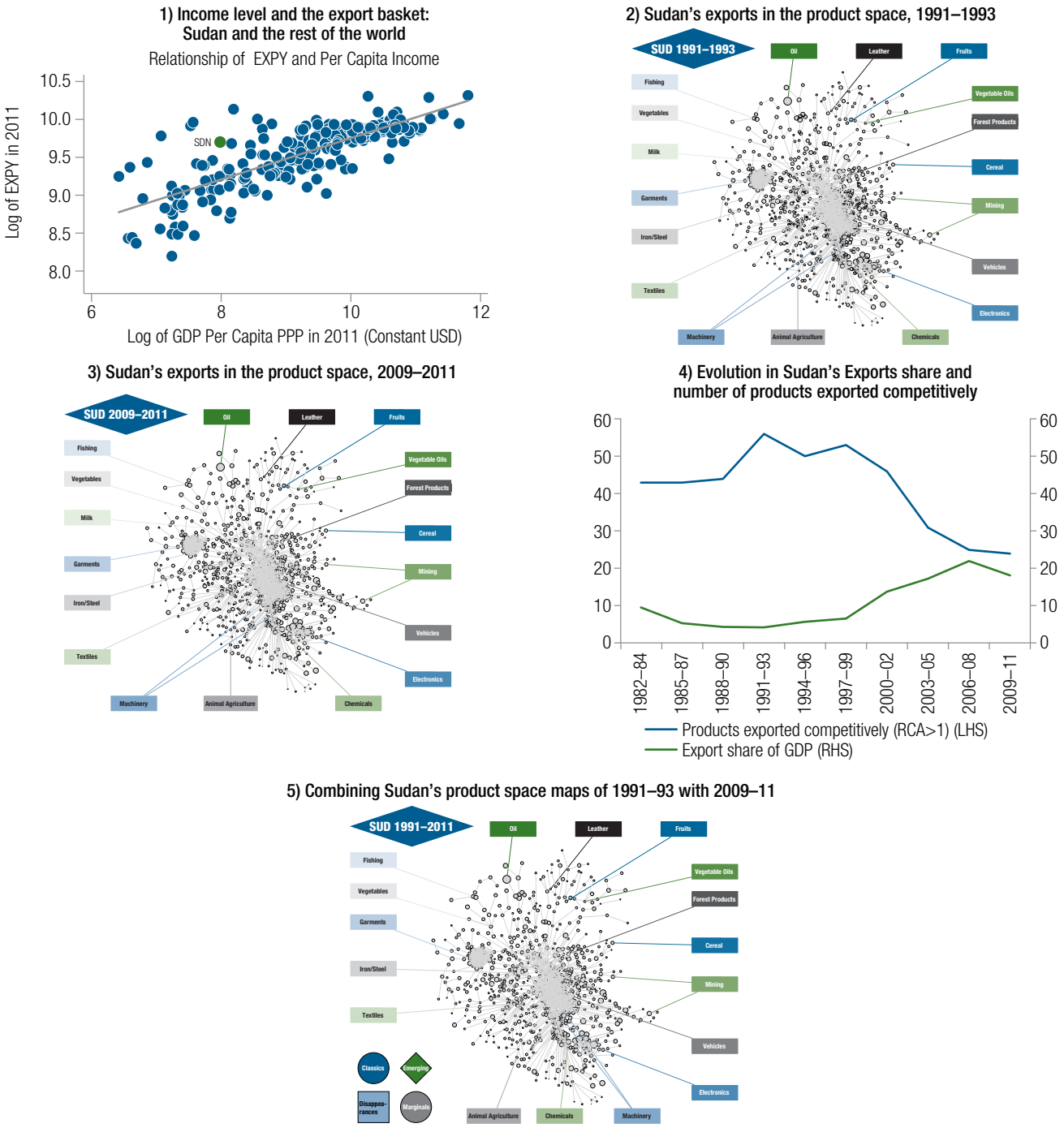
But diversification today needs to consider the changed competitiveness over time of products Sudan once produced. This is possible by adding the temporal classifications of products into "classics," "emerging champions," "disappearances," and "marginals" (see Box 4.3 for terminology). The product space analysis identifies 13 dominant classic exports, which show sustained competitiveness (Figure 4.7.5 and Annex 6, Table 0.16). All of them are primary products except for molasses (resource-based) and leather of other hides (low-technology). It is noteworthy that molasses are also among the products that can be identified as significant export items back in the 1990s, which do not show these significance anymore in today's export basket (Table 4.4).

There are also ten "emerging champions", products, which are now being competitively exported from Sudan that were not so in the early 1990's. The most well-known of these are

BOX 4.4: Product Space: Classics, Emerging Champions, Disappearance, Marginals

- "Classics" are products with demonstrated competitiveness over time where it may be less risky to invest.
- "Emerging champions" are products in which Sudan has increased its comparative advantage in global markets.
- "Disappearances" are products that were competitive in the past, but have lost that competitiveness more recently.
- "Marginals" are products in which Sudan had a low comparative advantage in the past and remain with low comparative advantage.

FIGURE 4.7: (Export) Diversification – Past and Present



Source: World Bank staff own calculations, based on data used from UN Comtrade; and the World Bank Exporter Dynamics Database.

petroleum and gold. Additionally, 28 products that were competitive in 1991–93 are no longer being competitively exported, these "disappearances" include maize, green groundnuts, oilcake, and peanut oil. Mechanically, the surge in crude petroleum exports is a large factor in the decline in the number of products exported competitively as the share of exports of many of these products are now

significantly lower given the tripling of the share of exports to GDP. In other words, some products that were once a significant share of the total exports are now a fraction of their original share due to the massive increase of crude petroleum, which was zero percent of the basket in 1991 and 94 percent of the basket in 2011 (Figure 4.7.4).

There are a variety of products (including manufactured exports) that Sudan has exported in significant quantities in the recent past, or in small quantities today. The rise of oil, and then of gold, may have entailed a drawing away of labor, capital, and other resources from the production of goods that were significant in the 1990s in a type of "Dutch disease" phenomenon. Thus, the lack of diversification and low survival rates of Sudanese exports may be interrelated. Conversely, the reduced significance of oil may allow some of these exports to return in the future (Table 4.4). Molasses could be one of them as mentioned earlier; organic chemicals are currently marginal as identified in Annex 6, Table 0.16, but could possibly be represent potential for forward integration from crude oil.

Sudan's historical export products represent a source of latent comparative advantage, which could emerge to contribute to macroeconomic stability in the event of shocks. Many countries have products in which they had historical comparative advantage but no longer do so today. These products provide a stock of latent comparative advantage (Lederman et al. 2015). Based on the experience of other countries, the presence of a latent export basket can reduce both GDP volatility and terms-of-trade volatility, particularly for poor countries with small economies. At least two types of shocks could potentially restore competitiveness of some of these historical products; a reduction in the price of oil, such as experienced in 2014 and 15, and a depreciation of the Sudanese currency, which could accompany a unification of the exchange rate and could increase overall competitiveness.

Prospect for value addition in gum arabic

This chapter showed that Sudan has significant market power in global markets for gum arabic. Since this power is based on the exports of raw, undifferentiated products, there could be an opportunity to slowly shift to more value addition through some processing. So while Chapter 3 looked at gum arabic marketing, the following will analyze the gum arabic value chain. In order to do so, there is a need to understand current constraints on processing products, and how to maximize value addition through combining processing solutions with smart variations in producing the raw materials. Since value addition would have to come through companies and activities carried out by the private sector, it is also important to look at broader business

Table 4.4: Manufactured Exports of Significance in the pre-Oil Period

Of significance in the late 1990s	Of secondary significance in 2011–2013	Both of significance in the late 1990s and of secondary significance in 2011–2013
• Molasses from sugar • Organic chemicals (styrene, saturated monohydric alcohols) • Essential oils and resins, cosmetics	• Miscellaneous edible preparations • Petroleum refining products • Plastics, and plastic and rubber products • Copper and copper products • Undenatured ethyl alcohol • Alfalfa meal • Interchangeable metal tools • Wood, wood articles, and wood charcoal • Paper and paper articles • Prefabricated buildings	• Cotton products—mostly yarn, but also fabrics and apparel • Leather and skins • Vegetable oils, oilseed products, oil cakes • Aluminum, iron and steel products (structures, bars, etc.

Source: World Bank staff own calculations, based on data from UN Comtrade.

environment constraints to facilitate a shift towards more value addition.

While Sudan is the largest producer of gum arabic in the world, it has no significant added value processing, a phenomenon observable in most producing countries (World Bank 2015a). Hence, a core objective of the sector in Sudan is to increase the level of value addition at origin and to increase the share of value-enhanced gum arabic products in the overall gum arabic trade from Sudan. This would lead to improved returns and resultant increases in the price paid to producers for the raw material.

The goal for gum arabic value addition should be to reach a level in Sudan that can produce spray dried material with high and defined levels of functionality, particularly in emulsions and encapsulation (World Bank 2015a). The possibility of adding functionality is important as margins are still not large for bulk sales of a standard processed spray dried gum arabic. Higher margins are created through the production of spray dried material with high and defined levels of functionality, particularly in emulsions and encapsulation. World Bank (2015a) argues that this requires management and development of the raw material supply chain to improve the quality of the crude gum related to functionality, and to put in place a traceability system to allow maintenance of the identity and integrity of batches of crude gum selected for, and defined by their particular quality attributes.

A strategy to increase the level of value addition through the development of spray drying capacity must therefore also address the development of raw material quality and the supply chain. This will also address the perceived quality problems with kibbled and powdered material that result in current low levels of demand for these products and the basic value addition that they offer, and provide a basis on which to build increased sales and value addition. Development of the supply chain will also directly address the issues raised by overseas processors, and so help secure the overall gum arabic trade and Sudan's dominant place in the trade (World Bank 2015a).

Enhancing the raw material production directly benefits producers through the potential for improved prices, and provides the base for processors to build value added. While the factors that determine quality, and harvest and post-harvest factors that deliver quality are well established, it is clear that "best practice" is not always implemented in the field. To illustrate, research in Sudan has shown that maximum yields are obtained when tapping of *senegal* is done between October 1st and November 1st, with the *Sonke* tool (rather than an axe or other implement), exposing an area about 30cms long, and 5 cm wide. But tapping is often not done in the optimal period; yet, later tapping (November 15th to December 15th) can reduce yields by up to 50 percent (World Bank 2015a).

Three additional measures to enhance the production and management of gum arabic—both raw and spray-dried—could make a big difference to increase value addition and hence returns to producers in gum arabic trade from Sudan (World Bank, 2015a):

- **Access to pre-harvest crop finance.** This is frequently quoted as a major requirement for producers. Buyers will typically pre-finance their agents and other middlemen over whom they have control, but the constraint to direct pre-finance to producers is a common problem for producers accepting pre-finance from one buyer and then selling to a different one. As such, buyers without strong linkages exercise control over the producer. There are alternative (traditional) ways to finance through the village traders but these are linked to high effective interest rates and low prices for material (World Bank 2015a).
- **Bundling interest to enhance buyer-producer links**. Gum Arabic Producer Associations (GAPA) have already been formed, but they need to be strengthened to effectively establish

a framework through which buyers can work with producers. This allows buyers to influence and improve practices and as therefore quality, price and production volumes, while providing the necessary interest and security to buyers to enable them to consider direct pre-financing. Support to producer groups—training, awareness, and management—will be required to reduce defaults on pre-financing from buyers (World Bank 2015a).

- **Establish a simple practical product traceability system.** This is essential to maintain the link between product and quality through the supply chain. Traceability provides the base for differential pricing by quality, and enables containment and management of any groundnut (or other) contamination issue that might occur. Raw material traceability feeds also directly into processing quality management systems (World Bank 2015a).

Considerations for the development of services

Reforms in the area of services need to focus on the development of framework conditions that facilitate the growth of professional services, and address skills shortages and skills mismatches. In the short term, reforms need to focus on the developments of the necessary regulatory framework and incremental, qualitative improvements in domestic regulations that hamper the growth of the sector. Top regulatory constraints identified by the private sector include regulations regarding participation in public procurement processes, competition issues, and the qualification and licensing requirements and registration and other administrative procedures that limit the entry and the operation of professional services firms. The regulatory reform process needs to involve the private sector. In the long term, faculties and other training programs must be created, improved, and expanded to satisfy professional training needs, but this must be planned and carried out in a manner that will increase not only the quantity but also the quality of offerings.

Sudan could leverage earlier progress made in the education sector. For example, its success at increasing enrollment at the primary and secondary levels generates growing demand for vocational and higher education. The absence of links between educational systems, employers, and users of services prevents young graduates from acquiring market-relevant skills. Several stakeholders from the private sector have emphasized the coordination problems between employers, professional associations, and education institutions in the content of educational programs for engineers and accountants. Policy actions to encourage collaboration between universities, professional associations, and the private sector (for example through internships) could help students acquire skills and practical training. Such collaborative actions are required to better understand and strengthen the links between the curricula and the skills required to support the expansion and diversification of the economy. The requirements for medium- and high-level skills in more sophisticated business services need to feature in Sudan's Education Sector Plan to mobilize both internal and external financing.

Regional integration and multilateral negotiations offer opportunities for implementing regulatory reforms and reducing the skill gap through services liberalization. Sudan is a COMESA member and is currently negotiating its WTO accession. How far and how quickly Sudan will proceed depends on political and economic considerations. Ideally, liberalization would be non-preferential so that domestic users of professional services have access to, and domestic professionals can benefit from, exposure to the best service providers in the world. This protects countries from suboptimal regional providers. If, however, reciprocal liberalization at the regional level is politically more feasible, then Sudan ought to weigh the unquestionable benefits of market opening, even in the narrow regional context, against the possible

costs of giving a first-mover advantage to what may be a second-best regional service provider.

Steps need to be taken by Sudan to relax the explicit trade barriers applied to the movement of natural persons and commercial presence of professional services. Examples of possible reforms include: articulating the economic and social motivation for nationality and residency requirements; minimizing restrictions on the forms of establishments allowed; and developing a transparent and consistent framework for accepting professionals with foreign qualifications. The reduction of explicit trade barriers also needs to be complemented with the reform of immigration laws and rules on the hiring of foreign workers.

Deeper regional integration, through regulatory cooperation with neighboring partners who have similar regulatory preferences, can usefully complement non-preferential trade liberalization. Regional integration would also enhance competition among services providers, enable those providers to exploit economies of scale in professional education, and produce a wider variety of services. Regional integration brings further benefits in that a larger regional market is able to attract greater domestic and foreign investment; and regionalization may help take advantage of scale economies in regulation, particularly where national agencies face technical skills or capacity constraints.

Regional integration may help Sudan take advantage of scale economies in regulation, particularly where national agencies face technical skills or capacity constraints. Regional initiatives such as the program that is currently being developed by the Inter-University Council for East Africa (IUCEA) in terms of designing university curricula and research, and creating university/industry partnerships for fostering knowledge could provide guidance for Sudan's education reforms. Also, collaboration with the IUCEA could contribute to the reduction of education-related differences that fragment the regional market for education and thereby encourage trade in education between Sudan and neighboring countries.

Opening up regional boundaries and establishing Mutual Recognition Agreements (MRAs) would facilitate Sudan's services integration with its African partners. The free movement of COMESA nationals without work permit requirements would be of great help to increase business opportunities within the region and boost service exports. Sudan could learn from East Africa's experience with MRAs in accounting and architectural services. The EAC Common Market Protocol, adopted by the Multi Sector Council in 2009 includes an annex on a framework agreement on MRAs for academic and professional qualifications. The five EAC countries have already signed an MRA in accounting services and implementation focuses on the following areas: requirements for education, examinations, experience, conduct and ethics, professional development and re-certification, scope of practice, and local knowledge. To assist with the preparation of potential MRAs Sudan countries could benefit from technical assistance in the context of the DTIS implementation.

5 EXTRACTIVE INDUSTRIES: STILL IMPORTANT BUT NO LONGER DOMINANT

Remaining natural resources in Sudan are likely to provide some limited time-bound support to the efforts for diversification, but to consider the transient character of natural resources in post-2011 Sudan is prudent. The diminishing effects of both oil and gold on Sudan over the next 10–15 years are obvious. The constrained outlook for exports and revenues from domestic oil production places the spotlight on fees that the Government obtains for the handling of South Sudanese transit oil. Notwithstanding the fiscal benefits obtained from transit fees, these arrangements can only be expected to be transitory. With this background, the Government's emphasis on promoting alternatives to the oil sector is well founded, and there have been early results in the form of the boom in gold exports. Traditional mining may, with sufficient support, provide a source of livelihood in rural areas that may have few other sources of economic support. Industrial mining may take some time to become established, however, such a development over the medium to long term would be more likely to provide a more balanced, export and revenue contribution to the economy than traditional mining. Overall, the contribution of mining to Sudan's economy over the medium term could be positive, however, the scale of the sector is very unlikely to rival that of the oil sector in its heyday and its fiscal impact may be substantially lower. Any more thorough evaluation of the contribution of the mining sector to economic development in Sudan would have to take into account negative externalities such as harmful environmental and social impacts. At the very least the remaining natural resource wealth available through oil and gold could be used to finance three of the more cost-intensive recommendations developed in this study.

A. Overview

After a decade of heavy dependence on oil to fuel its economy, Sudan faced the abrupt loss of two-thirds of its oil production capacity in June 2011. At secession Sudan as a whole was producing some 460,000 barrels per day (bpd) of crude oil, most of which was exported. As a result, export proceeds were the main foreign exchange provider for the economy, the sector contributed 16.3 percent of GDP (2010) and revenues from oil were 45 percent of domestic revenues and grants (2010). Within a year of secession Sudan was producing little more than 100,000 bpd, with less than half of this exported and the sector contributed just 2.8 percent of GDP and 27 percent of government receipts. A further two years have passed and recent production has fluctuated around 120,000 bpd (Ministry of Petroleum 2014; IMF 2013; and IMF 2014a). However, oil prices, which at least were favorable in 2012, are now a source of concern after falling to around US$50 per barrel on the international market.

Simultaneously, after the secession, Sudan emerged almost overnight as one of Africa's leading gold exporters. Official exports reached

46 tons in 2012, valued at US$2.1 billion, placing Sudan fourth behind South Africa, Ghana, and Tanzania and one of the top twenty gold exporters in the world. Yet, by the end of 2013, world gold prices had dropped sharply. Although export volumes and values have been lower than the peak, they are nonetheless significantly higher than they had been in the years prior to secession. Moreover, the Government continues to issue statements suggesting that gold activity remains strong and is, in fact, rising (for instance, see CBOS 2014).

The Government sees the gold sector as critical to its plans to mitigate the impacts of the loss of oil exports and revenues. It has followed a bold plan to promote gold exports and encourage development of gold mining. The gold buying policy of the Central Bank of Sudan has been central to these plans and the Government has further invested in a domestic gold refinery. Mining, whether done traditionally using rudimentary techniques or fully mechanized in industrial mining projects is being supported at the policy level both in Khartoum and at State level.

B. Sudan's Oil Sector

Overview of recent developments

Just before the turn of the century Sudan began to exploit oil resources first discovered in the 1970s, enabling the economy to double its size in real terms by 2010. Sudan joined the ranks of oil exporting countries in 1999, capitalizing on an oil market buoyed by rapid Chinese industrialization and direct support of China to build the facilities needed to export crude oil. Oil exports quickly came to dominate exports, accounting for 86 percent of exports of goods and services on average from 1999 to 2010. The fiscal contribution of the sector surpassed all others, accounting for 47 percent of government receipts on average in the same period (IMF 2012). By that time Sudan had in place an extensive and integrated system for refining its oil to meet domestic demand and exporting some US$11 billion worth of surplus crude annually, whose upfront installation costs had largely been recovered.

The secession of South Sudan in July 2011 brought about an immediate and severe rupture in the oil sector, with oil reserves attributable to Sudan just 30 percent of pre-secession levels (BP 2014; and Wood Mackenzie 2013).[55] This meant a fall from an estimated 111 barrels to 43 barrels of reserves per capita. In addition, the reserves to production ratio, which had stood at nearly 29 years fell to about 26 years, depending on what rate of production is assumed to be sustainable.[56] Since oil is a finite resource, all governments must prepare for the day when resources become exhausted but in Sudan's case that process was accelerated by secession.

Sudan's trade balance suffered as well since the surplus oil available for export after meeting domestic demand for refined petroleum products rapidly disappeared. Domestic needs had been rising fast and with the loss of production to the south, Sudan now needed to import petroleum products to meet demand that domestic refining capacity alone could not supply.[57] Refinery capacity exceeds what Sudan can supply from its own oil fields, although owing to contractual obligations, a portion of its crude oil is still exported, meaning that refining

[55] BP and Wood Mackenzie report different levels. BP originally reported proven reserves of 6.7 billion barrels of oil at the end of 2010 but the 2014 report puts reserves at the end of 2012 for Sudan and South Sudan combined at 5.0 billion barrels, with 1.5 billion barrels (30 percent) attributable to Sudan. Wood Mackenzie, reports "commercial" reserves, which is a narrower definition of what can be produced. According to these reports Sudan has just 0.52 billion reserves (BP 2014; and Wood Mackenzie 2013).

[56] For this calculation, the analysis uses reserves reported by BP and assumed that the nominal rate of production that could have been sustained in Sudan after secession (free of any security and technical constraints) would have been some 160,000 bpd. If the far-lower reserve levels reported by Wood Mackenzie were assumed, the number of years over which production could be sustained would be correspondingly less.

[57] Domestic demand for petroleum products in Sudan is estimated to be reaching close to 120,000 bpd of oil equivalent and based on elasticity of demand and GDP projections would rise around 175,000 bpd by 2020, far exceeding the projections of available domestic crude oil as reported in various cases in Figure 5.1.4.

operates at below capacity. Data for the first half of 2014 indicate petroleum products imports weighing heavily on the trade balance, continuing the trend seen in Figure 4.1.1.

The reduction of production after secession led to a sharp fall in Government fiscal receipts. Before secession receipts from crude oil stood at some 60 percent of total Government receipts but are estimated to have been just 15 percent of total receipts in 2013 (IMF 2014a). The level of receipts reflects total production volumes, the share that is transferred domestically for refining at controlled prices and global oil prices. The precipitous fall of the latter in late 2014 will feed into government oil receipts, as discussed further below.

The fiscal position has also been influenced by developments in South Sudanese production, since Sudan levies fees for the use of oil processing facilities, pipelines, and port facilities located in Sudan. Within six months of secession an inability to settle boundary disputes and terms under which Sudan would handle oil shipments from the south resulted in oil production being suspended for some 18 months. Eventually production resumed once terms were agreed between the two countries in the *Bi-Lateral Agreement on Oil and Related Matters.* In 2013, receipts under these arrangements are estimated to have been nearly 7 percent of total receipts (IMF 2014a).[58] These were forecast to increase in significance in 2014 after the resumption of South Sudanese output, however, the outbreak of civil war there in December 2013 has resulted in lower than projected receipts.

The outlook for oil exports and government oil revenues is difficult to predict. The Government has projected rising domestic oil production and is also relying on South Sudan's output to both increase and continue to be exported through Sudanese facilities. The following analysis evaluates each of these elements and provides some preliminary projections over fifteen years to 2030. The flows of oil that will be examined can be represented as shown in Figure 5.1.2.

Domestic oil resources and production

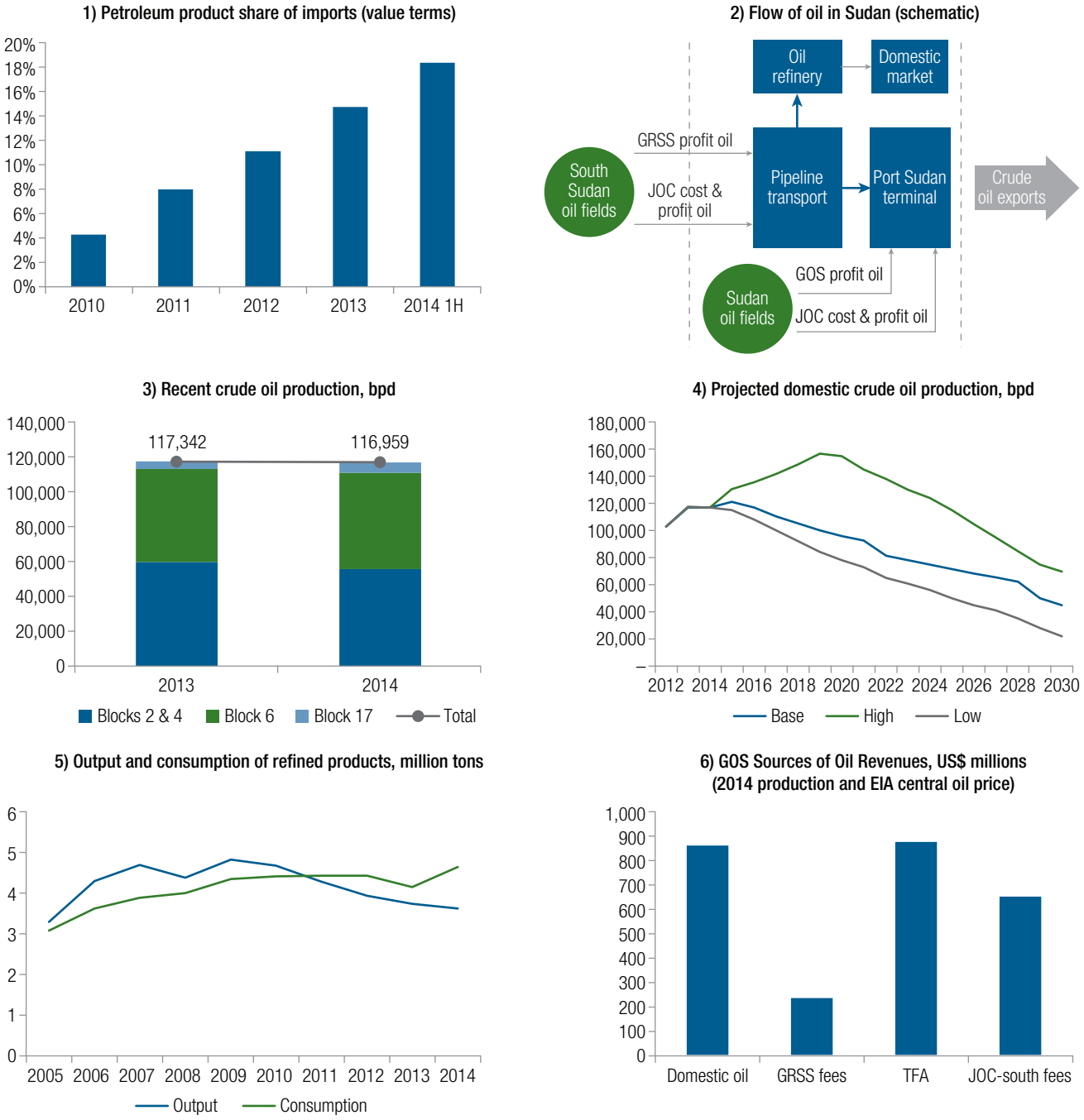
Sudan's oil resources since secession consist primarily of oil contained in reservoirs in the Muglad–Sudd Rift Basin which were the target of exploration in the 1970s and 1980s. Only a small portion of the productive Melut Basin exists in the north (Figure 5.2). Indications of oil resources in other inland basins have yet to be followed up with exploration drilling, although there are 11 blocks for which exploration rights were awarded in 2012. Over the years non-associated natural gas has been found in two of the other inland basins and in the Red Sea but in each case has been considered sub-commercial to exploit, although the Ministry of Petroleum is evaluating how to make use of this resource.

The aggregate amount of oil reserves reported vary according to the reserves definition used. The reserves reported by BP in their annual global review are associated with oil fields that were already in production in 2012 and amounted to 1.5 billion barrels by year end (including proven and probable reserves but not possible reserves: BP 2014). Only one additional field has commenced operations since 2012, for which reserves data are not reported. Additions to reserves would result either from the re-evaluation of reserves at existing fields or new discoveries once appraised.

Sudan's oil fields are of varying age and productivity, with several having reached their decline phase. The Greater Nile (North) oilfields and processing facilities are contained in Blocks 2a, 2b, and 4 in the Muglad Basin. GNPOC is the Joint Operating Company and supplies Nile Blend crude oil via the Heglig-Bashair Pipeline. Production peaked in Greater Nile (North) at over 100,000 bpd (Wood Mackenzie 2013). Block 6, also in the Muglad Basin, is operated by Petro-Energy and supplies Fula Blend crude oil via the

[58] World Bank staff estimates based on IMF (2014c); this comprises transit fees and the transitional payments under the Bi-lateral Agreement.

FIGURE 5.1: Sudan's Oil Sector: Production, Trade and Flows



Source: World Bank staff own calculations and visualizations, based on data from CBOS 2014; Ministry of Petroleum 2014; IMF 2012; IMF 2013; and IMF 2014c Wood Mackenzie 2013; and the U.S. Energy Information Administration (EIA).
Note: (5) 120,000 bpd in Sudan; 160,000 bpd in South Sudan. The TFA payment shown is pro-rated by year rather than linked to production level.

Al Fula–Khartoum Pipeline. It is estimated to be producing close to its peak rate. Since 2012 production has started up in Block 17 operated by Star Oil from the al-Barasaya field. Figure 5.1.3 shows the composition of crude oil production in 2013 and 2014.

The Government has been working with the Joint Operating Companies (JOCs) on plans under which production could eventually be lifted to 175–200,000 bpd and has based its medium term economic projections on such plans. These plans include improvements in the rate of recovery from existing oil fields through a mixture of de-bottlenecking, improved oilfield practices, and enhanced oil recovery technologies.[59] An agreement was recently signed by the Government with CNPC in respect of the Greater Nile (North) and Block 6 oil fields, under which it is reported investments to increase oil production will take place to help reach the Government's production target. Details of the nature, scale and timing of these investments were not reported, though the Ministry of Petroleum's target for 2015 is 140,000 bpd (EIU 2015).

On an unusual note, the Government's medium term plans also rely on expectations that successful exploration will add to production. In December 2014, the Minister of Petroleum announced that operators plan to drill 253 wells in 2015, without specifying what kinds of wells these would be (production, injection, appraisal, exploration). As a result of these wells reserve additions amounting to 65.4 million barrels (equivalent to two and a half years of output at present rates) are expected (Reuters 2014). While there is reason to expect that some proportion of exploration wells will strike oil, not only is the success rate of exploration drilling difficult to predict but so too is the size of discoveries made, until they are fully appraised.[60] It is very unusual for governments to include such expectations in projections that are used for wider economic planning and budgeting.

Three scenarios for future oil production: base, high, and low

This analysis argues that the base case projection oil production can be sustained only at around 120,000 bpd and only for a year or two before a gradual decline takes hold, with output down to 100,000 bpd after five years and to 45,000 bpd after fifteen. The base case draws on available information about the reserve base and production profiles of existing oil fields only as well as installed processing and pipeline capacity (Wood Mackenzie 2013). It assumes that no significant investment in enhanced oil recovery takes place at existing fields and that there are no oil reserve additions made through discoveries. Until information is available that would confirm significant investments in Enhanced Oil Recovery (EOR), this study considers this conservative base case to be justified. Projections are subject to growing levels of uncertainty as the time horizon increases (Figure 5.1.4).

FIGURE 5.2: Key Oil Infrastructure in Sudan (and South Sudan)

Source: EIA September 2014.
Note: The Thiangrial refinery is located near Palougue not as shown.

[59] In Block 6 a pipeline is being built to tie in previously unexploited fields to the processing facilities and main pipeline (Sudan Tribune 2014).
[60] BMI (2014) also casts doubt on the ability to contract such the large number of drilling rigs implied by the official report.

The high case assumes that large investments in enhanced oil recovery proceed soon, thereby enabling oil production to rise to a peak rate of 156,000 bpd before beginning its decline.[61] While it is reasonable to assume that, given a favorable security and commercial environment, substantial investment would take place to enhance oil recovery and find more oil, there remains considerable uncertainty about when this will in fact take place.[62] With regard to exploration, the long lead time needed to bring any significant new discoveries into production probably means that the impact on total production would only occur after 2025, so this upside possibility has not been considered (Figure 5.1.4).

The low case assumes that additional risks to oil production result in output declining earlier and more sharply than in the base case, with output reaching just 22,000 bpd after 15 years rather than 45,000 bpd. A significant source of uncertainty concerning the production outlook stems from the technical standards used to operate oil fields and the constraints imposed by the difficult security situation. Though not possible to confirm from available data there is a possibility that oil fields have been "over-produced" in the interests of short-term cash generation at the expense of overall oil field recovery (implying shorter field life) (Figure 5.1.4).

Domestic supply and exports of crude oil

Government policy has been geared towards meeting domestic demand for petroleum products and exporting surplus crude oil. Two refineries—the main Khartoum refinery and its extension, and the El Obeid Refinery—refine domestic crude oil to produce a wide range of fuels. The main Khartoum refinery can refine up to 50,000 bpd of Nile Blend crude and produces 2.5 million tons of fuel products per year, almost entirely for domestic consumption. The extension to the Khartoum refinery was constructed in 2004 to process the highly acidic Fula blend. It has a capacity of 40,000 bpd and can produce 2 million tons of heavy fuel products (for instance, heavy coke and petroleum coke) each year, mostly for electricity production. The El Obeid Refinery has a capacity to refine 15,000 bpd of Nile Blend and produces gasoline, diesel, and fuel oil, with the latter—again used primarily for electricity generation—accounting for the largest share (IMF 2012). Refinery production is shown in Figure 5.1.5.

Although domestic refineries have been built and expanded over the years, domestic demand for refined petroleum products now equals domestic supply capacity. Although the pace of demand growth has slowed since secession, Sudan's consumption is likely to rise at rates exceeding average GDP growth. The supply-demand balances vary across the range of petroleum product markets depending on the type of the crude oil supplied and configuration of oil refineries. Gasoil, diesel, jet oil, and LPG are imported to cover the shortfalls in domestic production. On the other hand, gasoline (mogas) output exceeds consumption and the surplus has been exported to neighboring countries (IMF 2012).

The Government has long supplied its share of profit oil to the oil refineries at controlled prices and may call on JOCs to supply oil refineries as well to meet domestic requirements. The refineries receive Government crude oil at a fixed price of US$49 per barrel and JOC crude oil at negotiated prices linked to international market prices. The differential between export and controlled domestic prices has narrowed with the precipitous fall in global oil prices in recent months. This may limit the incentives to smuggle refined products to neighboring markets that have until recently faced higher product prices.

[61] Based on IMF (2014c) which reflects discussions with the authorities for the period to 2019; the projection of output from 2020–2030 in this high case is based on World Bank staff estimates.

[62] The objective of investment in EOR is to increase the proportion of oil in place that is recovered by stimulating well productivity through the injection of water, gas, steam or chemicals into the reservoir. According to SUDAPET there are plans to lift the recovery factor at existing fields from an average of 27 to some 35 percent.

Exports of crude oil are now confined to the JOC share of production less any domestic supply obligation. There are understood to have been some inconsistencies in official reporting of exports but adjusted data for 2013 shows export of 43,000 bpd (about 37 percent total domestic output; IMF 2014c). This amount would imply that the JOCs are exporting only a portion and not all of their oil entitlement under the EPSAs. Since domestic refinery capacity imposes a ceiling on how much crude oil could be supplied domestically, any significant increase in domestic oil production, as in the high case projection, would contribute to a significant increase in crude oil exports. Conversely, any decision to expand refinery capacity in view of the growth of domestic demand for petroleum products could be expected to result in diminishing crude oil exports.

Fiscal revenues from domestic oil production

Under the Exploration and Production Sharing Agreements (EPSAs) that govern the allocation of oil, the Government receives crude oil remaining after the JOC takes cost oil and its share of profit oil. The amount of cost oil is subject to a 50 percent ceiling in all the EPSAs, ensuring that in each year some oil is allocated to profit oil and shared by the parties. Greater Nile (North) oil fields are mainly mature and their capital costs have been largely recovered, so the amount of oil allocated to the JOC as cost oil is relatively low (i.e. lower than the ceiling would allow). In the case of Block 6 the recoverable costs are high enough that all cost oil will be allocated for a few more years. All oil remaining after cost oil has been allocated is shared between the Government and the JOCs. In aggregate, the Government is currently entitled to some 62–68 percent of profit oil depending on the EPSA.

Each of the EPSAs has been modeled to determine the amount of oil available to the Government and then aggregated. This involves first valuing oil production to determine what quantity has to be allocated to meet eligible JOC costs. The value used in the model is based on the export price of Sudanese crude oil FOB Port of Sudan. The export price is specific to the crude oil type, in this case Nile Blend, or Fula Blend. This analysis uses the simplifying assumption that the export price is that of Brent crude oil less a discount, reflecting the quality differential between Brent and Nile Blend. The second step is to allocate the balance of crude oil after cost oil has been deducted according to the profit oil splits in the EPSAs.

The export value of crude oil is derived from projections of Brent crude prices issued by the U.S. Energy Information Administration (EIA), with adjustment for the price discount.[63] The central EIA forecast is for oil prices, in real terms, to remain slightly below US$100 per barrel over the next six years before rising gradually again. Recent sharp falls in the price of oil on international markets has forced a re-think of the short-to-medium term outlook for oil prices. Rather than modifying the central price forecast, which covers a long period, this analysis instead used high and low scenarios to test the sensitivity of the Government share of oil to external market shocks.

The Government's share of crude oil production in the base case scenario ranges between 40–45 percent in the period to 2030. It is assumed that the entire share is transferred to domestic oil refineries at the controlled price. If it is further assumed that the transfer price is US$49 per barrel, the Government's oil reaches a peak value of US$970 million in 2016. By 2025 the amount drops to US$550 million. Production bonuses are also payable by the JOCs to the Government on the basis of cumulative production from individual blocks; however, the amounts are not significant compared to revenues obtained from its oil entitlement.

[63] The price information is based on EIA Brent forecast (short-term for 2014 and 2015); long-term thereafter, discounted based on real and nominal price forecasts provided by the EIA as of June 2014. Since recent price development has been downward, the central price scenario, at least in the short term may be too optimistic.

Higher or lower international oil prices affect Government oil revenues not through the transfer price, which is fixed, but through increases or decrease in the Government's oil entitlement. With recent oil prices sharply lower, there is expected to be an increase in cost oil allocated to the JOCs (subject to limits imposed by the cost oil ceiling) and a commensurate decrease in the Government's oil entitlement.

Fiscal receipts from fees charged on South Sudanese crude oil

So long as South Sudan relies upon processing and transportation facilities in Sudan to export its crude oil it will pay fees to the Government of Sudan (GOS). Moreover, the level of fees payable will reflect the degree to which Sudan exercises monopoly over such exports. There are two sets of arrangements under which fees are payable to GOS. The first is the Bi-Lateral Agreement on Oil and Related Matters (Bi-Lateral Agreement) between the two governments. This agreement was only reached in mid-2013, some 18 months after oil production in South Sudan had been suspended. The second is a series of agreements negotiated by GOS directly with the JOCs in South Sudan (JOC-South) as recently as mid-2014.

The Bi-Lateral Agreement requires the Government of the Republic of South Sudan (GRSS) to pay GOS fees on GRSS crude oil processed in Sudan and transported to Port Sudan for export. The agreement specifies separate processing, transportation, and transit fees totaling US$9.10 per barrel supplied from Blocks 3 and 7 (the two blocks in Upper Nile State from which regular deliveries have been possible since production resumed in 2013) and US$11.00 per barrel from Blocks 1, 2, 4 and 5a in Unity State, where wells remain shut-in.

Under the Bi-Lateral Agreement GRSS is also required to pay US$15 per barrel up to a maximum of US$3.028 billion as a Transitional Financial Arrangement (TFA) ending in December 2016. This is equivalent to US$875 million a year if prorated evenly across the 3 ½ year period during which the TFA is in force. This payment is supplementary to the processing, transportation, and transit fees described above. The arrangement is based on an assumed supply rate of 152,000 bpd of GRSS oil over the term of the agreement but if these volumes are not adequate to allow Sudan to recover the full US$3.028 billion prior to the expiration of the agreement in December 2016, GRSS is required to pay GOS the outstanding TFA balance 60 days prior to the expiration of the term of the Bi-Lateral Agreement (IMF 2014c). Given output constraints due to the shut-in of fields in Unity State, this arrangement is likely to result in a large shortfall payment. It is unknown at this stage if the Bi-Lateral Agreement will be succeeded by one with a similar payment guarantee or be tied only to actual exports of GRSS entitlement oil. Nor is it known at what level tariffs for processing and transportation will be fixed since this will all need to be negotiated between the parties.

In 2014, it is estimated that on average some 70,000 bpd of GRSS entitlement oil has been exported through Sudan, generating US$233 million annually in processing and transportation fees (excluding the TFA transit payment).[64] Predicting future levels of South Sudanese crude oil exports and the impact on payments to GOS is complicated by uncertainties as to i) the resumption of output from Unity State and the level at which output in Upper Nile State can be sustained, ii) the profit oil share allocated to GRSS under the EPSAs, iii) what portion of crude oil produced in the south would in the future be refined in South Sudan; and iv) at what point South Sudan may have alternative routes to export crude oil by pipeline.[65] Output in South Sudan is running some 30 percent lower than

[64] This calculation is based on total crude oil output of 160,000 bpd and a GRSS entitlement of 40 to 45 percent of this.

[65] South Sudan hosts two small oil refineries that have yet to operate but are understood to have capacities of 10,000 and 5,000 bpd of crude oil, respectively. It is not clear what arrangements have been made for them to obtain crude oil supplies from processing facilities located in Sudan.

projected in preparing the GRSS Budget for July 2014–June 2015 and, as in the north, substantial investment in EOR and exploration is needed to avert a gradual production decline.

In July 2014 the JOC of Blocks 3 and 7 in South Sudan agreed with GOS to pay a combined processing and transportation tariff of $19.80 per barrel retroactive to June 2013 (the date when oil supplies resumed) up until December 2016. With falling oil prices, this means that Sudan is able to obtain a growing share of the market value of any South Sudanese oil it handles on behalf of the JOC destined for export. Assuming that these terms apply to all JOC entitlement oil estimated to be currently produced in Blocks 3 and 7 these obligations would amount to US$650 million a year.[66]The same agreement provides for a reduced tariff of US$12.10 per barrel for the period from January 2017 to March 2022. A similar agreement is in place for the oil fields in Unity State, albeit with different tariffs. So if production were to resume, the total amount payable by JOCs in the south to GOS would, of course, increase.

An interesting feature of the arrangements for charging tariffs on transit oil is that they are based on agreements with GOS, not the operators of the facilities being used by suppliers from the south. GOS has indemnified the suppliers for any claims for payment by operators of the Central Processing Facilities and transportation infrastructure for their use. Out of its receipt of fees GOS pays the owners of the processing and transportation facilities at the rates that apply generally for crude oil handling services and the net balance is retained by GOS. Although the data necessary to quantify it precisely is not available, it would be reasonable to assume a margin over tariffs of some 3:1.

Aggregate fiscal revenue position in 2014

It is estimated that GOS oil revenue from domestic oil production in 2014 reached some US$860 million based on 48,000 bpd of entitlement oil valued at the controlled transfer price to domestic oil refineries. This is significantly lower than the value that would have been obtained had entitlement oil been valued at the export price. Other sources of revenue include net proceeds of SUDAPET, for which information is unavailable, and minor production bonus payments.[67]

Payments received from GRSS and JOCs-South represent a significant additional revenue stream estimated to have been nearly US$1.8 billion in 2014. The composition of GOS oil revenues in 2014 is shown in Figure 5.1.6 and is based on current production levels in both countries, the central EIA price forecast for 2014, and calculations based on the EPSAs and other agreements. This only shows gross receipts of fees before GOS pays tariffs to the owners of processing and transportation facilities out of fees collected from GRSS and JOCs-South. On the other hand it does not show the supplementary payments due to GOS from JOCs-South for arrears in relation to the period from June 2013 to July 2014.

An interesting feature of Government oil revenues is the limited direct impact that international oil prices have on revenue levels. Revenues from domestic production are largely price insensitive since all of the Government's oil entitlement is transferred to domestic refineries at a fixed price. Revenues from South Sudan's oil exports depend on fixed tariffs per barrel of transit oil for the periods specified in relevant agreements. This insulates a significant share of Sudan's total oil sector receipts from the direct impacts of varying oil prices. There are, nonetheless, secondary effects of changes in international oil prices through adjustments in the

[66] Total South Sudanese production in 2014 is estimated to be on average 160,000 bpd.

[67] The national oil company SUDAPET is a member of the JOC under each EPSA and, as such, receives cost oil and profit oil in proportion to its participation interest in the JOC. For purposes of this analysis, it is assumed that the proceeds of its share of oil are used to meet costs and the profit element is not Government revenue. In practice, as an owner of SUDAPET the Government may receive revenue in the form of a transfer of net proceeds from SUDAPET.

amount of oil that needs to be allocated to cover cost oil of the JOCs both north and south of the border. Recent sharp falls in oil prices will result in the volumes of oil allocated to both governments falling as a result.

Finally, that portion of transit fees covered by the shortfall provision in the Bi-lateral Agreement is also insulated from production changes in South Sudan. Notwithstanding this significant level of protection, the current level of tariffs is only fixed for the period up to December 2016 when the Bi-lateral Agreement with GRSS expires and the transit agreements with the JOCs-South provide for a reduced tariff rate starting in January 2017.

C. Sudan's Gold Sector

Overview of recent developments

Only in the wake of the loss of oil resources at secession, has the Government of Sudan turned to minerals as part of a policy to diversify the economy. Although the country draws on a rich history of mining going back millennia, until very recently Sudan had been only a minor producer of gold, chromite, iron ore, a number of non-metallic minerals, and construction materials. The geology of Sudan had always suggested potential that far exceeded both ancient and more recent levels of activity. Yet private sector investment to modernize traditional mining practices, or to identify and measure viable deposits through targeted exploration activities had been scarce. Most activity was taking place only on a small scale, much of it was unregulated, and the sector made a very limited contribution to the national economy.[68]

As part of its strategy to promote the mineral sector since 2011, the Government has made a concerted effort to encourage the mining of gold and divert hitherto illicit gold flows into the formal export economy. In 2011 the Minister of Mines stated that "[t]he gap in the budget from the loss of oil revenues is about $4 billion. If our gold is not smuggled, it can provide this amount of money (...). So our policy now is to concentrate on closing the gate through which the gold is smuggled" (Martelli 2011). The main measures used were to launch a Central Bank's gold buying program and to construct a national gold refinery. The Central Bank has established a network of gold buying centers and agents to offer competitive prices to the traditional mining sector. Until 2012 unrefined gold purchased this way would then be officially exported for refining abroad. However, once the refinery was installed in September 2012 this gold could be refined into pure gold bars before being exported[69] Furthermore, a ban was placed on exports of unrefined gold and informal gold refining in December 2012 (Sudan Tribune 2012).

Official exports had begun to increase in the run up to secession but, soon after, they surged to over US$2 billion in 2012 (Figure 5.3.1). Although exports were sharply lower the next year, they increased somewhat in 2014 and are, in any case, far in excess of the levels seen before secession. Moreover, the dramatic growth of exports was not simply the result of a rise in international

[68] Other than gold, Sudan produces only modest quantities of minerals, although copper is set to emerge as a significant mineral export. Trade data lists only chromium among Sudan's mineral exports aside from gold; however, the values have been insignificant compared to gold. There is very little information about the mines producing these minerals, though it is understood the main source is Blue Nile State (Ingessana Hills). The U.S. Geological Survey reports sporadic output of chromium and manganese ores and a variety of industrial minerals, principally feldspar, gypsum, and kaolin. Within the next few years, however, the Hassai mines will begin exploiting a large copper orebody and plan to produce some 50,000 tons annually. At US$5,000/ton revenue of US$250 million would result. There is some early stage exploration ongoing that suggests that, as at Hassai, copper may be hosted in a series of Volcanic Massive Sulphide deposits. Eventually, these could form the foundation of an industrial mining sector on a significantly larger scale. Insufficient information is available to project other mineral production even though geological studies over the decades have detected mineralization in multiple areas. Aside from minerals produced for export there are considerable quantities of low-value construction minerals produced for domestic consumption.

[69] It is possible that short term differences between refinery production and exports would take place due to inventory changes. Moreover, since gold is also held officially in reserves as "monetary gold" it is possible that releases or additions to such reserves would temporarily affect export volumes and values and not be reflected in refinery output.

gold prices. As can be seen in Figure 5.3.2, export volumes have grown at the same time and, indeed, have been closely correlated with movements in the international price of gold.

The strong performance of official gold exports has given the Government confidence that its policies have been working and that gold exports can eventually replace the role previously played by oil exports. To better understand why gold exports boomed after secession and how likely it is that exports can grow further, it is important to identify the sources of the gold that is being exported. Figure 7 shows the possible sources of gold that flow to the gold refinery in Khartoum. The Minister of Mining has announced that gold output reached 73.3 tons in 2014, which would place Sudan as Africa's third biggest producer after South Africa and Ghana and 12th in the world overall (Sudan Vision 2015a). Only 15 percent of this is reportedly attributable to industrial gold mining.[70] There is no official data to indicate the composition of the remainder, although official statements refer to it all being supplied by the traditional sector.[71] However, in the absence of detailed data it is possible that some of the gold that is supplied is either i) privately held "old" gold attracted by high gold prices;[72] or ii) gold smuggled into Sudan for refining and re-export.[73] Most of the focus in the subsequent analysis is on domestically mined gold since it is likely to be the primary driver of Sudan's ability to continue to export significant amounts of gold into the future. Nevertheless, the ability of the Sudanese authorities to benefit from and, indeed, to promote supplies of old gold and smuggled gold to its refinery may continue to be an important factor, so some discussion of these sources also follows. The flows of gold mentioned above are shown in Figure 5.3.3.

Mine production of gold

Determining the level of gold that is mined in Sudan is complicated by the limited statistics available from official sources and difficulties in independently building up a picture of mine production. The Ministry of Mines issues statements about total annual gold production (not specifically refined gold) from time to time. There are no publicly available breakdowns of this total by month, quarter, or by composition. Moreover, the statements are difficult to reconcile with official export data. The two data series are compared in Figure 5.3.4. The low level of production reported in 2011 might reflect its limitation to production reported by the few industrial mines then in operation. Thereafter, however, the picture changes and official statements of production are at first similar to but later well in excess of exports. It is thought likely that the official statements of production are based on a mix of records from the Central Bank's gold buying operations, gold refinery output (since September 2012), and estimates of gold that is produced traditionally and marketed outside Central Bank channels. Since refinery output could include gold recovered from foreign sources of gold ore and old gold, this would be an unreliable measure of gold mined in Sudan. In view of the limitations of official data this analysis builds up

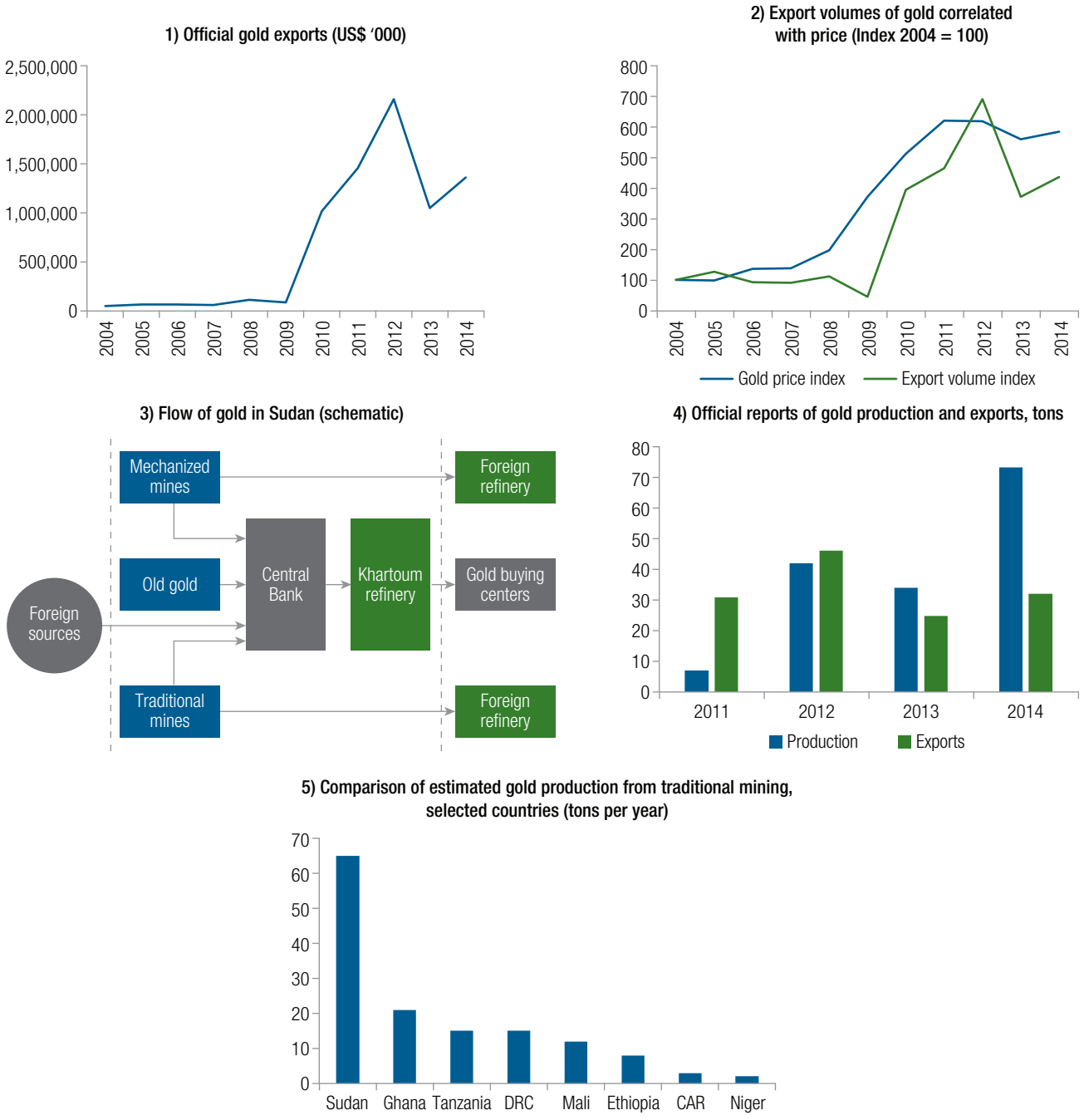
[70] Industrial gold mines are those that employ modern high volume mechanized mining and processing methods needing significant upfront capital investment.

[71] The traditional gold mining sector refers to mining using mainly non-mechanized and small-scale methods of excavation and low technology methods of gold processing to produce unrefined gold.

[72] Old gold (also referred to as "broken" gold) is refined gold that is in circulation mainly as jewelry and other ornaments but could also include gold bars that have been in storage. Such refined gold may, if prices are attractive, or if the holder needs access to cash, be supplied for re-melting. For the most part this gold supply comes from private individuals.

[73] Newly mined gold may take several forms prior to refining into pure gold. It can take the form of lumps (nuggets), grains, and powder with high gold content and impurities. These would typically be extracted from rich alluvial deposits or rich near-surface vein systems. Or is can take the form of gold-bearing ore excavated from an ore-body in which gold may barely be visible with the eye. The latter is typical of industrial mines that rely on high volumes and efficient technology to extract the gold content profitably. Sometimes this ore has varying mixed metallic content (e.g. gold mixed with silver and copper) and impurities that are liberated from host minerals at the initial processing stage. All of these forms of gold are marketable and traded on the basis of the amount of pure refined gold that can be recovered, with allowances made for the costs of refining and losses.

FIGURE 5.3: Sudan's Mineral Sector: Production, Trade and Flows



Source: World Bank staff own calculations and visualizations, based on data from CBOS 2014; Ministry of Mining and Natural Resources 2014; Sudan Tribune (2012 and 2014); Sudan Vision (2014a-b and 2015a); and World Bank Mining Assessments (various country issues)

an independent picture of production by its probable source, for which it relies on publicly available company reports, interviews, field visits, and third party accounts. However, short of undertaking comprehensive and regular surveys of gold mine sites, it is not possible to place complete reliance on this data either.

It is clear that new investments in industrial mining are not the main reason that gold activity has risen so sharply since the secession of South Sudan. Indeed, the contribution of industrial mines to national gold production cannot have exceeded 10 tons per annum, a conclusion confirmed by recent official statements (Sudan Vision 2015a).[74] Ariab Mining Company at Hassai in Red Sea State has operated the main industrial mines since 1992. Output peaked in 2003 at 5.7 tons; but in the absence of significant new investment recent production has been no more than two to three tons per annum. Other industrial gold mines include those operated by Managem (Morocco), Tahe (Turkey), and Rida (Sudan). These have come into operation in the past five or so years but none matches the size of the Hassai mines. The World Bank estimates that between them these mines could not have produced more than 5 tons of gold per annum, although there is some evidence that output is being supplemented by low-grade material discarded by traditional miners which is re-treated to extract gold and mercury.

This analysis projects gold production from industrial mines to increase gradually to some 8–12 tons within five years based on an extension of mine life at Hassai and the commissioning of several new mines. The Hassai mines are partly owned by the Government but together with its private partners financing is being sought to first sustain output by recovering gold contained in tailings and then to begin mining of a large copper-gold ore body, whereupon the mine will produce gold as a by-product of copper. Managem's Qbgbih Mine began operations in 2013 and plans to produce some 3 tons of gold annually. Expansions at the mines operated by Tahe and Rida plus projects being advanced by Orca, Qatar Mining, and others could eventually contribute additional output after 2020.

Traditional mining has proliferated very rapidly to account for the bulk of Sudan's mined gold. Though traditional mining has a long history it was the reports in 2009 of a gold rush attracting tens of thousands of people to the Wadi Gagaba area in the northern Nubian Desert that signaled a new period of heighted activity (Africa Confidential 2012). Rushes to these extensive desert areas, in which surface gold outcrops had been detected, seem to have gathered pace thereafter. But traditional mining is not restricted just to the northern desert areas. A large gold rush took place at Jebel 'Amer in North Darfur in March 2012, evidence of which was captured in satellite imagery (Ismail and Kumar 2013). Other reported areas of traditional gold mining have included sites in Northern, Nile, North and South Kordofan, Blue Nile, and Kassala States. Indeed, one source cites 150 locations found in 80 localities. A North Kordofan State official recently referred to 29 mining sites being worked (Sudan Vision, 2014a). The Minister of Mines visited sites in the Kadugli and Ghadeer districts of South Kordofan in October 2014 (Sudan Vision, 2014b). No publicly available consolidated map or comprehensive register of sites exists.

Indeed, notwithstanding a lack of official data on traditional gold mining, there is a large body of physical evidence of gold mining and processing taking place at multiple sites. This includes evidence of mining, and especially processing, taking place in a highly organized manner. For example, field visits confirmed that gold-bearing mineral is transported in sacks after mining to a number of processing centers where crushing and amalgamation of gold takes place. Such centers are confined within perimeter fences with guarded entrances and are overseen by local authority officials and police. Sophisticated trading systems have evolved involving miners, processors, gold buyers and suppliers of equipment and inputs (Ministry of Mining and Natural Resources 2014).

National surveys done on employment in the mining industry do not disaggregate employment

[74] The Minister of Mines stated that 63 tons out of the 73.3 tons reportedly produced in 2014 is sourced from the traditional sector rather than industrial mines (Sudan Vision, 2015).

BOX 5.1: How Many Artisanal and Small Scale (ASM) Gold Miners are There?

Estimates of the number of people involved in ASM often provide large numbers but these are generally not based on reliable census work. If a country has both a formal and an informal gold sector, then the difference between the official production by companies, and the total gold produced, is used to estimate the number of artisanal miners. An often-used method to estimate the number of ASM miners is based on the supposition that a typical artisanal gold miner produces, say, 0.5–1g gold per day. If a miner works 200 days/year then 1kg gold produced corresponds to 5–10 miners. For example, in 2009 in Tanzania, total gold produced was about 40 tons, of which 36 tons derived from formal mines. If the "missing" 4 tons are apportioned to ASM activities, then this corresponds to 20–40,000 miners. Problems and uncertainties with these types of estimates include the fact that artisanal miners may work only part time as miners, whereas their main occupation could be, for example, subsistence agriculture; and that gold deriving from undisclosed sources may be apportioned to ASM activities, thereby legitimizing its origins.

by mineral mined, making it difficult to estimate the numbers of people engaged in traditional gold mining alone. It has been suggested that the figure for gold miners may vary from as low as 250,000 to as high as one million. Numbers quoted usually do not distinguish between those directly engaged in mining, processing, and trading in gold. A ratio of 1:5 (direct vs. processing/trading) or more would not be unusual. Another approach to assessing the size of the sector is to consider the productivity of the traditional gold miners. Box 5.1 discusses the numbers of "artisanal" miners attributable to certain amounts of production, drawing on experience from around the world. However, even if reliable numbers of miners were available, one would have to be careful not to impute the total amount of gold produced in view of varying richness of gold mineralization and mining techniques used. If the numbers engaged in traditional gold mining in Sudan are indeed as high as some sources have suggested, then this might be expected to have had a considerable impact on the overall labor market. This is discussed further later in the chapter.

The recent surge in traditional mining can be explained in part by the low barriers to entry into the sector, especially in the excavation and primary processing phases. Traditional mining relies on access to surface and near-surface concentrations of gold that can be accessed with little need for mechanization. The methods that appear to predominate are hand digging of surface gold alluvial sources, surface stripping by bulldozers followed by picking of gold nuggets located by metal detectors, and shallow excavation of vein systems to obtain gold-rich ore. Due to the nature of the vein systems, outcrops at the surface can be followed only to a certain depth before heavy excavation equipment and reinforcement of walls and shafts is needed. Investments in mechanization are seldom made in this regard, although some pits as deep as 40 meters are nonetheless being worked.[75]

Regrettably, this type of mining is not technically sustainable in the long term, therefore raising the question as to the longevity of Sudan's present traditional mining boom. Artisanal gold mining is typically not sustainable for long periods at any single site, especially if not well planned. Indeed, there is evidence of many initially prolific sites having played out. Although low labor costs can justify the heavy use of laborers to scavenge and dig for gold, eventually such operations run out of exploitable gold. It is possible for two or three good years to be followed by a collapse—and falling gold prices can exacerbate this process. Moreover, since the extent of resources is unlikely to be properly tested and measured before exploitation takes place, unless organized on a larger scale, mining methods tend to be sub-optimal.[76] Without a comprehensive survey of traditional gold mining

[75] In many other countries such depths would be unattainable owing to friable soil and rock, and flood risk.

[76] One example of this would be indiscriminate stripping of the surface by bulldozers uncovering only targets obvious from the surface but further burying or impeding access to less obvious targets.

sites one cannot confidently infer that, in aggregate, output of gold has been falling.[77] However, there is evidence that many of the most prolific sites are unable to be sustained. Such evidence includes abandoned mine sites, the presence of scavenging where more methodical mining had taken place previously, abandoned or under-used facilities at gold processing centers, and accounts by traders of falling activity, all of which were observed during a field visit in May 2014 and have been corroborated by others familiar with the sector.

Comparisons of gold produced by the traditional sector in other countries rich in gold resources suggest that the huge scale of non-industrial mining officially reported to be taking place in Sudan is anomalous. Countries such as the DRC, Ghana, Tanzania, in which there is a thriving traditional gold mining sector, report levels of output that are no more than one quarter of the level implied by official statements. Figure 5.3.5 illustrates this point. The number of people engaged in such mining is similar to those numbers cited in Sudan; all three reportedly engage one million or more. Moreover, if gold is indeed being mined on the scale claimed, it is difficult to see how that level could be sustained for very long.[78]

Drawing on the available evidence, it is projected that the traditional mining sector could support production of some 10–15 tons of gold per annum over the next five years if gold prices remain at current levels and new surface deposits of gold continue to be located as others are played out.[79] The downside risk is that fewer surface deposits can be worked at current prevailing international gold prices, which are some 30 percent lower than at peak in 2012. Another limiting factor is the growing distance of exploitable deposits from roads and sources of water. The upside potential is that if gold prices increase in the near future, it will potentially prompt more people to go to gold mining areas made more attractive to exploit.

Combining projections of gold production by industrial and traditional mining, Sudan is projected to produce between 18–28 tons annually over the next five years, worth US$750–US$1,130 million annually at a gold price of US$1,300/oz. The contribution of industrial mining will probably be greater than in the past few years, as expansions take place and new mines become operational. The traditional sector will continue to be the source of most gold produced in this period, although the ability to sustain this contribution beyond this five-year period is

[77] The Ministry of Mines has launched a program of fieldwork to survey mining sites across the country, however, the findings will take some time to be assessed and reported upon.

[78] *Gold smuggled* into Sudan for export appears to explain at least part of the gap between official gold exports and the estimates of domestic mine production in this analysis. The Central and East African region is rife with illicit movements of gold and anecdotal evidence is that gold has traditionally moved both in and out of Sudan (Radio Dabanga 2014). Unrecorded and illicit movements of gold within and between neighboring countries has reached particularly high levels in recent years, with a disproportionate share of the gold ending up in the U.A.E., which is now a major gold trading hub. Unfortunately gold import data from the U.A.E by country is unavailable after 2011, reducing the ability to detect discrepancies that might imply unofficial exports from Sudan (PAC 2014). The U.A.E. records show a total of 834 tons of gold imported in 2011, of which roughly one tenth was sourced from the Great Lakes region, which includes Sudan (i.e. about 80 tons). This includes raw mined gold, old gold (scrap and re-melt), and refined gold. Sudan's official exports of gold to the U.A.E in 2011 were 30 tons. The Ministry of Trade of the U.A.E. is reported to have stated that imports from Sudan in 2011 reached US$1.98 billion which is far in excess of Sudan official exports of US$1.14 billion (Africa Confidential 2012). This discrepancy might point to significant illicit flows on top of official flows. It is assumed that until Sudan's gold refinery was commissioned in September 2012, all Sudanese exports to the U.A.E were of raw mined gold and old gold. In 2012 and 2013 the U.A.E. accounted for 96 percent and 88 percent of Sudan's official exports of gold respectively. *Supplies of old gold* are the only other source, aside from gold smuggled into Sudan for re-export, that could account for the gap between official gold exports and the estimates of domestic gold production presented here. Evidence of such supplies is available from traders in the local gold markets, especially at Omdurman, where it is customary for individuals to sell gold jewelry to raise cash. This takes place, for example, when school fees are due or when money must be raised for special events or pilgrimage. It is assumed that direct selling to the Central Bank and the gold refinery may also take place. Other possible sources of old gold are antiquities that are illicitly traded to be re-melted. A Dubai TV broadcast in May 2014 made this allegation.

[79] Forward projections are necessarily subject to a wide margin of error, especially when reliable and comparable data is scarce. Among the factors taken into account in generating projections are the nature of gold mineralization that is being exploited, economics of conducting operations in the various locations where gold is found, the techniques and technologies used to locate and exploit gold, limitations imposed by geography, infrastructure and access to water and business constraints, including security issues.

increasingly doubtful. A more likely pattern is that industrial mining will become the main source of domestically mined gold after 2020.

Government policies and institutions

The Government's drive to promote the mining sector and divert smuggled gold into formal channels demands close consideration of the role of public policies and institutions. Although the sharp rise in gold exports coincided with a sharp escalation of gold prices, which no doubt encouraged supply, it also coincided with deliberate policies of the Government to encourage gold activity to address the macro-economic dislocation that resulted from South Sudan's secession. Aside from launching an active gold buying policy and building a state-owned gold refinery, the Ministry of Mining has also been actively promoting the acquisition of exploration rights over large tracts of land. This has resulted in a marked increase in the number of mining agreements signed with a diverse range of companies. Finally, in certain States the local administration has become active in the organization and oversight of gold processing and trading linked to the rise in traditional mining.

The Central Bank of Sudan (CBOS) has been executing a gold buying policy since 2011 with the expressed intent to generate hard currency through the export of gold. CBOS is understood to be able to outbid other buyers of gold through the price it offers and by waiving royalty, which would otherwise be payable by licensed exporters. CBOS is reported to pay traders in Sudanese Pounds but at the parallel market rate of exchange. In order to sustain such a policy in a fiscally constrained context and with limits to access of debt financing it has had to print money, which has been one factor driving domestic inflation (Africa Confidential 2012). In 2014, for example, the overall annual inflation was running at over 40 percent compared to the targeted annual inflation rate of 29 percent. The IMF has called on the authorities to rein in gold buying and other quasi-fiscal operations undertaken by CBOS on behalf of the Government (IMF 2014c). See Box 5.2 for some more details about gold buying programs in general.

In 2012 the Government opted to finance construction of a large gold refinery to take advantage of supplies of gold purchased by CBOS. The refinery was initiated with a capital of SDG100 million as a partnership between the Central Bank of Sudan

BOX 5.2: State-Sponsored Gold-Buying Programs

State-sponsored gold buying programs have been used as one means to promote and bring order to traditional gold mining and to combat smuggling. The practice has grown in importance since the 1990s among Central Banks in a number of gold producing countries (e.g., the Philippines, Ethiopia), though such programs have had various degrees of success or failure. Buying programs typically comprise a mix of measures such as i) providing the Central Bank with a monopoly on gold buying and export; ii) establishing networks of state agents with the legal authority and financial resources to buy from mining sites and traders; and iii) contracting a third-party to buy on behalf of the government who, in exchange, provide certain financial and technical services to miners. In all models, the ability of the state to establish itself as the dominant buyer in the domestic gold market is critical.

Many buying programs have failed, principally due to the following factors:

- Insufficient liquidity held by the government to purchase gold on a timely and sustained basis.
- Inability of government to compete with prices offered by non-licensed traders and buyers.
- Constraints in broader mineral governance that place obstacles between sellers and buyers.
- Bearing in mind these factors, in order to succeed a government may consider the following:
- Create incentives to sell to official buyers by coupling buying with technical or financial services rendered to miners.
- Reduce or eliminate fees charged by official buyers.
- Establish revenue-sharing arrangements with local government and communities, thereby motivating them to promote and encourage the sale of gold to the Government.

(70 percent), Ministry of Mines (15 percent) and Ministry of Finance (15 percent). The refinery has a current capacity of 150 tons of gold annually and 30 tons of silver, which makes it Africa's second largest refinery after the Rand Refinery in Johannesburg. No data about its economic performance has been available for the research for this CEM. In particular, it would be necessary to know the composition of the intake of the refinery, output, and any inventory held, to be able to better identify sources of gold (either mined or "old" gold) and both the value and timing of gold exports.

With strong backing of the Government, the Ministry of Mines has actively promoted development of the industrial mining sector to supplement the traditional sector. The Ministry has offered tracts of land for mineral exploration demarcated into blocks, which are then the subject of negotiation with interested companies. Well over a hundred of these blocks have been allocated and mining agreements signed. As a result, there are now a large number of foreign and Sudanese companies holding mineral exploration rights. The work being carried out by these companies ranges from very preliminary exploration programs to locate potential mineral sites through to more detailed evaluation of promising mineral deposits. As identified in an earlier section, the progress of some advanced gold exploration projects suggests that new gold mines may become operational in the next five or more years.

The Ministry's efforts to promote the mining sector have included offering fiscal incentives. These have been used in part to overcome major obstacles linked to limited knowledge of opportunities and perceptions of high country risk among potential foreign investors. The mining legislation empowers the Minister of Mines, working with the Mining Committee, to set policy, issue licenses, and sign negotiated contracts. These powers appear to be exercised independently of the Investment Authority, with which all foreign investors must register. The scope and efficacy of fiscal incentives is addressed in a later section on government revenues.

While overall management of the mining sector is a Federal function, responsibility for regulating traditional mining has been delegated to State level, giving rise to mutual dependency but also considerable complexity. The Regulation of Traditional Mining for Gold provides that States may issue licenses for traditional mining and supervise the sector through the offices of the State Minister of Mines.[80] Moreover, the State authorities may group individuals practicing traditional mining into specified locations to locate grinding mills and other processing facilities. Among other things, these provisions raise questions about how effectively and consistently mining, health, safety, and environmental practices are regulated.

Along with delegated responsibility for regulating traditional mining the States have responsibility for levying taxes. The same Regulation mentioned above provides for a 5 percent levy on the value of gold the proceeds, which is divided 50/50 between the Federal Ministry and the State. If the States are able to collect such levies this would represent a significant source of revenue in view of the scale of traditional mining taking place in recent years, however, it remains unclear how effectively revenue would be collected. Since royalties are currently waived under the CBOS gold buying program no revenues are being raised through this channel. On the other hand the State's appear to have been levying a variety of fees at local sites.

Economic impact of gold

The rapid emergence of the gold sector will have important direct and indirect effects on the economy. At the national level gold exports have generated large foreign exchange inflows at a time when the country has been struggling to adapt to the loss of oil export earnings and a rise in oil product import dependency. While the contribution

[80] Available at: http://www.minerals.gov.sd/eng/Regulation_traditional.htm.

Table 5.1: Main Elements of the Mining Fiscal Regime for Industrial Mines

Royalty	Profits Tax	Government Free Share	Tax Exemptions
Gold: 6–7 percent (negotiable) Base Metals: 5 percent	10 percent in one example seen, but according to the National Investment Encouragement Act 2013, may be exempted	Negotiable (indicatively 20–30 percent)	Import duty and VAT during exploration

Source: Company disclosures and interviews with government agencies.

to the trade balance is clear, the impact of gold on investment inflows and government finances is far harder to measure. The following assesses the contribution of the industrial and traditional mining sectors separately.

Flows of investment into the industrial mining sector appear to have increased in recent years as the number of mining companies engaged in mineral exploration and launching new mines has grown. However, no records of investment levels have been available in preparation for this CEM. The Ariab Mining Company has substantial investment needs in order to continue to exploit gold and develop copper deposits, amounting to some US$500 million over the next few years. Other companies with advanced exploration projects will need to raise funds to move into mine construction and commissioning, probably of the order of some US$50–100 million each. In all cases, raising finance is constrained by limited access to the main international mining finance centers, which may tend to slow the pace of investment.[81]

Revenues generated by industrial mining could be significant once mines are brought into production and reach profitability. On the other hand, the use of tax incentives reduces, or at least delays, likely receipts. Moreover, mines built with large capital outlays typically take time to reach profitability. The fiscal regime is subject to negotiation of several key terms. Key elements of the fiscal regime are set out in Table 5.1. The use of fiscal incentives to attract mineral investment is not unusual, however, the World Bank has observed that very few mineral investments are simply tax driven, principally because the conditions necessary for investment to take place depend on geology, access to critical inputs and infrastructure, and non-fiscal elements of the investment climate.

Flows of investment into the traditional mining sector are insignificant at the individual site level; however, the aggregate amount of cash and short-term credit flowing into this sector must have increased sharply in recent years. No records of investment levels have been available. The presumption is that investment is largely obtained in the domestic market. Field visits and other accounts suggest that domestic entrepreneurs have been willing to invest in earth-moving equipment and transportation in order for new excavations to be launched. Moreover, at some processing sites entrepreneurs have installed banks of grinding mills run by on-site generators. These too would require a considerable upfront outlay.

Revenues generated by traditional mining are generally constrained by the limited extent to which operations are licensed and subject to taxes. Regulations issued by the Ministry of Mines make provision for State level regulation and tax collection. The proceeds of a 5 percent levy on production are supposed to be split evenly between the State authorities and the Federal Ministry. However, it is unclear how widely this is enforced. In place of direct imposition on miners, the State authorities can impose the levy on licensed gold traders and dealers, who would factor this into the price paid to sellers. It is unclear, however, how this arrangement

[81] The presence of companies such as Qatar Mining in Sudan suggest that those willing to take on projects in Sudan have access to sources of capital that are neither impacted by sanctions or perceptions of high country risk. It is also observed that some Sudanese trading and construction firms have obtained mineral rights, suggesting that they are more likely to be able to mobilize funds than others.

works in practice, especially since a large amount of buying is now done by the CBOS through its agents. The fact that the CBOS seeks to obtain gold from sellers and traders who would otherwise smuggle gold out of Sudan, means that the 5 percent levy is being waived by the CBOS. Some States are understood to be levying other fees (Sudan Vision 2015b) However, without having seen relevant revenue reports at Federal and State level it remains unclear what revenue flows are associated with the traditional gold mining sector.

Profile of miners and relationship to poverty

Most miners work in informal arrangements, a common characteristic of artisanal mining around the world. In the National Census (2008), of the 3.5 million respondents only 781 self-identified as miners, all of whom identified as part of the working population (age 15–65). Of these 781 self-reported miners, 84.8 percent were male and 15.3 percent were female. 64.3 percent of the same 781 respondents reported working for their own account, meaning these individuals work as day laborers. A further 27.7 percent respondents reported being paid employees and 3.6 percent reported being an employer within the mining industry. It is likely that those who identified as paid employees are working for some of the larger exploration and processing operations in the country. It is therefore important to note that the vast majority of respondents are working likely in informal arrangements, a common characteristic for other artisanal mining environments globally. Of those self-identified miners, 56.7 percent declared their role as the prime earner in the household, with an average mean age of 37. Though not disaggregated for gender, it is most likely that these heads of households are male. A further 21 percent of the self-identified miners were either sons or daughters of the head of household with an average age of 23.

Education levels of people active in the mining sector appear to be very low. Ten percent of respondents declared having no qualification in the sector, a further 8 percent declared having completed primary education, and 7 percent having completed secondary. However it is important to note that of the total 781 respondents, 57 percent could not identify their education level within the categories offered by the National Census, making the data on education difficult to extrapolate.

Mining is spread across the country, with no clear relationship between levels of activity and poverty rates at the district level. For instance, the districts of Abu Hamed and Berber, both of the Nahr el Nir State of the Northern region, report having 21 and 12 percent, respectively, of the active working population engaged in mining activities. Yet, these two districts have some of the lowest poverty rates in the country: that is 27.3 and 29.0 percent, respectively. Indeed the national poverty rate per district, according to the National Census (2008) is 49.8 percent. Consider on the other hand, Giesan district in Blue Nile State of the Central region which reports a mining population of 9 percent and a poverty rate of 77.4 percent; or Alrasad and Abu Jibieha districts of South Kordofan State in the Kordofan region, who report 11.1 and 14.7 percent of their working populations to be in mining, with poverty rates of 49.8 and 53.3 percent, respectively.

There has been a doubling of mining employment statistics in certain districts since 2008. The Population and Housing Census (2008) had reported the highest levels of mining activities in Bahri and Abu Hamed districts: that is 10.0 and 8.7 percent of the working population aged 15–65. Since that time Abu Hamed has doubled its percentage of the mining workforce to 20.9 percent, as stated above. Other districts with significant percentage increases include Berber (from 4.9 to 12.0 percent), Giesan (from 3.6 to 9.0 percent), Abu Jibieha (from 5.9 to 14.7 percent), and Alrasad (4.4 to 11.1 percent). These statistics would seem to suggest a rise in the level of activity, predominantly in traditional gold mining areas. It is however difficult to conclude whether these increases

in employment are made up of residents of the area who are taking further interest in the sector since the government put in place its buying policies. Data from the National Census on migration does however suggest that cross-districts migration is almost non-existent, with 99.4 percent of the total surveyed population (3.5 million) reporting no district migration. Hence it is plausible to assume that rises are coming from within the available labor pool in the respective districts. Further investigations are required to understand why levels have increased and whether this employment is full-time or seasonal.

Environment and social impact

The rapid expansion of gold mining has without doubt impacted local environments and communities in a variety of ways. The pace at which gold activity grew after secession in 2011 and the largely unmanaged proliferation of traditional mining operations is bound to have generated multiple environmental and social challenges for which regulatory institutions are typically ill-prepared. In the absence of firm enforcement of labor standards or environmental regulations, miners face both physical and social vulnerabilities. However, given the economic attractiveness offered by mining compared to farming or other rural productive activities, miners may consciously choose to take on these risks in pursuit of better economic welfare.

Traditional mining sites are predominantly away from heavily populated and cultivated areas along the Nile but nonetheless generate a variety of harmful impacts. Aerial images bear witness to the dramatic impacts of gold rushes with closely spaced excavations over extensive areas and shanty town-type development to support the influx of people. Field visits provided evidence of the widespread use of bulldozers to excavate topsoil to expose gold bearing rocks with little or no reclamation of land as mining plays out. There appears to be little attention to safety hazards, exemplified by the depth to which some excavations are dug and minimal use of support structures. Furthermore, rudimentary health precautions are taken at mining sites and processing centers, where water and hygiene conditions are poor and do not appear to be subject to routine monitoring and inspection.

Of note is the liberal use of mercury in the recovery of gold at processing centers. During field visits it was evident that mercury is widely available and traded. It is used in the traditional way for amalgamation but it was also observed being used in grinding mills to assist with the liberation of gold, prior to washing and amalgamation.[82] Mercury is therefore found in tailings generated during crushing and grinding and seems to be deposited without containment. Tailings at some sites are collected for sale to those that have the facilities to re-treat them to obtain both residual gold and contained mercury. Unfortunately, it is not possible to assess the scale of mercury used in traditional gold mining as a whole. Nevertheless, given the amount of gold being recovered at sites like the ones visited, it can be inferred that the amounts are significant.

The Ministry of Mining seems to be aware of the environmental and social consequences of widespread traditional mining and has taken some measures to deal with them. The Ministry of Mines is issuing licenses to companies able to recover mercury from tailings and other discard material and it has banned mercury imports other than by a state trading company. There is also a Directorate within the Ministry charged with environmental monitoring and enforcement. It has participated in teams sent to inspect mining and processing sites. It has information that has been disseminated on the safe handling of chemicals and technologies to help reduce likely contamination by mercury. How effective these measures are is difficult to assess without careful survey of sites. Such

[82] Amalgamation is a mineral processing method that extracts gold from mined ore using mercury to create amalgam, which is then decomposed leaving gold.

surveys are beginning to be undertaken, according to the Ministry. Moreover, early in 2015 the Ministry announced that it had secured the support of the African Development Bank to help finance these and related activities.

Anecdotal evidence of positive and negative impacts on livelihoods of the traditional gold mining boom in the communities in which activity has been concentrated needs to be supplemented by rigorous data collection. Positive impacts are reflected in the level of activity among trades that provide inputs into the mining and processing value chain. On the other hand, negative impacts on the availability of seasonal labor in the agricultural sector have been reported. One report spoke of this reducing the harvest of the sesame crop in some areas. There were several informal reports of school students joining the gold rush in 2012–13, either as child labor or accompanying their families.

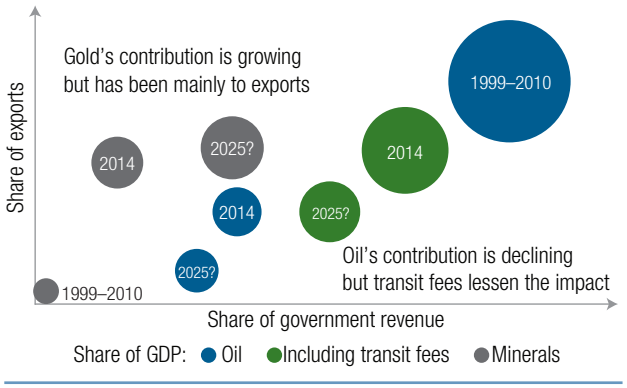
D. Combined Implications of Oil and Mining

While it appears inevitable that the contribution of oil to Sudan's economic development will decline over time it is by no means certain that the mineral sector will be a full substitute for it, even though the mineral sector is quite likely to make a bigger contribution than it has in the past, most notably in terms of exports. Figure 5.4 shows how the contribution of the two sectors to Sudan's economy might evolve in the medium term. The oil sector was the mainstay of the economy for over a decade, whether measured in terms shares of GDP, exports, or government revenues (See Figure 5.4, red large circle on the right upper side). Due to the reduced scale of reserves and production and limited scope for reversing this, at least in the medium term, the contribution is already shrinking and is likely to shrink even further by 2030. In Figure 5.4 this is characterized by a move towards the lower left side, which shows that both the share in sports and the share in Government revenue will decrease. Even in the high case scenario for oil production (Figure 5.1.4), this evolution is merely slowed rather than changed. The same would be true of a higher oil price environment; however, at least in the short term, the oil price is unlikely to provide much support.

The constrained outlook for exports and revenues from domestic oil production places the spotlight on fees that the Government obtains for the handling of South Sudanese transit oil. The analysis shows that this now has become at least as, if not more, important than the domestic oil sector in terms of exports (almost all South Sudanese oil is presently exported) and government revenues. In Figure 5.4 this manifests as the red line circle that is somewhat between the oil position of 1999/2010 and 2025. Under present arrangements, the GOS obtains fees from both the Government of Sudan and the JOCs-South at levels that yield a considerable fiscal surplus (after meeting tariffs charged by the operators of processing and transportation facilities in Sudan). Although the data necessary to quantify it precisely is not available, it would be reasonable to assume a margin over tariffs of some 3:1. Moreover, this source of fiscal revenues is not linked to oil prices, so it is largely protected from present oil price uncertainties. An additional factor is that the TFA provides for a shortfall payment to be made by GRSS to GOS in the event that production in South Sudan does not meet expectations. These arrangements effectively eliminate two of the principal sources of fiscal risk to Sudan.

Notwithstanding the fiscal benefits obtained from transit fees, these arrangements can only be expected to be transitory, a fact acknowledged by the expiration dates of relevant agreements. So while the current fiscal benefits, when combined with revenues from the domestic oil sector help sustain the contribution of oil to the Sudanese economy, there are medium terms risks relating to i) an uncertain outlook for South Sudan's production rate (as well as uncertainty over TFA volumes if conflict in South Sudan persists for another year);

FIGURE 5.4: Contribution of Oil and Minerals to Sudan's Economy



Source: World Bank staff own visualization.

and ii) the incentives created for South Sudan's oil to be used either domestically or exported via an alternative route. Figure 5.4 shows the combined contribution of the oil sector diminishing over the medium term both in terms of exports and government revenues.

The Government's emphasis on promoting alternatives to the oil sector is well founded, and there have been early results in the form of the boom in gold exports. A policy of encouraging gold produced domestically to be exported officially so that foreign exchange could accrue to the Government seems to have had success, at least in the short term, even though a major driver of gold activity has been the gold price and the main supply response has been from the traditional mining sector, not the industrial mining sector. The main policy concerns about this strategy is how long will it be sustainable in the face of lower gold prices and/or diminishing scope for exploitation of gold by traditional methods.

Whereas the increase in traditional gold mining has fueled a gold export boom, its fiscal contribution has been less significant. It is unclear how much of a fiscal contribution this sector can sustain given policies that i) devolve fiscal power to State level; and ii) depend on offering competitive prices to sellers of gold who would otherwise avoid official channels. The data needed to assess this has not been readily available. Conservative expectations of the fiscal contribution of the traditional mining sector are reflected in Figure 5.4 (green circles for gold) in which the estimated contribution of gold in 2014 is weighted heavily towards exports rather than to government revenues.

Traditional mining may, with sufficient support, provide a source of livelihood in rural areas that may have few other sources of economic support. Traditional mining can create direct, indirect, and induced demand for labor, goods, and services in areas where few alternatives exist. Field visits provided ample evidence that in localities in which traditional mining has been taking place, market opportunities had been opened up for vendors of equipment and suppliers of support services.[83] With sufficient mapping and resource evaluation it is likely possible to identify areas that are sufficiently rich in gold so that traditional mining could be sustained for more than a few years. Experience from around the world suggests that this planned approach is only likely to take place if traditional mining takes place on a formalized basis, since this provides a basis for miners to obtain legal title and hence finance. Policies for supporting artisanal and small-scale mining, such as in Tanzania, place an emphasis of formalization and the reservation of areas considered to have high potential after technical investigation.

Industrial mining may take some time to reach its potential; however, such a development over the medium to long term would be more likely to provide a more balanced export and revenue contribution to the economy than traditional mining. The Government has made promotion of industrial mining a priority and taken a number of measures to encourage investment in mineral exploration. There are positive signs that the technical conditions on which industrial mining could develop are in place, backed by efforts of the

[83] This was so in Abu Hamed, for example, in which one section of town was dedicated to the sale of mining and processing equipment.

Ministry of Mines to enhance the geological database. The mineral rich Arabian Nubian Shield straddles Sudan and several of its neighbors and has been host to mining activity over millennia owing to an abundance of accessible surface and near-surface deposits of gold and other valuable minerals. Large-scale gold and copper-gold mines developed in neighboring Egypt, Eritrea, and Saudi Arabia provide reason for optimism. However, the degree to which Sudan has been explored using modern techniques to establish the viability of mechanized mining and to detect deeper lying deposits remains very limited.

For investment in industrial mining to take place on a consistent basis there will need to be proof that projects can be brought to commercial fruition, notwithstanding financing challenges and a limited track record in the implementation of contracts through all investment phases. In this regard the financing by Ariab Mining Company of the expansion plans at the Hassai mines and of progress of some of the more advanced gold exploration projects would send a very positive signal to the international mining community. Analysis carried out for this CEM in 2014 found that several aspects of the mining law and contracts, as well as regulatory arrangements could be improved. Moreover, it was found that some of the non-fiscal conditions necessary to attract and retain large-scale investment through the full cycle from exploration to production are not in place, such as early disclosure of right-holdings and clarity as to how surface access is obtained. That being the case, the value of tax incentives, which have been used to induce investment, may be questioned.

In view of the uncertainties addressed above, the contribution of mining to Sudan's economy over the medium term could be broadly positive, however, the scale of the sector is very unlikely to rival that of the oil sector in its heyday and its fiscal impact may be substantially lower. These considerations are reflected in Figure 5.4 by the modest increase indicated in export contribution and low increase indicated in the contribution to government revenues. There are numerous scenarios that could unfold, including much less positive ones, in which a lower gold price environment coupled with continuing constraints on financing of major mineral projects means that the recent gold mining boom wanes. Any sustained program of reforms to make the industrial mining sector more competitive and to strengthen regulatory institutions would require strong leadership and probably external support to enhance institutional capability and effectiveness.

Any more thorough evaluation of the contribution of the mining sector to economic development in Sudan would have to take into account negative externalities such as harmful environmental and social impacts; neither is captured in Figure 5.4. At this stage, impacts of this kind arise mainly in the context of traditional gold mining, though adequate regulatory care will be needed to ensure that further development of the industrial mining sector does not generate an excessive environmental and social burden. There is already evidence that traditional gold mining places the environment, as well as the health and safety of laborers and their dependents, at some risk, given its very rapid and widespread proliferation. It will be important for such risks to be managed carefully to ensure that a good balance is achieved between economic opportunity and environmental and social threat.

Annex 1: MAMS Model: Structure, Data and Assumptions

Structure of MAMS

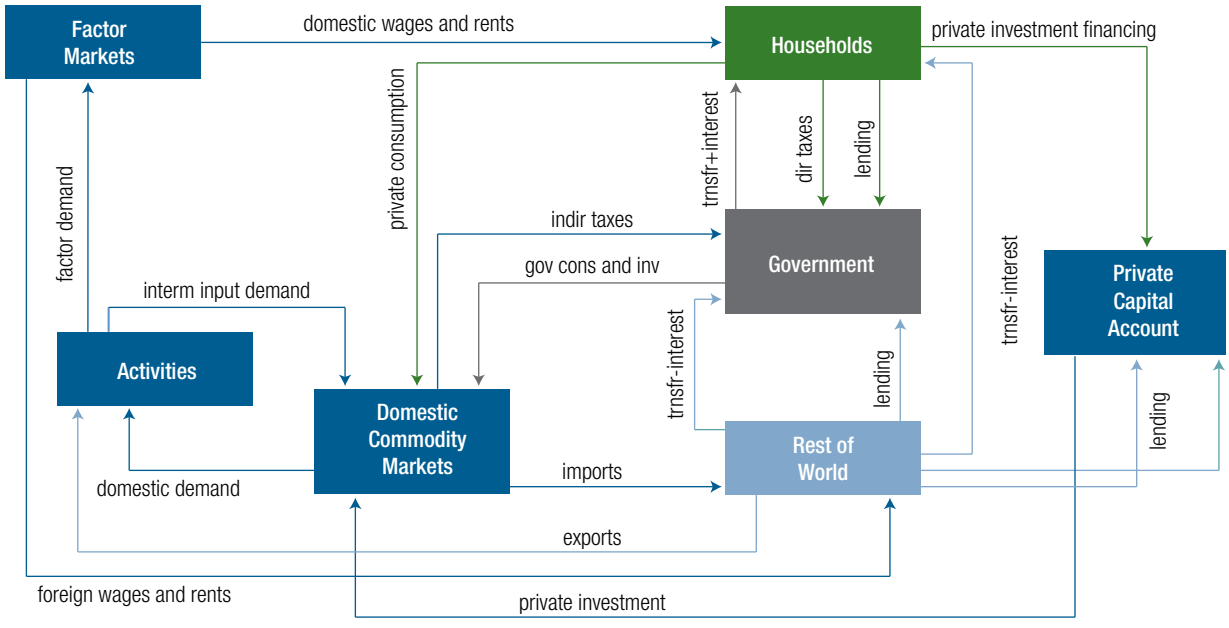
Figure 0.1 summarizes the payment flows that are captured by MAMS in any year. Activities produce, selling their output at home or abroad, and using their revenues to cover their costs (of intermediate inputs, factor hiring, and taxes). Their decisions to pursue particular activities with certain levels of factor use are driven by profit maximization. The shares exported and sold domestically depend on the relative prices of their output in world and domestic markets.

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

- Households (an aggregate domestic private institution) earn incomes from factors, transfers, and interest from the government (with the interest due to loans from the households to the government), and transfers from the rest of the world, net of interest on household foreign debt.[84] These are used for direct taxes, savings, and consumption. The savings share depends

[84] The household may lend to the government and borrow from the rest of the world; given this, it may receive interest payments from the government and make interest payments to the rest of the world.

FIGURE 0.1: Aggregate Payment Flows in MAMS



on per-capita incomes. Their consumption decisions change in response to income and price changes. By construction (and as required by the household budget constraints), the consumption value of the households equals their income net of direct taxes and savings.

- The government gets its receipts from taxes and transfers from abroad; it uses these for consumption, transfers to households, and investments (providing the capital stocks required for production of government services), drawing on domestic and foreign borrowing for supplementary investment funding. To remain within its budget constraint, it either adjusts some part(s) of its spending on the basis of available receipts or mobilizes additional receipts of one type or more in order to finance its spending plans.
- The rest of the world (which appears in the balance of payments) sends foreign currency to Sudan in the form of transfers to Sudan's government and households (net of interest payments on their foreign debts), FDI, loans, and export payments.[85] Sudan uses these inflows to finance its imports. The balance of payments clears (inflows and outflows are equalized) via adjustments in the real exchange rate (the ratio between the international and domestic price levels in domestic currency), which take place when the balance is in surplus or deficit.[86]

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

In domestic commodity markets, flexible prices ensure balance between demands for domestic output from domestic demanders and supplies to the domestic market from domestic suppliers. The part of domestic demands that is for imports faces exogenous world prices—Sudan is viewed as a small country in world markets without any impact on the import and export prices that it faces. Domestic demanders decide on import and domestic shares in their demands on the basis of the relative prices of commodities from these two sources. Similarly, domestic suppliers (the activities) decide on the shares for exports and domestic supplies on the basis of the relative prices received in these two markets.[87]

Factor markets reach balance between demands and supplies via wage (or rent) adjustments. Across all factors, the factor demand curves are downward-sloping reflecting the responses of production activities to changes in factor wages. On the supply side of the labor market, unemployment is endogenous—the model includes a wage curve (a supply curve) that is upward-sloping until full employment is reached, at which point it becomes vertical (see Figure 0.2; its supply curve assumes a minimum unemployment rate of 5 percent). Unemployment is defined more broadly than in official statistics to include un- and under-employment. In the simulations, a broad definition of

[85] Sudan's economy is treated as fully dollarized.

[86] For example, starting from a balanced situation, a balance of payments surplus could arise from increases in foreign exchange receipts (perhaps due to an increase in foreign aid or the world price of an export). The resulting increase in domestic demands (be it from the government or other agents) would not change international (export and import prices) in foreign currency but reduce their prices relative to domestic prices (the prices of domestic output sold domestically, via an appreciation of the model exchange rate and/or an increase in domestic prices, in both cases representing an appreciation of the real exchange rate. This relative price change would encourage domestic producers to switch part of their outputs from exports to domestic sales and induce domestic demanders to switch part of their demands from domestic sources to imports. This process would continue until the balance of payments surplus is eliminated. The opposite would happen in the case of a balance of payments deficit.

[87] An individual production activity does not respond to changes in relative prices for exports and domestic sales if its output only has one destination, either exported in full or sold domestically in full. By the same token, domestic demanders do not have a choice between imports and domestic output for commodities if only one source is available. In the case of Sudan, some commodities do not enter trade (including government services) while others are only traded in one direction (like the output of gold mining, which only is exported). Such structural features reduce the flexibility of Sudan's economy.

unemployment increases the scope for the existing labor force to generate a larger (smaller) amount of effective labor if the incentives to work were to improve (deteriorate) without any change in the labor-force participation rate; typically, this seems realistic. Over time, the labor force grows due to demography. For non-labor factors, the supply curves are vertical in any single year (the supply is fixed) but switch over time as supplies change (see next point).

The above discussion refers to the functioning of model economy in a single year. In MAMS, growth over time is endogenous. The economy grows due to accumulation of capital (determined by investment and depreciation), labor (determined by demography), and other factors (following exogenous growth trends), as well as because of improvements in TFP. Apart from an exogenous component, TFP depends on the levels of government capital stocks.

The disaggregation of MAMS varies widely across different applications depending on data availability and the kinds of questions the model is called upon to analyze. For the Sudanese application, the database is disaggregated into some 60 accounts (see Table 0.3), indicative of the aspects of Sudan's economy that the model is able to consider. Among other things, the database includes 11 production sectors. The factors of production are split into labor, capital (private and government), and 4 natural resource factors (land for crops, land for livestock, oil, and gold), which are specific to individual sectors and thereby help making sure that their output growth respects natural constraints.

MAMS Database

Any analysis of Sudan's economy faces severe data challenges, severely aggravated by the 2011 secession. Most available data apply to pre-2011 Sudan. In this situation, it is important to strive to make the best possible use of what is available in order to satisfy analytical needs.

FIGURE 0.2: The Labor Market in MAMS

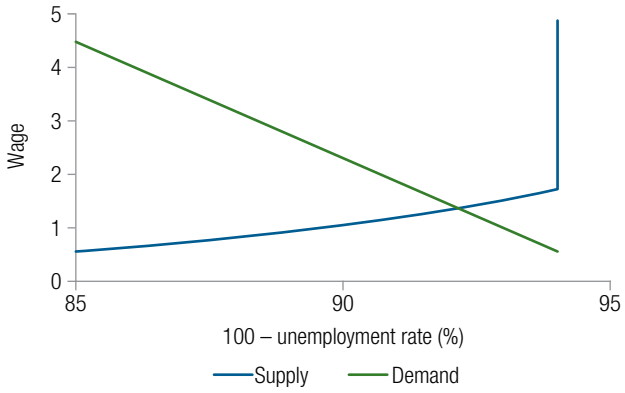


Table 0.1 shows the disaggregation of the database for this analysis. The database consists of a Social Accounting Matrix (SAM), data on stocks (of factors of production and debts), elasticities (in production, consumption, and trade), and miscellaneous other data.[88] The SAM was constructed on the basis of a 2004 SAM for Sudan (Siddig 2009) and data for 2012 that reflect the post-secession macro, trade, and sector value-added structure of Sudan's economy, parts of which was used to build a macro SAM (Table 0.2). The 2012 information is primarily based on IMF (2014a, 2014b, 2014c), and CBOS (2014). In order to ensure consistency with minimal adjustments, a matrix estimation program was applied to the SAM (Robinson et al. 2001).[89]

[88] A SAM is a square matrix that that provides a comprehensive, consistent economy-wide summary of the payments in an economy during one year. It links institutions, factors, and production sectors. The latter are split into activities (which carry out production) and commodities (representing activity outputs or imports without domestic production). Given the consistency requirement, each account must be balanced—its receipts must equal its outlays. The accounts of the Sudan SAM closely match the disaggregation of MAMS (Table 0.1).

[89] More concretely, on the basis of 2012 data and structural features of the 2004 SAM (such as household consumption shares and the input structure of production activities), an initial unbalanced 2012 was constructed. The estimation program generates a balanced SAM subject to constraints that subset of cells exactly or approximately sum up to observed 2012 data while otherwise minimizing deviations from the structure of the initial SAM.

Table 0.1: Disaggregation of Sudan MAMS

Category	Item
Sectors	Crops
	Livestock
	Gold and other mining
	Oil and products**
	Manufacturing
	Construction
	Electricity and water
	Trade, restaurants and hotels
	Transport and communications
	Government services
	Other services
Factors	Labor
	Capital – private
	Capital – government
	Natural resource of gold and other mining sector
	Natural resource of oil sector
	Land for crop production
	Land for livstock production
*Institutions**	Household (domestic non-government institution)
	Government
	Rest of the World
	Financial institution (holds foreign reserves)
Auxiliary institutional accounts	Taxes – direct
	Taxes – domestic indirect
	Taxes – value added
	Taxes – imports
	Subsidies
	Interest – dometic
	Interest – foreign
Investment	Investment – private
	Investment – government

*Household government, and rest of the world have current and capital accounts.
**The oil sector covers both crude production and refining.

The elasticities that are used are displayed in Table 0.3. They were defined on the basis of the literature and author assessments, drawing on a combination of econometric evidence and experience from similar country applications; for a survey, see Annabi et al. (2006). For the oil sector, it is assumed that imports are near perfect substitutes for domestic products (in effect permitting a smooth substitution of imports for domestic products as the latter decline in importance) whereas, output is allocated in near fixed proportions between exports and domestic sales (reflecting that a relatively inflexible part of the output is refined and sold domestically. Given the consistency features of an economy-wide model like MAMS (in markets for factors and commodities, quantities demanded and supplied must be equal and all agents live under budgetary constraints) most elasticities tend to play a qualitatively minor role as long as they stay within accepted bounds.

Foreign and domestic debts stocks are based on the above-mentioned IMF and World Bank sources. The growth rates for utilization of the stocks of natural resources (oil and gold), which are exogenous, were defined to match recent trends and projected production growth for these sectors up to 2030. Private capital stocks were defined on the basis of cross-country data on stocks and profit rates, and adjusted to ensure plausible capital stock growth and rents for the base scenario (Arslanalp et al. 2010; Nehru and Dhareshwar 1993). Data on population (total and in labor force age), and labor (stock, employment, and unemployment) are based on UN (2014), UNCTAD (2014), and IMF (2013).

The poverty results are generated by a module that draws on the simulated evolution of household per-capita consumption, a Gini coefficient (which is exogenous), and an initial poverty rate, assuming that consumption is log-normally distributed.[90] Using 2009 data for the then Northern provinces,

[90] It is widely accepted that a log-normal distribution provides a good approximation for within-country income and consumption distributions (Bourguignon 2003; Easterly 2009). Inter alia, as noted by Easterly (2009, pp. 28–29): (i) empirical cross-country analysis indicates that the higher the initial poverty rate, the lower the poverty elasticity of growth; and (ii) the absolute value of the simulated poverty-elasticity of growth with a log-normal distribution is inversely related to the initial poverty rate and positively related to per-capita income.

Table 0.2: Macro SAM for Sudan, 2012 (% of GDP)

	act	com	fac	hhd	gov	row	tax-dir	tax-imp	tax-exp	tax-act	tax-va	sub	int-dom	int-row	cap-hh	dcap-gov	cap-fin	cap-row	inv-prv	inv-gov	total
act		97.2																			97.2
com				83.6	5.7	8.8						1.8							17.2	1.5	118.6
fac	94.9					0.0															94.9
hhd			93.8		3.0	0.9							1.4								99.1
gov			0.0	1.7		0.4															9.8
row		16.8	1.1	0.0	0.0		0.7	2.1	0.0	2.3	2.6			2.8							20.6
tax-dir				0.7																	0.7
tax-imp		2.1																			2.1
tax-exp		0.0																			0.0
tax-act	2.3																				2.3
tax-va		2.6																			2.6
sub					1.8																1.8
int-dom					1.4																1.4
int-row				0.1	2.7																2.8
cap-hhd				13.0													5.4	4.6			22.9
cap-gov					–4.8										2.2		1.3	2.8			1.5
cap-fin															7.5						7.5
cap-row						10.5											0.9				11.3
inv-prv															13.2			3.9			17.2
inv-gov																1.5					1.5
total	97.2	118.6	94.9	99.1	9.8	20.6	0.7	2.1	0.0	2.3	2.6	1.8	1.4	2.8	22.9	1.5	7.5	11.3	17.2	1.5	

Notation

act	production activities	**tax-exp**	taxes – exports	**cap-fin**	capital account – financialsystem
com	commodities	**tax-act**	taxes – activities	**cap-row**	capital account – restofworld
fac	factors	**tax-va**	taxes-value-added	**inv-prv**	investment – private
hhd	household (domestic non-government)	**sub**	subsidies	**inv-gov**	investment – government
gov	government	**int-dom**	interest on domestic government debt		
row	rest of world	**int-row**	interest on foreign debt		
tax-dir	taxes – direct	**cap-hhd**	capital account – household		
tax-imp	taxes – imports	**cap-gov**	capital account – government		

the Gini coefficient is set at 0.353 and the initial poverty rate at 46.5 percent (World Bank 2011a, p. 2; World Bank 2014b).

Scenario Assumptions

The base scenario is designed to provide a plausible picture of Sudan's development up to 2030 that is broadly consistent with recent World Bank and IMF projections, including the analysis of Sudan's mineral sectors in Chapter 5 of this CEM. It serves as a benchmark for comparisons with alternative simulations. However, given that it is generated with the help of a more disaggregated model than those used for these World Bank and IMF projections, the simulations offer additional detail on

Table 0.3: Value-Added, Consumption, and Trade Elasticities

	VA	LES	Armington	CET
Crops	0.70	0.56	2.00	2.00
Livestock	0.70	0.76	2.00	2.00
Gold	0.08			
Oil	0.08	1.23	18.00	0.38
Manufacturing	0.70	1.10	0.90	0.90
Construction	0.70		1.50	
Electricity-water	0.70	1.60		
Trade	0.70			0.90
Transportation	0.70	1.23	0.50	
Government services	0.30	1.38		
Other services	0.70	1.60	0.50	

Notation:
VA = value added (elasticities of factor substitution in CES VA function);
LES = Linear Expenditure system (elasticities of household consumption with respect to total consumption spending);
Armington = CES aggregation function for domestic demand (elasticities of substitution between imports and domestic output);
CET = Constant Elasticity of Transformation function for domestic output (elasticities of transformation between exports and domestic supply).

developments up to 2030 that are consistent with these macro projections.

The simulations start in 2012, the base-year for the SAM and the bulk of the database. Coverage of the base scenario starts with the key assumptions, followed by a presentation and analysis of selected simulated results.

In order to generate a base scenario that satisfies the criteria specified above, it is crucial to specify appropriate rules and values for growth in GDP at factor cost and various payments (involving the government, the household, and the rest of the world), as well as mechanisms for the clearing of macro balances (the government budget, the balance of payments, and the private savings-investment balance).

For the base scenario (but not for the other scenarios), annual growth in GDP at factor cost is exogenous, in the ranges of 3–4 percent up to 2016 and 4–5 percent in subsequent years, generating an average of 4.1 percent for the period 2013–2030, a figure that is slightly below Sudan's average growth rates in recent decades.[91] Given projected population growth of 2.2 percent per year, average annual growth in GDP at factor cost per capita is around 1.8 percent.

Among other assumptions, it is important to take note of the following:

- Government. Domestic payments to and from the government evolve on the basis of IMF/WB projections, imposed either as exogenous real growth rates (for consumption and investment) or as exogenous GDP shares (for import tariffs, domestic borrowing, domestic transfers, and subsidies. Payments received from abroad —foreign grant aid and foreign borrowing— are exogenous in foreign currency, set at levels that are consistent with IMF/WB projections. Domestic and foreign interest payments depend on exogenous interest rates and the level of foreign and domestic debt stocks; it is assumed that, starting from 2015, foreign interest is paid in full. Domestic taxes (direct and indirect) are scaled to clear the government budget. Given that all other major payments are defined to be close to projections, the GDP shares for tax payments are also close to projections.
- Savings-investment. Government investment is financed within the government budget. FDI is exogenous in foreign currency. The GDP share of domestically financed private investment is exogenous while the private savings rate adjusts to generate needed financing—domestic private savings net of lending to the government is allocated to investment.

[91] Technically, the level of GDP is fixed, removing one variable from the model for each solution year. At the same time, a variable that introduces a uniform adjustment in TFP in each production activity is flexed, assuring that the exogenous GDP level is reached and that the model continues to have an equal number of equations and variables. Among production activities, TFP is not adjusted for petroleum and other mining since production growth for these two sectors is based on exogenous projections. For all non-base scenarios, the GDP level is flexible whereas the TFP adjustment variable is fixed.

Table 0.4: Definitions of Non-Base Scenarios

Name	Description
Crop+	TFP growth for crop agriculture increased by 2 percentage points during the period 2015–-2030.
Rem–	Zero growth in private transfers, including worker remittances, from abroad, 2015–2030.
Crop+rem–	Combining the changes for Crop+ and Rem–
Rexrdepr	Series of simulations with real exchange rate depreciation in conjunction with withdrawal of foreign exchange to build up reserves
TofT+	Stepwise* 10% decrease in foreign-currency import prices (excluding oil) in 2016–2018; stepwise* 5% increase in foreign-currency export prices (excluding gold and oil) in 2016–2018. Rationale: Normalized relations with RoW
Aid+	Stepwise* increase in foreign grants to government in 2016–2018, in 2018 and subsequent year at $150 mn; stepwise* increase in concessional government foreign borrowing in 2016–2018, in 2018 and subsequent year at $600 mn. Rationale: Normalized relations with RoW.
Debt–	Stepwise* foreign debt relief in 2016–2018, by 2018 having removed 75% of Sudan's 2016 debt. Rationale: Normalized relations with RoW.
Normal	Combining the changes for TofT+, Aid+ and Debt–

*Stepwise = 25% of change in 2016, 62.5% in 2017, and 100% in 2018. New levels of prices, grants and borrowing stay in place 2019–2030.

- Balance of payments. The government-related items and FDI were described above. Among other non-government items, on the inflow side, net private transfers and net private foreign borrowing (which is small) are both exogenous in foreign currency; among the outflows, net additions to foreign reserves are exogenous in foreign currency while private interest payments (like their government equivalents) depend on private foreign debt. The balance clears via adjustments in the real exchange rate, which influences export and import quantities and foreign currency values.[92, 93]
- Oil and gold price and production data. For both commodities, production data is based on Chapter 5 of this CEM whereas international prices (in constant US$) are based on IMF (2014c), and World Bank (2015a, 2015d); in the absence of World Bank price projections after 2025, prices are assumed to stay at the 2025 level during the period 2026–2030. The information is shown in the main text, Figure 2.2.1. For oil, production is projected to peak in 2015 after which it declines gradually, at an annual rate of 6.7 percent; for gold, a recent production decline is projected to continue until 2016 after which production will stabilize with a resumption of growth for 2019–2030 at an annual rate of 3.4 percent. After the precipitous decline in 2015, oil (and oil product) export and import prices (in constant US$) are projected to increase gradually up to 2025 after which they stabilize, with an average annual growth rate of 3.4 percent for the period 2016–2030. For gold, export prices are projected to continue their gradual decline up to 2025 after which they also stabilize, for the full period 2013–2030 falling at a rate of 0.9 percent.

[92] The real exchange rate is defined as follows: PW•EXR/PD where PW is an index of export and import prices in foreign currency, EXR the nominal exchange rate (local currency units per foreign currency unit), and PD an index of prices of domestic output sold domestically.
[93] For example, a real depreciation raises the prices in local currency of exports and imports, for exports inducing domestic suppliers to increase quantities and foreign currency values and, for imports, inducing domestic demanders to decrease quantities and foreign currency values, with the result being a surplus (or reduced deficit) in the balance of payments.

Scenario Results

Table 0.5: Real Macro Indicators by Simulation (%annual Growth 2013–2030)

	2012	Base	Crop+	Rem–	Crop+rem–	TofT+	Aid+	Debt–	Normal
Absorption	243.1	3.1	3.9	2.2	3.2	3.5	3.2	3.4	3.8
Consumption – private	188.3	2.9	3.9	2.0	3.2	3.3	3.0	3.2	3.7
Consumption – government	12.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Fixed investment – private	38.6	2.7	3.5	1.6	2.6	3.2	2.9	3.1	3.7
Fixed investment – government	3.5	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Exports	19.8	6.0	7.6	6.7	8.2	6.2	6.0	5.9	6.1
Imports	37.7	3.4	4.7	2.5	4.0	4.1	3.6	3.8	4.5
GDP at factor cost	213.6	4.1	5.0	3.7	4.8	4.3	4.2	4.3	4.6
Total factor employment (index)		3.0	3.3	2.8	3.1	3.2	3.1	3.2	3.4
Total factor productivity (index)		1.1	1.7	1.0	1.7	1.1	1.1	1.1	1.2
GNI	216.5	3.9	4.9	3.5	4.7	4.2	4.0	4.2	4.5
GNDI	219.5	4.1	5.1	3.5	4.6	4.4	4.2	4.4	4.7
GNI per capita	5.8	1.7	2.6	1.3	2.4	2.0	1.8	2.0	2.3
GNDI per capita	5.9	1.9	2.8	1.3	2.4	2.1	2.0	2.1	2.4
Real exchange rate (index)		4.4	3.7	4.8	4.0	4.2	4.3	4.3	4.1
Unemployment rate (%)	20.0	10.8	5.0	12.5	6.0	6.9	9.8	8.5	5.0
Headcount poverty rate (%)	46.5	38.4	29.4	47.2	35.8	34.2	37.4	35.8	31.4

Note:
1. Unless otherwise noted, column for initial year shows data in mn 2012 SDG.
2. For the unemployment and poverty rates, the base-year and simulation columns show base-year rate and simulation-specific final-year rates, respectively.

Table 0.6: Macro Indicators in 2012 and by Simulation in 2013 (% of GDP)

Indicator	2012	Base	Crop+	Rem–	Crop+rem–	TofT+	Aid+	Debt–	Normal
Absorption	108.0	104.7	103.3	96.3	96.6	104.2	105.5	106.951	106.9
Consumption – private	83.6	81.7	80.4	74.7	75.0	81.3	82.3	83.446	83.5
Consumption – government	5.7	5.2	4.7	5.5	4.9	5.0	5.2	5.113	4.9
Investment – private	17.2	14.3	14.9	12.4	13.3	14.6	14.5	14.913	15.3
Investment – government	1.5	3.6	3.2	3.7	3.4	3.3	3.5	3.479	3.2
Exports	8.8	26.0	27.1	33.0	32.7	25.8	25.6	24.7	24.1
Imports	16.8	30.7	30.3	29.3	29.3	30.0	31.1	31.6	31.0
GDP at market prices	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Net indirect taxes	5.1	9.0	8.2	9.8	8.7	8.5	8.3	6.8	5.8
GDP at factor cos	94.9	91.0	91.8	90.2	91.3	91.5	91.7	93.2	94.2
GNI	96.2	93.6	94.5	92.9	94.0	94.0	93.2	96.2	96.0
GNDI	97.5	103.6	102.4	95.0	95.6	103.2	103.3	105.8	105.0
Foreign savings	10.5	1.1	0.9	1.3	1.0	1.0	2.1	1.1	1.9
Gross national savings	8.2	16.7	17.2	14.9	15.7	16.9	15.9	17.3	16.7
Gross domestic saving	10.7	13.1	14.8	19.8	20.1	13.7	12.6	11.4	11.6
Foreign government deb	81.4	113.8	89.8	127.9	97.7	103.9	126.5	37.0	46.2
Foreign private debt	2.6	3.7	2.9	4.1	3.1	3.3	3.6	3.5	3.2
Domestic government debt	12.9	16.3	13.6	17.4	14.3	15.1	16.1	15.7	14.4

Table 0.7: Government Receipts and Spending in 2012 and by Simulation in 2030 (% of Nominal GDP)

			Final year							
Indicator		2012	Base	Crop+	Rem–	Crop+rem–	TofT+	Aid+	Debt–	Normal
Receipts	Direct taxes	0.7	1.1	1.0	1.2	1.1	1.1	1.0	0.7	0.6
	Import tariffs	2.1	2.7	2.7	2.5	2.6	2.6	2.7	2.7	2.7
	Other indirect taxes	4.9	6.9	6.0	7.8	6.7	6.5	6.1	4.5	3.7
	Private transfers	1.7	2.9	2.9	2.7	2.7	2.9	2.9	3.0	3.0
	Foreign transfers	0.4	0.4	0.3	0.5	0.3	0.4	0.7	0.4	0.6
	Domestic borrowing	3.5	1.7	1.4	1.8	1.5	1.6	1.7	1.7	1.5
	Foreign borrowing	2.8	0.9	0.7	1.0	0.8	0.8	1.9	0.8	1.7
	Total	16.1	16.6	15.0	17.5	15.6	15.8	16.9	13.9	13.7
Spending	Consumption	5.7	5.2	4.7	5.5	4.9	5.0	5.2	5.1	4.9
	Fixed investment	1.5	3.6	3.2	3.7	3.4	3.3	3.5	3.5	3.2
	Private transfers	3.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Commodity subsidies	1.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Domestic interest payments	1.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3
	Foreign interest payments	2.7	3.4	2.6	3.8	2.9	3.1	3.8	0.8	1.2
	Total	16.1	16.6	15.0	17.5	15.6	15.8	16.9	13.9	13.7

Table 0.8: Balance of Payments in 2012 and by Simulation in 2030 (% of Nominal GDP)

			Final year							
Indicator		2012	Base	Crop+	Rem–	Crop+rem–	TofT+	Aid+	Debt–	Normal
Outflows	Imports	16.8	30.7	30.3	29.3	29.3	30.0	31.1	31.6	31.0
	Factor income to RoW	1.1	2.8	2.7	3.1	2.9	2.7	2.8	2.8	2.6
	Net interest income to RoW	2.8	3.6	2.8	4.0	3.1	3.2	4.0	1.0	1.3
	Change in foreign reserves	0.9	0.9	0.7	1.1	0.8	0.9	0.9	0.9	0.8
	Total	21.5	38.1	36.6	37.5	36.1	36.8	38.8	36.4	35.8
Inflows	Exports	8.8	26.0	27.1	33.0	32.7	25.8	25.6	24.7	24.1
	Private transfers from RoW	0.9	9.6	7.6	1.7	1.3	8.8	9.5	9.3	8.4
	Official transfers from RoW	0.4	0.4	0.3	0.5	0.3	0.4	0.7	0.4	0.6
	Private borrowing	4.6	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	Government borrowing	2.8	0.9	0.7	1.0	0.8	0.8	1.9	0.8	1.7
	FDI	3.9	1.1	0.8	1.2	0.9	1.0	1.1	1.0	0.9
	Total	21.5	38.1	36.6	37.5	36.1	36.8	38.8	36.4	35.8

Table 0.9: Real GDP at Factor Cost in 2012 and Growth by Simulation (% Annual Growth)

	2012	Base	Crop+	Rem–	Crop+rem–	TofT+	Aid+	Debt–	Normal
Aggregate sectors									
Agriculture	60.8	5.7	7.0	5.7	7.1	5.9	5.7	5.7	6.0
Industry	47.4	1.9	2.5	1.3	2.0	2.2	2.0	2.2	2.5
Mining	19.7	–3.4	–3.5	–3.4	–3.4	–3.4	–3.4	–3.4	–3.4
Manufacturing	15.9	4.3	5.1	3.6	4.5	4.6	4.4	4.6	5.0
Other	11.9	3.5	4.2	2.8	3.6	3.9	3.7	3.9	4.3
Services	105.4	3.8	4.6	3.2	4.2	4.1	4.0	4.1	4.5
Private	94.6	3.9	4.7	3.2	4.2	4.2	4.0	4.2	4.5
Government	10.8	3.7	4.0	3.3	3.7	3.8	3.7	3.8	4.0
Disaggregated sectors									
Crop agriculture	32.3	6.1	8.3	6.4	8.6	6.3	6.2	6.2	6.3
Livestock agriculture	28.6	5.1	5.1	4.9	4.7	5.4	5.2	5.2	5.5
Gold	7.7	–2.3	–2.5	–2.3	–2.4	–2.4	–2.3	–2.3	–2.4
Petroleum	12.0	–4.2	–4.2	–4.2	–4.2	–4.2	–4.2	–4.2	–4.2
Manufacturing	15.9	4.3	5.1	3.6	4.5	4.6	4.4	4.6	5.0
Construction	8.5	3.7	4.3	2.9	3.7	4.1	3.8	4.0	4.5
Electricity-water	3.3	3.1	3.9	2.5	3.5	3.4	3.2	3.4	3.7
Trade services	56.5	3.9	4.7	3.3	4.3	4.1	4.0	4.2	4.5
Transportation services	20.9	3.8	4.7	3.0	4.1	4.1	3.9	4.1	4.5
Government services	10.8	3.7	4.0	3.3	3.7	3.8	3.7	3.8	4.0
Other services	17.2	3.9	4.9	3.1	4.3	4.3	4.1	4.3	4.8
Total	213.6	4.1	5.0	3.7	4.8	4.3	4.2	4.3	4.6

Table 0.10: Sector Structure in 2012 and by Simulation in 2013 (% of GDP)

	EXP-shr	VA-shr	EMP-shr	IMP-shr	EXPOUT-shr	IMPDEM-shr
2012						
Agriculture	15.6	28.5	63.6	16.9	3.7	7.7
Crop	11.6	15.1	35.8	15.2	4.4	10.8
Livestock	4.1	13.4	27.8	1.7	2.6	2.2
Industry	76.8	22.2	8.7	64.0	8.3	14.5
Mining	75.3	9.2	2.1	8.9	37.3	11.9
Gold	38.9	3.6	0.9		100.0	
Petroleum	36.4	5.6	1.2	8.9	22.3	11.9
Manufacturing	1.5	7.4	3.6	54.1	0.3	17.2
Other	0.0	5.6	3.0	1.0	0.0	1.8
Services	7.5	49.3	27.7	19.1	1.0	4.9
Private	7.5	44.3	22.6	19.1	1.2	5.5
Government		5.0	5.0			
Total	100.0	100.0	100.0	100.0	4.8	9.8
2030						
Agriculture	75.2	38.9	73.0	3.3	38.9	3.3
Crop	55.3	23.0	45.2	3.0	41.7	4.6
Livestock	19.9	15.8	27.8	0.3	32.7	0.9
Industry	12.7	17.7	5.8	82.0	4.4	27.9
Mining	10.3	6.0	0.7	48.2	31.7	72.2
Gold	5.3	1.5	0.3		100.0	
Petroleum	5.0	4.5	0.3	48.2	18.4	72.2
Manufacturing	2.4	7.0	3.0	33.5	1.1	18.4
Other	0.0	4.6	2.2	0.3	0.0	1.2
Services	12.1	43.4	21.2	14.7	5.4	7.7
Private	12.1	38.9	17.3	14.7	6.2	8.7
Government		4.5	3.9			
Total	100.0	100.0	100.0	100.0	14.1	17.5
Δ (2030–2012)						
Agriculture	59.5	10.4	9.4	–13.6	35.1	–4.4
Crop	43.8	7.9	9.4	–12.2	37.2	–6.2
Livestock	15.8	2.5	0.0	–1.4	30.1	–1.4
Industry	–64.2	–4.5	–2.9	18.0	–3.9	13.4
Mining	–65.0	–3.2	–1.5	39.3	–5.5	60.3
Gold	–33.7	–2.1	–0.6			
Petroleum	–31.4	–1.1	–0.9	39.3	–3.9	60.3
Manufacturing	0.9	–0.4	–0.7	–20.6	0.8	1.2

(continued on next page)

Table 0.10: Sector Structure in 2012 and by Simulation in 2013 (% of GDP) (*continued*)

	EXP-shr	VA-shr	EMP-shr	IMP-shr	EXPOUT-shr	IMPDEM-shr
Other	0.0	–0.9	–0.8	–0.6	0.0	–0.5
Services	4.6	–5.9	–6.5	–4.4	4.4	2.8
Private	4.6	–5.4	–5.4	–4.4	5.0	3.2
Government		–0.5	–1.1			
Total	0.0	0.0	0.0	0.0	9.3	7.7

Notation	Share in
EXP-shr	exports
VA-shr	value added
PRD-shr	production
EMP-shr	employment
IMP-shr	imports
EXPOUT-shr	sector output to exports
IMPDEM-shr	domestic demand from imports

Annex 2: Determinants of Savings in Sudan

The main text showed that national savings in post-secession Sudan fell sharply and is low given its income level. Low savings further can translate into lower growth through lower investment. This annex provides a short analysis of the determinants of savings from both macro and micro perspectives. In doing so, the analysis uses estimates from World Bank (2013), which modified estimations by Loayza, Schmidt-Hebbel and Servén (2000) by incorporating nonlinearity of macroeconomic stability. See Figure 0.3 for results.

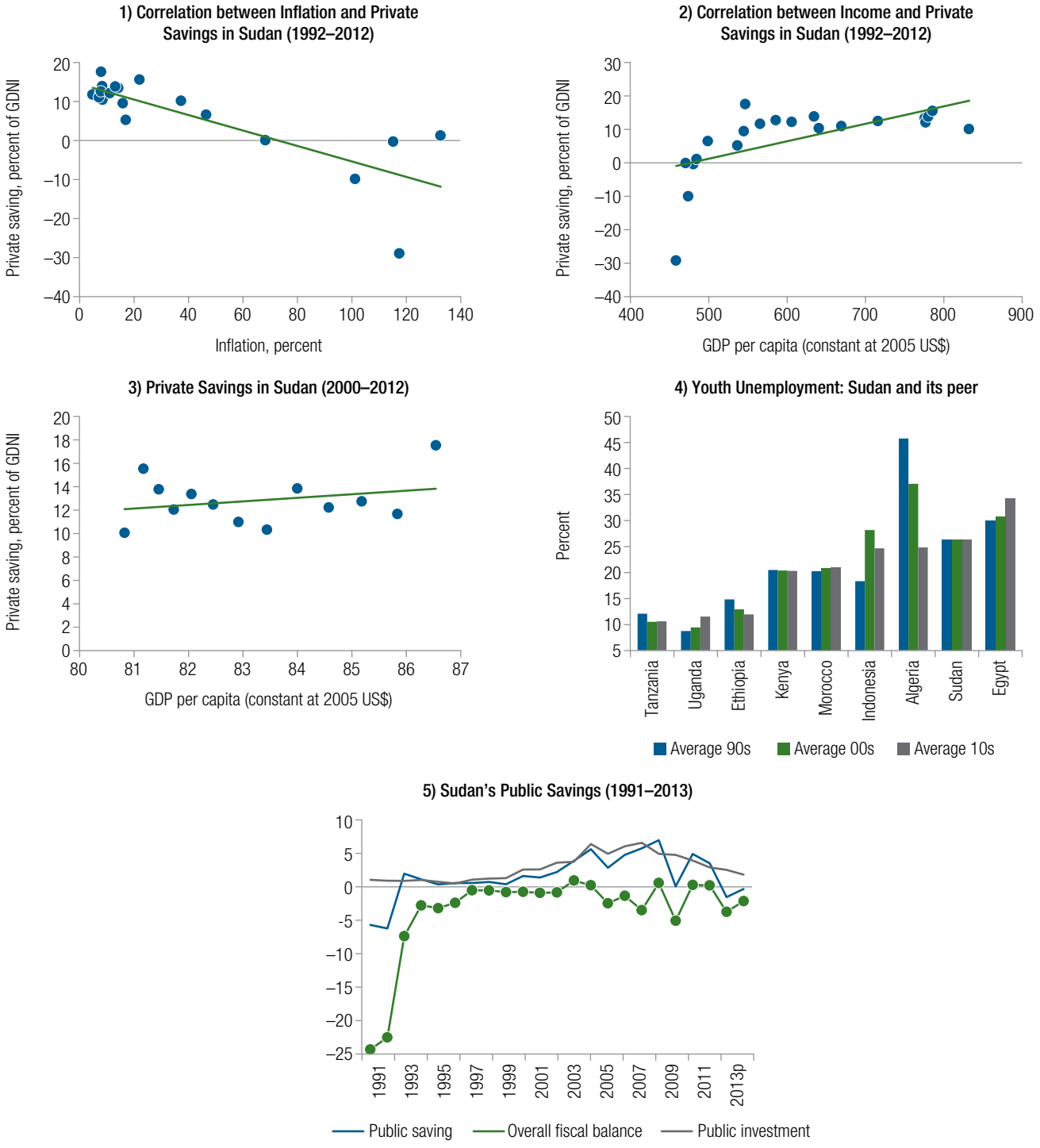
Sudan's private savings behavior is mostly attributable to three determinants: macroeconomic instability, income level, and youth dependency:

i. ***Macroeconomic stability*** significantly affects Sudan's private saving.[94] The sharp decline in inflation in the late 1990s raised private saving, whereas the skyrocketing inflation since the secession of South Sudan lowered private saving. The above analysis found a negative relationship between inflation and savings rate, which suggests that skyrocketing inflation discourages households to save by depleting real value of household assets and purchasing power of household income. In such a case, households dis-save to fill in consumption gap or to save in non-monetary form by increasing inventory of goods or save in foreign currency.
ii. The increase in ***income level*** since the advent of oil in the 2000s boosted Sudan's private saving. The literature suggests that households start to save when their income exceeds subsistence levels. The advent of oil accelerated economic growth in the 2000s, leading to increase in private saving. Sudan's per capita GDP stagnated in the 1980s and the 1990s but started to rise since the mid-1990s.
iii. The decline in ***youth dependency ratio***, in general, contributes to rising private saving. Sudan's youth dependency ratio fell from 82 percent of working-age population in 2000 to 75 percent in 2012. The literature finds strong negative correaltion between youth dependency ratio and saving. In this period, however, Sudan's private savings rate fell from 17.5 percent in 2000 to 10.1 in 2012. This inconsistency can be attributable to Sudan's high and unchanged youth unemployment. Youth unemployment *effectively* adds burden of youth dependency. Sudan suffers from particularly high youth unemployment: new labor market entrants, those around 20 years of age, face an unemployment rate of around 24 percent. Comparison with the peer group countries shows that Sudan's youth unemployment rate is the second highest after Egypt. Consequently, even as the young-age population bulge came of age and entered the labor market, the *effective* youth dependency on income earners did not decline much.

The increase in private savings in the early 2000s was accompanied by **an increase in public savings**. Before the advent of oil, public savings was in the range of 0 to 1 percent of GNDI. Public investment remained low and overall fiscal deficit was improving from the poor macroeconomic performance in the early 1990s. Public savings started to rise following a rise in public investment in the early 2000s. Because fiscal balance remained close to zero until the mid-2000s, public savings was mostly driven by public investment. Large fiscal deficit was registered in 2009 when the global financial crisis hit the Sudanese economy and in 2012 when Sudan lost nearly 55 percent of its fiscal revenues after the secession of South Sudan. Public saving, in turn, is recently driven by large fiscal deficit given public investment is declining.

[94] Balassa (1986) claims that stable and substantial level of domestic savings can be achieved by keeping the real interest rate stable and sufficiently high. Alternatively, Balassa proposes that low and stable inflation, supported by a small budget deficit, encourages saving.

FIGURE 0.3: Savings Rates in Sudan, 1991–2013



Source: World Bank staff own calculations, based on data from World Bank World Development Indicators; and IMF World Economic Outlook.
Note: (1) "p" denotes preliminary.

Annex 3: Timeline of U.S. Sanctions Against Sudan

1997, 3rd November – Executive Order 13067 (blocking Sudanese Government property and prohibiting transactions with Sudan) issued

2002, 21st October – OFAC added names of individuals and firms to its specially designated nationals list including Sudanese Petroleum Corporation

2004, 5th April – OFAC issued an interpretative ruling on publishing activities involving manuscripts from sanctioned countries including Sudan

2004, 2nd August – OFAC added Farmers Commercial Bank in the specially designated nationals list for Sudan

2004, 16th December OFAC issued a general license pertaining to certain publishing activities in Sudan

2005, 29th March United Nations Security Resolution 1591 of 2005 passed a resolution obligating all United Nations members to subject to asset freeze and travel restrictions individuals who are determined to have inter alia impeded the peace process, constituted a threat to stability in Darfur and the region, commit violations of international humanitarian or human rights law or other atrocities

2005, 13th June OFAC issued amendments to the Sudanese Sanctions Regulations to authorizes inter alia (a) the operation of accounts in U.S. financial institutions under certain circumstances for individuals ordinarily resident in Sudan; and (b) U.S. persons to process transfers of funds constituting noncommercial, personal remittances to or from Sudan or for or on behalf of individuals ordinarily resident in Sudan

2006, 26th April – Executive Order 13400 (blocking property of persons in connection with the conflict in Sudan's Darfur Region) issued

2006, 13th October – Executive Order 13412 blocking property and prohibiting transactions with the Government of including all transactions by U.S. persons relating to Sudan's petroleum or petrochemical industries, including, but not limited to, oilfield services and oil or gas pipeline. The President of the United States signs into law the Darfur Peace and Accountability Act of 2006 (imposing sanctions against individuals responsible for genocide, war crimes, and crimes against humanity, to support measures for the protection of civilians and humanitarian operations, and to support peace efforts in the Darfur region of Sudan). The two pieces of law also provided relief to Southern Sudan and the Government of Southern Sudan as well as select areas of Sudan including Southern Kordofan/ Nuba Mountains, Blue Nile State, Abyei, Darfur and marginalized areas in and around Khartoum (Specified Areas of Sudan) by exempting them from some of the prohibitions sets forth in the Executive Order 13067

2006, 17th November – OFAC issued an Interpretative Guidance regarding the application of Executive Order 13412 to transshipments of goods and financial transactions conducted through certain areas of Sudan

2006, 3rd April – OFAC amended the Sudanese Sanctions Regulations to permit the exportation or re-exportation, from the United States or by a U.S. person, of any goods or technology to a third-country government, or to its contractors or agents, for shipment to Sudan via a diplomatic pouch

2007, 29th May – OFAC added names of individuals and firms to its specially designated nationals list pursuant to Executive Order 13400 of April 26, 2006 as contributing to the conflict in the Darfur region. These include Sudan Telecommunications Company Limited (SUDATEL), Sudan Gezira Board, Azza Air Transport Company Ltd and Giad Motor Industry Company Limited

2007, 31st October – OFAC amended the Sudan Sanctions Regulations to implement Executive Order 13412, provide interpretative sections in the Regulations and introduce general licenses which expands the exemption relating to official business

of the U.S. Government and the United Nations to include transactions and activities not only of employees but also of contractors and grantees of the U.S. Government and United Nations or any of the United Nation specialized agencies, programs, and funds (including, e.g., the World Bank Group and International Monetary Fund).

2009, 10th June – OFAC amended the Sudan Sanctions Regulations to expand the authorization of select imports for diplomatic or official personnel to include the provision of goods or services in the United States to the diplomatic missions of the Government of Sudan to the United States and the United Nations, and to the employees of such missions

2009, 9th September – OFAC issued a general license authorizing the exportation and re-exportation of agricultural commodities, medicine, and medical devices to the Specified Areas of Sudan

2010, 10th March – OFAC issued a general license authorizing the exportation from the United States or by U.S. persons of certain limited services and software related to the exchange of personal communications over the Internet

2010, 20th October – OFAC issued a statement on licensing policy that seeks to establish a favorable licensing regime through which U.S. persons can request from OFAC specific authorization for the commercial exportation or re-exportation of U.S.-origin agricultural equipment and services to an area of Sudan other than the Specified Areas of Sudan

2011, 12th April – OFAC issued an Interpretative Guidance regarding the application of the Sudanese sanctions regulations to the new state to be formed by the secession of Southern Sudan

2011, 17th June – OFAC issued a guidance clarifying that donations of food and medicine to non-Specified Areas of Sudan, when intended to be used to relieve human suffering, are exempt from the prohibitions of the Sudanese Sanctions Regulations

2011, 12th October – OFAC issued general licenses authorizing processing of consular funds transfer and transportation of human remains to or from Sudan

2011, 13th October – OFAC issued general licenses authorizing the exportation or re-exportation food to individuals and entities in an area of Sudan other than the Specified Areas of Sudan

2011, 8th December – OFAC issued general licenses which inter alia authorizes related financial transactions and the activities supporting transshipment—through Sudan to or from South Sudan—of goods, technology, and services for South Sudan's petroleum and petrochemical industries

2013, 15th April OFAC issued General License 1 permitting certain academic and professional exchange activities between the United States and Sudan, which are otherwise prohibited by the Sudanese Sanctions Regulations including establishment and operation by U.S. academic institutions of academic exchange programs with academic institutions in Sudan

2014, 11th August – OFAC issued General License 1A which modify the scope of authorization permitted on April 15, 2013 and expands the definition of "U.S. academic institutions", permits such institutions to engage in activities involving Sudanese nationals and authorizes U.S. financial institutions to process money transfers incidental to participation of Sudanese nationals in academic and professional exchange programs organized by U.S. academic institutions.

2015, 18th February – In order to advance free flow of information and to facilitate communications by the Sudanese people, OFAC issued an amended general license pertaining to certain software, hardware, and services incident to personal communications (essentially expanding the scope of ICT devices, software and services for personal communication that can be made available in Sudan by U.S. persons).

Source: World Bank staff own compilation, based on data from the U.S. Office for Foreign Asset Control (OFAC).

Annex 4: Additional Details on RER Calculations and Theoretical Considerations

Examples of the theoretical relationship between the real exchange rate and exports

Two examples show the theoretical impact of RER adjustments on exports:

- *First*, a reduction in domestic demand would lower both the RER and the price of export. This is because the reduced domestic demand would lower the prices of both the domestic non-tradable and tradable goods. Since the price of the foreign tradable good does not change (much), this implies that the domestic tradable good would become relatively cheaper compared to the foreign tradable good. This in turn would imply cheaper exports.

  In addition, since both the prices of the non-tradable good and tradable good decline compared to the foreign goods, the relative price of the domestic consumption basket becomes lower, implying a depreciated RER. So there would be cheaper export and a *depreciated* RER.
- *Second*, consider a policy that would subsidize the production of domestic tradable goods. As a result, production of the domestic tradable goods would expand and they would become cheaper compared to the foreign tradable good, implying cheaper export. On the other hand, the unsubsidized domestic non-tradable goods would become relatively scarce and hence more expensive. The increase in the non-tradable goods' prices could outweigh the decline of the tradable goods' prices, thus possibly making the price of the domestic consumption basket to go up compared to that of the foreign consumption basket. The RER would appreciate. So the subsidy makes export cheaper, but the RER *appreciates*.

Measuring a country's RER misalignment

The first step, measures an RER misalignment index after controlling for the Balassa-Samuelson effect. The Balassa-Samuelson effect captures the effect of an economy's productivity on its non-tradable goods' prices. In detail, this can be explained as follows: usually it is observed that the prices of services (like a haircut) are higher in developed countries than in developing countries because wages are higher in developed countries. But why are wages are higher in developed countries? It is because the tradable sector of developed countries has higher productivity than that in developing countries. Given the law of one price on tradable goods, this implies that wages paid to tradable-sector workers in developed countries have to be higher to commensurate their high productivity. In other words, low productivity explains a large part why the tradable/non-tradable good price ratio (i.e. the real exchange rate) in developing countries is larger than that in developed countries. After the Balassa-Samuelson effect is captured, the remaining residual is considered the misaligned part.

The Balassa-Samuelson effect is captured as follows:

$$s_{i,t} * lnRERiW,t = \beta si,t * (\ln y_{i,t} - \ln y_{W,t}) + u_{i,t}$$

It is a weighted regression (to take into account the fact that larger countries have heavier weights in the regression). A country's productivity is proxied by its output per capita.

$$s_{i,t} = \frac{Y_{i,t}}{\sum_{j=1}^{N} Y_{j,t}}$$

is the weight of country i at time t. $Y_{i,t}$ is country i' nominal output;. $lnRERi_{W,t}$ is the log of the real exchange rate of country i relative to the world; $\ln y_{i,t}$, $\ln y_{W,t}$ are country i and world average output per capita at time t. Coefficient β captures the Balassa-Samuelson effect with an expected negative sign. The idea is that according to the Balassa-Samuelson effect,

a country's RER, at any given time, is larger if its output per capita (a proxy for productivity) is smaller compared to the world's output. This is slightly different to Rodrik's approach, in the sense that he only regresses a country's RER with its absolute output per capita. Since RER is a relative concept, the decision was made to add the world average output to the right hand side of the equation to generate output differential, which is a relative concept as well.

Notice that there is no constant in the regression and no time and country fixed effects. The regression is designed that the sum of the right hand side exactly equals the sum of the left hand side every period (i.e. sum of $u_{i,t}$ equals 0 for all t). What it means is that at any given time, on average, the world RER is exactly aligned.

The results show that Balassa-Samuel effect is highly significant with a negative sign. It shows that for each additional 1 percent output differential, Balassa Samuelson effect on average explains 0.317 percent of RER appreciation. What this means is that for each 1 percent output differential, the productivity differential accounts for 0.317 percent of the RER differential between countries.

$\widehat{u_{i,t}}/s_{i,t}$ will be the RER misalignment variable of country i where $\widehat{u_{i,t}}$ is the residual of the regression. A positive $u_{i,t}$ implies an undervalued RER. That is, the RER is larger beyond the explanation of the Balassa-Samuelson effect. In other words, the tradable/non-tradable good price ratio is larger, beyond the explanation of the Balassa-Samuelson effect.

Measuring the impact of undervalued RERs on export and output growth

To examine econometrically the relationship between a country's RER undervaluation with its export and output growth using international data the following regression is used:

$$growthrate_{i,t} = \alpha + \gamma \frac{\widehat{u_{i,t}}}{s_{i,t}} + f_t + f_i + \varepsilon_{i,t}$$

where growth rate is calculated for both real exports and real GDP, $\widehat{u_{i,t}}/s_{i,t}$ is the undervaluation measure, and f_t, f_i are country and time fixed effects. The time fixed effects is to control for global macroeconomic factors that affect all countries' export in the same way at a given time. The country fixed effects is to control for country's time-invariant characteristics. Essentially, with the country fixed effects, the following question is asked: how does a real export growth change *within* a country, given its RER undervaluation index relative to the rest of the world? The initial value of export and output levels are controlled. The expected sign of γ is positive: it implies that a more undervalued exchange rate (a larger $\widehat{u_{i,t}}/s_{i,t}$) is associated with higher export and output growth.

Two results are derived and shown in Tables 0.12 and 0.13. Simple descriptions of the results are in the main text.

Table 0.11: Panel Estimation Effect on Exports Growth of Undervaluation

	First-Stage Balassa-Samuelson
Weighted relative GDP growth	–0.317 ***(0.0117)
Time Fixed Effect	no
Country Fixed Effect	no
Observations	8,184
R-squared	0.804

Notes: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 0.12: Undervalued RERs and Export Growth

	Second-Stage						
	All Countries	High Income			Low Income		
	Δln(real exports)	Δln(real exports)			Δln(real exports)		
	Full Sample (1)	Full Sample (2)	1950–1980 (3)	1981–2011 (4)	Full Sample (5)	1950–1980 (6)	1981–2011 (7)
ln(Initial Real Exports)	–0.0999*** (0.0225)	–0.0847*** (0.0151)	–0.137*** (0.0233)	–0.127*** (0.0187)	–0.127*** (0.0437)	–0.388*** (0.0631)	–0.128*** (0.0250)
Undervaluation	0.0598*** (0.0131)	0.0811*** (0.0188)	0.126*** (0.0379)	0.0497 (0.0336)	0.0502** (0.0211)	–0.0375 (0.0708)	0.0699*** (0.0258)
Constant	0.778*** (0.148)	0.547*** (0.104)	1.163*** (0.174)	1.199*** (0.168)	0.771*** (0.273)	2.431*** (0.401)	0.934*** (0.173)
Time Fixed Effect	yes	yes	yes	yes	yes	yes	yes
Country Fixed Effect	yes	yes	yes	yes	yes	yes	yes
Observations	7,139	3,561	1,444	2,117	3,578	1,305	2,273
R-squared	0.139	0.159	0.157	0.209	0.148	0.334	0.159
Number of country id	156	75	63	75	81	63	81

Notes: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Low Income countries: if the real GDP per capita was below US$6,000/year in 2000.

Table 0.13: Undervalued RERs and Output Growth

	Second-Stage						
	All Countries	High Income			Low Income		
	Δln(real exports)	Δln(real exports)			Δln(real exports)		
	Full Sample (1)	Full Sample (2)	1950–1980 (3)	1981–2011 (4)	Full Sample (5)	1950–1980 (6)	1981–2011 (7)
ln(Initial Real Exports)	–0.0916*** (0.0204)	–0.141*** (0.0450)	–0.215** (0.0983)	–0.294** (0.114)	–0.0830*** (0.0128)	–0.182*** (0.0372)	–0.135*** (0.0171)
Undervaluation	0.0884*** (0.0204)	0.138*** (0.0496)	0.195*** (0.0731)	0.183** (0.0828)	0.0764*** (0.0123)	0.121*** (0.0248)	0.114*** (0.0184)
Constant	0.743*** (0.156)	1.205*** (0.370)	1.984** (0.924)	2.722** (1.059)	0.601*** (0.0925)	1.322*** (0.267)	1.042*** (0.132)
Time Fixed Effect	yes	yes	yes	yes	yes	yes	yes
Country Fixed Effect	yes	yes	yes	yes	yes	yes	yes
Observations	8,020	3,925	1,570	2,355	4,095	1,579	2,516
R-squared	0.140	0.219	0.295	0.297	0.129	0.182	0.175
Number of country id	165	80	68	80	85	73	85

Notes: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Low Income countries: if the real GDP per capita was below US$6,000/year in 2000.

Annex 5: Financial Soundness Indicators for the Banking Sector, 2006–13

	Dec 2006	Dec 2007	Dec 2008	Dec 2009	Dec 2010	Dec 2011	Dec 2012	Mar 2013	Jun 2013
Capital Adequacy									
Regulatory capital to risk-weighted assets 1/	19.7	22.0	10.5	7.1	10.0	13.0	12.0	—	14.9
Regulatory Tier I capital to risk-weighted assets 1/	17.4	20.0	8.7	6.1	8.9	11.0	10.5	—	13.6
Asset composition and quality									
Loans to nongovernment to total assets	46.3	50.7	51.1	52.3	51.8	—	—	—	—
Gross NPLs to gross loans	19.4	26.0	22.4	20.5	14.4	12.6	11.8	11.3	10.4
NPLs net of provisions to gross loans	17.0	22.0	17.9	17.9	10.4	7.6	7.5	7.5	5.8
NPLs net of provisions to capital	63.7	85.0	71.0	74.8	43.7	33.3	33.5	30.5	25.5
Loans provisions to NPLs	14.0	15.0	20.0	23.9	31.7	39.8	36.5	33.3	43.7
Foreign currency loans to total loans	26.0	13.2	15.8	20.4	13.7	9.0	15.7	13.2	11.8
Deposits and investment accounts to total assets	60.0	55.5	57.4	63.2	63.9	63.5	63.4	64.5	65.1
Foreign currency deposits to total deposits	22.0	21.4	21.2	19.2	22.0	18.7	27.0	26.9	24.9
Off-balance sheet commitments to assets	33.0	32.5	34.4	28.0	31.5	29.8	32.2	29.9	28.9
Earnings and Profitability									
ROA (before tax)	3.6	3.7	3.0	3.8	3.9	4.2	4.4	1.0	1.3
ROE (before tax)	35.4	26.5	23.3	25.5	26.5	27.8	36.4	7.6	10.0
Liquidity									
BOS deposits to total assets	8.0	8.6	9.1	12.7	10.8	13.1	17.5	17.3	18.1
Required reserves to total assets	4.0	3.0	2.9	2.1	3.2	3.5	5.5	5.6	5.6
Required reserves to total reserves	39.0	34.8	26.0	14.5	25.5	23.9	28.6	28.9	28.0
Cash in vault to total assets	1.0	2.5	2.2	2.0	1.9	2.1	2.0	2.6	2.6
Liquid assets to total assets	25.0	25.6	28.0	34.2	35.3	36.3	41.7	39.6	39.8
Liquid assets to total short-term liabilities	75.0	75.0	85.0	97.0	98.2	93.8	102.5	96.3	96.7

Source: Central Bank of Sudan.

Annex 6: Additional Information for Export Performance Analysis

Tables and figures

Table 0.14: Change in Sudan's Shares of Exports, Main Export Products at HS-6 Level, 2007–2012

Product	Product Description	(1) Exports 2007 (US$ '000)	(2) Share 2007 (%)	(3) RCA 2007	(4) Exports 2012 (US$ '000)	(5) Share 2012 (%)	(6) RCA 2012	(7) CAGR
710812	Gold, non–monetary	197,391	2.32%	6.62	2,167,423	41.85%	40.11	61.48
10410	Sheep	61,456	0.72%	102.67	333,084	6.43%	770.21	40.22
120740	Sesame seeds	99,042	1.16%	163.84	147,845	2.85%	215.50	8.34
130120	Gum arabic	78,194	0.92%	486.43	92,291	1.78%	870.24	3.37
271000	Refined oil	63,746	0.75%	0.18	56,673	1.09%	0.19	–2.32
170111	Raw sugar not containing added flavor	19,550	0.23%	4.42	37,179	0.72%	6.86	13.72
854810	Waste and scrap of primary cells	608	0.01%	0.89	36,258	0.70%	130.24	126.55
740400	Copper waste and scrap	12,478	0.15%	1.00	26,070	0.50%	3.27	15.88
220710	Undenatured ethyl alcohol	0	0.00%	0.00	23,328	0.45%	10.09	n/a
20421	Other meat of sheep, fresh or chilled	5,134	0.06%	64.10	22,154	0.43%	252.30	33.97
	Other (Total exports minus top 11 export products)	254,466	2.99%	0.03	180,812	3.49%	0.04	–6.61

Source: World Bank staff own calculations, based on data from UN Comtrade.

Table 0.15: Joint Distribution of Sudan's Exporters Across Products and Destinations

Panel A. Distribution of Exporters in 2008

		Number of destinations per firm						
		1	2	3	4 to 10	11 to 20	20 or more	Total
Number of products per firm	1	52%	8%	3%	2%	0%	0%	65%
	2	5%	7%	2%	2%	0%	0%	15%
	3	1%	2%	3%	2%	0%	0%	8%
	4 to 10	1%	2%	2%	5%	0%	0%	11%
	11 to 20	0%	0%	0%	0%	0%	0%	1%
	20 or more	0%	0%	0%	0%	0%	0%	0%
	Total	59%	19%	10%	10%	1%	0%	100%

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Table 0.15: Joint Distribution of Sudan's Exporters Across Products and Destinations (*continued*)

Panel B. Distribution of Total Merchandise Exports in 2008

Number of products per firm	Number of destinations per firm: 1	2	3	4 to 10	11 to 20	20 or more	Total
1	28%	6%	4%	7%	8%	0%	54%
2	2%	1%	1%	3%	0%	0%	7%
3	0%	2%	4%	4%	2%	0%	12%
4 to 10	0%	2%	3%	17%	3%	0%	25%
11 to 20	0%	0%	0%	0%	2%	0%	2%
20 or more	0%	0%	0%	0%	0%	0%	0%
Total	31%	11%	11%	32%	15%	0%	100%

Panel C. Distribution of Exporters in 2012

Number of products per firm	Number of destinations per firm: 1	2	3	4 to 10	11 to 20	20 or more	Total
1	36%	11%	3%	2%	0%	0%	52%
2	6%	9%	3%	2%	0%	0%	20%
3	1%	3%	3%	3%	0%	0%	10%
4 to 10	1%	2%	2%	9%	1%	0%	15%
11 to 20	0%	0%	0%	1%	1%	0%	2%
20 or more	0%	0%	0%	0%	0%	0%	1%
Total	44%	25%	11%	17%	2%	0%	100%

Panel D. Distribution of Total Merchandise Exports in 2012

Number of products per firm	Number of destinations per firm: 1	2	3	4 to 10	11 to 20	20 or more	Total
1	3%	66%	1%	2%	0%	0%	71%
2	0%	3%	0%	1%	0%	0%	5%
3	0%	1%	1%	2%	1%	0%	5%
4 to 10	0%	0%	1%	13%	1%	0%	15%
11 to 20	0%	0%	0%	2%	0%	0%	2%
20 or more	0%	0%	0%	0%	1%	0%	1%
Total	4%	70%	3%	19%	3%	0%	100%

Source: World Bank staff own calculations, based on data used for the World Bank Exporter Dynamics Database.

Product Space Concepts

Revealed Comparative Advantage (RCA):
RCA for a product *i* in country *j* is calculated following Balassa (1977), as the ratio of the share of product *i* in total exports of country *j*, to the share of world exports of product i in total world exports

$$RCA_{ji} = \frac{x_{ji} / X_j}{\sum_j x_{ji} / \sum_j X_j}$$

Country j will be competitive in exporting good *i* if $RCA_{ji}>1$, which means that the share of product *i* in country *j* exports will be higher than the share of the same good worldwide.

PRODY:
To capture the income earning potential of any particular product and sophistication of products, Hausmann et al. (2007) introduce concepts of PRODY and EXPY. Income-earning potential of a product, PRODY, is calculated as a weighted average of the income per capita of the countries that export the given product. Weights are ratios of the share of the commodity *i* in the countries overall export baskets and aggregated value-shares across all countries exporting the good:

$$PRODY_i = \sum_j \frac{x_{ji} / X_j}{\sum_j \left(x_{ji} / X_j \right)} * GDPPC_j$$

The denominator in the RCA equation is not the same as the denominator in the PRODY weights. In RCA, denominator is the share of product *j* in world trade, while in the PRODY computation, denominator is a sum of product *i* shares across countries.

EXPY:
Sophistication of country exports, EXPY, represents the income level associated with a country's export basket, and it is calculated as a weighted average of PRODYs of the products exported by the country, where the weights are the shares of the products in the country's export basket:

$$EXPY_j = \sum_i \left(\frac{x_{ji}}{X_j} \right) * PRODY_i$$

Product and Economic Complexity:
Complexity of a product is a function of the capabilities it requires, while the complexity of a country is given by the number of locally available capabilities. To provide a numerical measure of product and economic complexity, Hidalgo and Hausmann (2009) first define Diversification of a country as the number of products that a country exports with RCA>1, and Ubiquity of the product as the number of countries that export the product with RCA>1:

$$k_{j,0} = \sum_{i=1}^{N_i} M_{ji} (Diversification)$$

$$k_{i,0} = \sum_{i=1}^{N_j} M_{ji} (Ubiquity)$$

where *i* denotes a product, *j* denotes a country, and $M_{ji}=1$ if a country *j* exports product *i* with RCA>1. Using a method of iterations, authors compute relative positions of each country and product, compared to other countries and products.

The method of iterations calculates iteratively the average value of the measure computed in the preceding iteration, starting with a measure of a country's diversification and a product's ubiquity. Each succeeding iteration takes into account the information from the previous iteration. These are given by:

$$k_{j,n} = \frac{1}{k_{j,0}} \sum_{i=1}^{N_i} M_{ji} k_{i,n-1}$$

$$k_{i,n} = \frac{1}{k_{i,0}} \sum_{j=1}^{N_j} M_{ji} k_{j,n-1}$$

where *n* corresponds to a number of iterations. Last two equations are computed until rankings

of countries and products stop changing between iterations. In this paper, we used k_j,16 to measure economic complexity, and k_i,17 to measure product complexity.

Proximities of Products:
To measure the inter-relatedness of different products, Hausmann et al. (2007) compute a probability that a country exports one product with a Revealed Comparative Advantage (RCA)>1 given that it exports some other product with an RCA>1. Thus, two products will be close to each other, and require similar capabilities, if countries which export product *i* tend to also export product *j* with RCA>1, and vice versa:

$$\varphi_{ij} = \min (P(RCA_i>1 \mid RCA_j>1), P(RCA_j>1 \mid RCA_i>1))$$

which provides "proximity" as a numerical measure of relatedness of products *i* and *j*.

Country Densities in Products:
Probability of a country being able to export product *i* with RCA>1 is measured as a weighted sum of proximities of product *i* and all other products in country's export basket that are exported with RCA>1. Hence, if a country exports large numbers of goods which are close (high proximity) to product *i*, there is a large probability that the country will be able to be competitive in exports of *i*. Probability *w* of exporting product *i* by a country *j* is measured by density of product *i*:

$$w_i = \frac{\sum_i RCA_i \varphi_{ij}}{\sum_i \varphi_{ij}}$$

Note: the density *w* of product *i* in country *j* can be interpreted as the "ease" of diversification into product *i*.

Open Forest:
Measures of density can be used to obtain an overall measure of the location of the country in the product space, and this indicator would measure the connectedness of existing export basket to the rest of the product space. Open forest provides a measure of the (expected) value of the goods that a country could potentially export (among the products that it currently does not export with comparative advantage).

Open forest is calculated as the weighted average of the PRODY's of all potential (currently non-exported) exports of a country, where the weights are country densities in these products. Therefore, the value of "open forest" depends on country's ease of diversification into unexported products—and a country that exports products in the core of the product space will have higher densities for unexported products, and thus higher value of the open forest:

$$open\_forest_j = \sum_i density_{ji} * (1 - x_{ji}) * PRODY_i$$

where $x_i = 0$ for products i with $RCA_i<1$, and $x_i = 1$ otherwise.

Strategic Value of Unexported Products:
The strategic value of every good that is not currently exported with comparative advantage can be measured using open forest. This is done by calculating what would happen to open forest if a country started exporting that good with comparative advantage. If a product is closely connected to a wide range of other valuable products not currently exported, it would result in a large increase in open forest, and therefore have high strategic value because it would greatly expand the country's options for successful diversification.

Table 0.16: Sudan Exports in Product Space Framework, 1991–2011

SITC2 Code	Product	Tech	Density	Path	Complexity	Trade Volatility	RCA 1991–93 avg	RCA 2009–11 avg	Exports 1991–93 avg ('000)	Exports 2009–11 avg ('000)
Classics										
9710	Gold, non-monetary	ST	0.08	84.05	742	1.68	1.79	7.78	3,545	742,469
2225	Sesame seeds	PP	0.10	71.38	765	2.35	661.78	108.77	23,885	163,489
12	Live sheep and goat	PP	0.06	96.82	658	2.34	345.85	109.14	41,563	105,314
2922	Natural gums, resins, lacs and balsams	PP	0.08	92.14	763	1.99	1,747.19	148.36	55,018	81,947
2631	Raw cotton	PP	0.09	75.97	768	2.64	150.93	3.78	114,222	37,081
2924	Flora in pharmacy	PP	0.07	100.84	744	0.83	49.89	11.61	6,411	19,156
112	Sheep and goat meat	PP	0.05	90.38	701	0.70	8.91	3.84	1,970	16,823
2879	Other non-ferrous base metals	RB2	0.07	95.32	736	3.76	2.89	1.44	444	14,874
611	Raw sugar beet and cane	RB1	0.06	85.64	752	1.68	1.68	1.22	722	12,434
548	Fresh and dried vegetables, roots and tubers n.e.s.	PP	0.08	88.94	734	1.54	66.45	5.30	13,785	12,088
6115	Sheep and lamb leather	LT1	0.08	107.39	757	1.83	8.09	5.98	944	6,625
459	Unmilled buckwheat, millet and other cereals n.e.s.	PP	0.05	103.06	696	2.49	190.08	2.88	27,161	5,709
615	Molasses	RB1	0.06	113.38	720	1.62	176.58	6.45	11,228	5,063
6116	Leather of other hides or skins	LT1	0.08	104.65	751	1.51	3.29	1.83	407	3,133
9410	Live animals, n.e.s. (zoo animals, pets, insects, etc)	ST	0.07	96.93	708	1.33	20.45	3.95	640	3,068
812	Bran, sharps and other cereal residues	PP	0.06	116.73	709	1.75	5.28	1.62	256	1,767
2238	Oil seeds and fruits n.e.s.	PP	0.06	118.10	699	1.44	3.41	1.91	91	1,573
2112	Raw calf skins	PP	0.06	125.72	653	2.93	16.66	3.99	640	1,355
2117	Raw sheep skin with wool	PP	0.09	82.99	766	2.17	48.71	5.22	2,623	1,022
2119	Hides and skins n.e.s.	PP	0.07	111.50	721	1.80	30.87	1.47	549	620
2911	Bones, horns, corals and ivory	PP	0.06	104.01	711	0.89	21.75	1.71	987	516
Emerging Champions										
3330	Crude petroleum	PP	0.10	45.42	762	2.47	0.00	9.32	0	9,307,506
2472	Sawlogs and veneer logs of non-coniferous	RB1	0.07	90.37	724	1.53	0.00	1.57	0	8,991

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Table 0.16: Sudan Exports in Product Space Framework, 1991–2011 (*continued*)

SITC2 Code	Product	Tech	Density	Path	Complexity	Trade Volatility	RCA 1991–93 avg	RCA 2009–11 avg	Exports 1991–93 avg ('000)	Exports 2009–11 avg ('000)
Disappearances										
2882	Other non-ferrous base metals	RB2	0.04	122.64	568	2.80	1.26	0.57	713	19,711
811	Green or dry hay	PP	0.04	101.98	542	1.09	1.38	0.99	189	2,068
4236	Sunflower seed oil	RB1	0.03	135.23	580	2.01	1.00	0.19	120	1,261
579	Fresh or dried fruit n.e.s.	PP	0.06	110.79	712	0.75	4.69	0.06	3,441	1,229
6851	Unwrought lead and alloys	PP	0.05	126.35	659	2.43	3.20	0.19	295	800
2111	Raw bovine and equine hides	PP	0.05	139.02	574	1.74	8.09	0.18	2,551	654
2221	Green groundnuts	PP	0.05	91.71	761	1.41	30.93	0.37	3,153	572
2925	Planting seeds and spores	PP	0.03	128.98	555	0.74	5.39	0.14	964	567
542	Dried or shelled legumes	PP	0.07	97.74	754	0.91	2.27	0.08	575	504
2929	Vegetable origin materials	PP	0.04	126.87	535	1.04	3.88	0.13	781	406
8741	Non-electrical navigating devices, compasses	HT2	0.02	103.37	145	0.69	1.02	0.03	472	389
2116	Raw sheep skin without wool	PP	0.06	117.04	660	3.35	84.37	0.68	2,669	247
440	Unmilled maize	PP	0.03	115.37	650	1.87	2.76	0.01	2,444	201
813	Oilcake	PP	0.04	105.80	666	1.64	9.00	0.01	7,235	153
4239	Other soft vegetable oils	RB1	0.02	138.00	264	2.46	6.58	0.03	742	135
752	Spices other than pepper	PP	0.06	112.62	704	0.93	1.66	0.04	172	93
7233	Road rollers	MT3	0.03	109.32	534	1.74	1.15	0.04	65	50
2731	Building stone	PP	0.05	117.11	694	0.98	1.45	0.01	213	28
572	Fresh or dried citrus n.e.s	PP	0.04	114.79	615	1.15	1.24	0.01	165	22
6582	Textile camping goods	LT1	0.03	109.52	634	1.03	1.02	0.00	88	6
7439	Centrifuges machinery parts n.e.s.	MT3	0.01	155.53	43	0.93	1.40	0.00	476	3
2732	Gypsum, plasters, limestone flux and calcareous stone	PP	0.04	134.76	641	1.05	3.35	0.00	208	0
2224	Sunflower seeds	PP	0.02	124.70	503	2.30	15.18	0.00	1,260	0
4234	Peanut oil	RB1	0.02	69.72	629	1.91	235.96	0.00	7,120	0

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Table 0.16: Sudan Exports in Product Space Framework, 1991–2011(*continued*)

SITC2 Code	Product	Tech	Density	Path	Complexity	Trade Volatility	RCA 1991–93 avg	RCA 2009–11 avg	Exports 1991–93 avg ('000)	Exports 2009–11 avg ('000)
612	Refined sugar	RB1	0.04	140.95	594	2.20	6.95	0.00	1,702	0
2634	Cotton	PP	0.06	112.03	750	2.36	10.30	0.00	40	0
2114	Raw goat skins	PP	0.02	45.82	405	4.41	317.08	0.00	1,904	0
6513	Cotton yarn	LT1	0.05	105.02	730	1.18	2.67	0.00	1,476	0
2632	Cotton linters	PP	0.05	75.93	759	2.62	79.80	0.00	1,189	0
2633	Cotton waste	PP	0.05	99.87	741	2.11	16.59	0.00	476	0
2232	Palm nuts and kernels	PP	0.02	31.30	644	4.07	112.24	0.00	221	0
6113	Calf leather	LT1	0.01	35.02	591	6.87	2.93	0.00	185	0
751	Pepper	PP	0.04	103.87	714	1.48	1.93	0.00	118	0
576	Figs	PP	0.03	70.69	551	0.72	1.30	0.00	17	0
2640	Raw processed jute and other fibres	RB1	0.05	38.64	764	2.14	1.17	0.00	12	0
Marginals with large export value in 2009–11 (>$1 million avg)										
2820	Iron and steel waste	RB2	0.04	111.39	490	2.65	0.18	0.77	147	27,854
5121	Acyclic alcohols and derivatives	MT2	0.04	101.61	643	2.03	0.00	0.38	0	14,387
3354	Petroleum bitumen n.e.s.	RB2	0.03	130.33	485	1.74	0.00	0.89	0	14,272
3413	Liquified hydrocarbons	PP	0.06	56.06	740	2.16	0.00	0.06	0	7,638
7781	Batteries	HT1	0.02	137.97	243	1.02	0.03	0.23	18	7,246
1223	Tobacco, extract, essences and manufactures	RB1	0.03	140.18	546	0.66	0.01	0.90	1	2,641
11	Live bovines	PP	0.04	141.36	474	1.06	0.00	0.44	0	2,158
573	Fresh or dried banana and plantains	PP	0.06	62.71	767	0.68	0.02	0.19	9	2,058
6114	Bovine and equine leather	LT1	0.05	127.40	664	1.24	0.26	0.15	147	1,637
7649	Parts of telecom and sound recording equipment	HT1	0.01	107.31	170	1.20	0.08	0.01	254	1,614
6821	Unwrought copper and copper alloys	PP	0.04	103.41	685	2.57	0.00	0.02	0	1,296
4242	Palm oil	RB1	0.04	58.95	729	2.19	0.00	0.04	0	1,263
6353	Builders` carpentry and joinery	RB1	0.02	163.48	366	1.12	0.11	0.08	52	1,250
7929	Aircraft equipment parts n.e.s.	HT2	0.01	103.47	135	0.98	0.44	0.02	993	1,155
6415	Paper and paperboad in rolls or sheets	RB1	0.02	162.94	163	1.26	0.00	0.05	1	1,136
Marginals with large drop in export value (>$1 million avg exports in 1991–93)										
111	Bovine meat	PP	0.03	131.27	530	0.87	0.91	0.01	1,416	315

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