

Impact of ongoing conflict and pathways to recovery in Sudan: Agricultural bounce-back, infrastructural investment and social protection

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ABSTRACT

In response to the 2023 conflict in Sudan and its extensive socio-economic repercussions, this study investigates the resultant economic, poverty, and undernourishment impacts, using an economywide model for in-depth analysis at national and household levels. It also aims to identify effective recovery pathways that can mitigate the adverse impacts of the conflict, with a particular focus on the role of the agricultural sector. Key findings reveal significant economic contractions across all scenarios, with the GDP experiencing a reduction of up to 12% and 18% in the World Bank and IMF war scenarios in 2023. Poverty rates are projected to increase by 8 and 11.6 percentage points, affecting an additional 2.7 and 3.9 million people in the two scenarios, respectively. Undernourishment is also expected to rise significantly, with an increase of 3.9 and 6.0 percentage points, adding approximately 1.3 and 2.0 million people to those affected in the two scenarios, respectively. The analysis proposes recovery strategies that emphasize agricultural productivity, infrastructure investment, and social protection measures. By simulating enhanced agricultural productivity scenarios, the study suggests that poverty could decrease notably, with potential reductions in the poor population by as much as 1.9 million by 2028. This study underscores the urgency of coordinated policy efforts and international support to mitigate the adverse impacts of the conflict, providing a strategic roadmap for recovery initiatives aimed at sustainable development and stability in Sudan.

Keywords: Sudan conflict, Economywide impact, Recovery strategies, Agricultural productivity, External grants, Poverty and undernourishment.

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1 INTRODUCTION

1.1 Background

Sudan is one of the poorest countries in the world, ranked 172 out of 189 in the UN Human Development Index (HDI) in 2021 (UNDP, 2022). Nearly 22 million people (52.3 percent of the population in 2021) are classified as multidimensionally poor, while an additional 7.4 million people (17.7 percent of the population in 2021) are vulnerable to multidimensional poverty and 31 percent of the population are in severe multidimensional poverty (UNDP, 2022). Poverty is closely entwined with long-running domestic and regional inter-ethnic conflicts. In the assessment of multidimensional poverty, the most significant contributing factor is the standard of living, which accounts for 49.8 percent of the overall deprivation. This is followed by education, contributing 29.2 percent, and health at 21.1 percent. These proportions underscore the varied impact of distinct dimensions on the extent of poverty (UNDP, 2023). Ethnic minorities, women, post-conflict communities and under-employed youth are particularly vulnerable groups, often with a history of exclusion and disenfranchisement.

The country's economy is mainly agricultural, based on rainfed crops and livestock production systems that have evolved to suit a hot and, mostly, arid landscape. Productivity levels are low compared with other LICs and East African neighbors. The livestock sector is one of the biggest in Africa, but production is predominately dependent on extensive, traditional pastoral or agro-pastoral systems. The mechanized rainfed sector is concentrated in the center of the country, but most crop farming is not mechanized and has very low productivity. There are large basin irrigation schemes along the Nile and some other river deltas in the northeast of the country, but there is little other irrigation and agriculture is predominantly rainfed. The country's high population growth rate places increasing pressures on the natural resource base, which is itself shrinking due to desertification, and driving urbanization at an accelerating rate.

Negative productivity growth has been a key challenge to achieving inclusive growth and poverty reduction. Productivity growth contracted on average by 3 percent between 2015 and 2019, due to various factors, including (i) poor infrastructure services, coupled with low and inefficient investment; (ii) low labor skills, particularly for youth and women; (iii) trade restrictions and isolation, which have compounded existing constraints to trade and limited growth overall; (iv) high level of informality, with an estimated 60 percent of the labor located in subsistence agriculture or low productivity livestock activities, and around 65 percent of Sudanese prime aged (25-54 years old) workers estimated to be engaged in the informal economy (UNDP, 2020a) ; (v) external shocks (both global and climatic) as well as ongoing civil disturbances.

The recent conflict which erupted between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) have exacerbated the economic situation further. Loss of lives, deprivation of assets, and disruption of income sources have occurred due to insecurity, extensive plundering, and property devastation. It started in Khartoum and swiftly spread to other regions, including Darfur and Kordofan. Despite numerous ceasefire declarations for humanitarian corridors, the fighting did not stop and recently extended to Al Gezira state which hosted 8 percent of the IDPs who came from Khartoum. As of December 31, 2023, Sudan, grappling with a severe internal displacement crisis, hosts over 9 million internally displaced persons (IDPs), which includes an estimated 3 million IDPs from before the conflict on April 15 and an additional 6 million due to armed clashes over nine months, representing the largest such crisis globally with about 13 percent of the world's IDPs (DTM Sudan, 2024).

The humanitarian circumstances arising from the armed conflict have reached a critical juncture, marked by substantial impediments in delivering healthcare services on a nationwide scale. This encompasses notable challenges such as the constrained availability of pharmaceuticals, medical resources, electrical power, and water infrastructure. In regions affected by conflict, approximately 70 percent of healthcare establishments exhibit non-functionality or operate at limited capacity, precipitating an overwhelming surge in the demand for healthcare services. Concurrently, there has been a prevalence of disease outbreaks, encompassing conditions such as measles, malaria, and acute flaccid paralysis, as documented by the World Health Organization (WHO, 2023). As of January 16, 2024, there have been reports of over 9,700 suspected cases of cholera, including 269 deaths, indicating a significant public health concern (UN-OCHA, 2024).

The repercussions of the ongoing conflict extend beyond immediate humanitarian concerns to significantly impact agriculture, domestic and external accounts, and the overall trajectory of GDP growth. The interconnectedness of these elements underscores the need for a nuanced comprehension, coupled with the formulation of evidence-based recommendations to guide policy reforms and strategic investments, ultimately fostering inclusive growth and recovery amidst ongoing conflict.

1.2 Observed effects of the ongoing conflict on the economy

The enduring conflict has far-reaching consequences for various sectors of the already struggling Sudanese economy. Armed conflict has exacerbated the deterioration of infrastructure in conflict-affected regions, affecting agricultural, services, and industrial production. Limited market accessibility, lack of security, and rampant looting have disrupted production and storage, impacting both domestic and international trade and causing shortages in various commodities. These unprecedented circumstances have led to a significant rise in food prices and a drastic devaluation of the Sudanese currency (WFP, 2023).

1.2.1 The agricultural sector

The armed conflict in Sudan has profoundly disrupted the agricultural sector, resulting in a considerable decline in production during the summer agricultural season. The repercussions extend to the winter season, with a pronounced impact on cultivation expected due to the war's direct and indirect influences. Key contributors to reduced production encompass scarcities in critical resources such as electricity, fuel, improved seeds, fertilizers, and finance. A survey conducted by Kirui et al. (2023) among smallholder farmers revealed that 44 percent of survivors were unprepared for the planting season, with 40 percent expressing no intention to plant later in the season. The primary reasons cited for not planting included the direct impact of conflict and insecurity (15 percent) and various indirect ramifications such as financial constraints (61 percent), lack of essential resources (13 percent), and unfavorable weather conditions (9 percent) (Kirui et al., 2023a).

Aligned with the anticipated shock to planted areas, a rapid assessment by the Food and Agriculture Organization (FAO) of the United Nations indicated a substantial reduction in cultivated areas, with total planted area declining by 15 percent compared to the previous year. Sorghum and millet, staple crops in the region, witnessed a decline in planted areas of 16 percent and 50 percent, respectively, leading to an estimated production reduction by 24 percent and 50 percent for sorghum and millet, respectively compared to the previous year (FAO, 2023). The livestock market also faced disruptions, primarily along routes throughout the country, impeding the movement of animals and disrupting trade. In addition, the forestry sector, particularly Gum Arabic production in states like Greater Darfur and Kordofan,

experienced a substantial decline in prices by nearly 60 percent, primarily attributed to export challenges resulting from the conflict, leading to reduced incentives for producers (Aljazeera, 2023).

1.2.2 The industrial sector

The industrial landscape of Sudan is concentrated in Khartoum and central states. In 2001, about two-thirds of manufacturing establishments were in Khartoum and a few provincial centers. Key regions contributing to manufacturing, including Khartoum, Gezira, Darfur, and Kordofan, accounted for 66 percent of the total manufacturing establishments (UNDP, 2016). The centralization in Khartoum was attributed to its accessible transportation and energy infrastructure, high population density, and availability of labor and markets. However, the ongoing conflict severely impacted the manufacturing sector, with the designated Minister of Industry reporting a 90 percent destruction of the sector as of December 2023 (EREM NEWS, 2023). Emergency plans involve relocating salvageable factories from Khartoum to secure states (EREM NEWS, 2023). The conflict has particularly disrupted agri-processing firms, leading to temporary or permanent closures of around two-thirds of such enterprises, while others operate at reduced capacities or have relocated to safer areas (Kirui et al., 2023). Critical components of the industrial sector, such as gold mining and oil production, have also been affected. Gold production during the conflict period is estimated at approximately 2 tons monthly, representing a significant decline from the 2021 production of 49.7 tons (SudanAkhbar, 2023b). On the other hand, the impact on oil production has been less pronounced than that on gold. However, satellite images indicate oil leakage at pumping station No. 5 in West White Nile state, suggesting potential disruptions to crude oil production in case of prolonged conflict. The crude oil processing has been adversely affected since the onset of the conflict, primarily due to the Rapid Support Forces' (RSF) control on Eljeili refinery in Khartoum. The situation was further compounded by the destruction of the Eljeili refinery in December 2023, which is expected to result in a prolonged period of recovery for crude oil processing.

1.2.3 The service sector

The service sector has experienced substantial impacts during the initial phase of the conflict, with diverse effects observed across its components. The banking sector, pivotal to the services and overall economy, faced significant shocks, especially given its concentration in Khartoum. Approximately 46 percent of bank branches were in Khartoum as of December 2021, with 61 percent of branches in Khartoum and other conflict-affected regions (CBoS, 2021). The ongoing conflict led to profound disruptions in banking infrastructure and payment systems. The Central Bank of Sudan's systems became inaccessible early in the conflict, hindering electronic payment services. While some banks have restored their systems, the electronic clearance system remains unrecovered, impacting inter-bank money transfers (UNICEF, 2023b). This disruption significantly affected liquidity, hindering the banking sector's capacity to provide finance (STPT, 2023).

The health and education sectors, constituting vital components of services, have also faced significant challenges. Conflict-affected states repurposed health centers and hospitals as military barracks, disrupting health services with 75 percent of health centers in the conflict affected states being closed. Limited availability of medicine, medical supplies, electricity, and fuel further impacted health services across the country. The education sector experienced a complete halt since the war's outbreak, and while attempts were made to reopen schools and universities in October 2023, challenges persisted. Schools in safe states were repurposed as shelters, and connection problems limited possibilities for online learning. In contrast, the transportation, accommodation, and restaurant services witnessed a

significant boom, driven by large-scale displacement from conflict-affected to safe states. The evacuation involved both individuals and products, with the sector thriving amid ongoing conflict. The total displacement of about 8 million people since April 15, 2023, has fueled this boom.

1.2.4 International trade

The ongoing conflict has inflicted significant repercussions on exports, with formidable impediments to the movement of export products from production zones to crucial export hubs, such as Port-Sudan. This difficulty is particularly pronounced for products originating from conflict-affected states. The persistent insecurity has led to severe disruptions in primary transportation routes linking central Sudan to Greater Kordofan and Greater Darfur regions, along with key exportation locations in the east and north of the country. The resultant disruption of routes has not only prolonged journey times but also substantially increased transaction costs for travel (Abushama et al, 2023). For instance, a journey covering 920 kilometers from Kosti to El Fasher took an astonishing eight days, underscoring the logistical challenges exacerbated by the conflict (FEWS NET, 2023). Additionally, the heightened risks of looting, route closures, and the scarcity of fuel have collectively escalated the costs associated with production and transportation. This confluence of challenges is anticipated to impact the competitiveness of Sudanese exports.

According to 2022 statistics, Sudan's export portfolio is comprised of gold (48 percent of exports), agricultural products (33 percent), livestock (15 percent), crude oil and oil products (0.9 percent), processed goods (0.5 percent) and other exports (CBoS, 2022). However, the conflict has precipitated a substantial decline in official gold exports, plummeting from approximately 11 tons, constituting 44 percent of overall exports in September of the previous year, to two tons in the corresponding period of 2023 indicating an 80 percent decline (CBoS, 2021; UNICEF, 2023b; SudanAkhbar, 2023c). While agricultural exports are anticipated to decrease due to expected reductions in production and farmers' diminished intent to plant cash crops (Kirui et al., 2023), livestock exports have experienced growth. In 2023, Sudan successfully exported 2.7 million cattle, contributing nearly US\$ 500 million in foreign currency a notable increase compared to the revenue generated from livestock exports in 2022 (CBoS, 2022; SudanAkhbar, 2023c).

Moreover, as per a vessel data analysis, crude oil exports have increased significantly, as the volume of shipments loaded at Port-Sudan witnessed a notable surge in May, marking its highest point in nearly two years. The daily load reached 154,839 barrels, signifying a substantial increase in comparison to the 77,419 barrels per day recorded in March 2023 (Energy Voice, 2023). This can be anticipated due to the restricted operation of the crude oil refinery and thus more crude oil must be exported.

On the import side, the conflict has inflicted a detrimental impact on Sudan's imports, forecasting significant reductions propelled by a deteriorating exchange rate, income reductions, foreign exchange shortage, and weakened financial capacity in the banking sector. Challenges such as logistics failure, infrastructure disruptions, and banking payment issues further compound the import predicament. Wheat, a predominantly import commodity, has experienced a substantial reduction in imports during the conflict compared to the previous year, declining from 336 to 359 thousand metric tons and from 550 to 166 thousand metric tons in the second and third quarters in 2023 compared to 2022 (FEWS NET, 2023; CBoS, 2022). The absence of control over cross-border illicit trade is expected to contribute to an upsurge in informal imports, especially from neighboring countries in the east and north of the country like the increase in smuggling during the war in Syria (Daher, 2019).

The pivotal role of agriculture as primary contributors to the economy remains undisputed. Elevations in productivity within the sector has the potential to bring about transformative effects, not only influencing economic expansion but also addressing fundamental challenges such as poverty mitigation, hunger alleviation, and the enhancement of overall dietary standards. Simultaneously, the influence of external grants on economic stability and growth introduces an additional layer of recovery, necessitating a comprehensive assessment of their potential effects on fiscal dynamics, investment patterns, and broader economic recovery.

1.2.5 Remittances

The large-scale internal displacement resulting from the war has profoundly affected over 8 million individuals (DTM, 2024), necessitating a significant reliance on remittances for consumption purposes. The increase in labor costs during the conflict corroborates that displaced individuals are depending on remittances, savings, or assistance for their consumption needs (Kirui et al., 2023; WFP, 2023). Anticipated remittance increases, albeit moderate, are expected due to the economic deterioration and livelihood challenges caused by the conflict. However, the abilities of remittances to increase are further constrained by migrants' characteristics and occupations, with low-skilled migrants not anticipated to make significant contributions (UNDP, 2020b).

1.3 Objectives

The objective of this report is to assess the impact of the changes triggered by the ongoing conflict, while exploring the possibilities of recovery considering increases in agricultural productivity and changes in external grants. The impact of these assessments is measured by means of changes in poverty, undernourishment, and economywide growth indicators. Specifically, the work will draw on IFPRI's RIAPA framework to:

1. Simulate the impacts of the ongoing conflict on economic growth and income distribution across rural and urban population.
2. Assess the differential impacts alternative recovery scenarios including increases in agricultural productivity on poverty, undernourishment and economywide growth, to inform identification and prioritization of areas of reform and investments for inclusive growth, and
3. Simulate changes in external grants and assess their potential impact as part of the recovery pathways for Sudan.

The remainder of the report is organized as follows. Section 2 presents the analytical framework used for the assessment of three objectives. Section 3 describes the simulation scenarios including the development of a counterfactual against which the war and recovery scenarios are compared. Section 4 presents and discusses the results, while section 5 concludes and provide policy recommendations.

2 THE ANALYTICAL FRAMEWORK

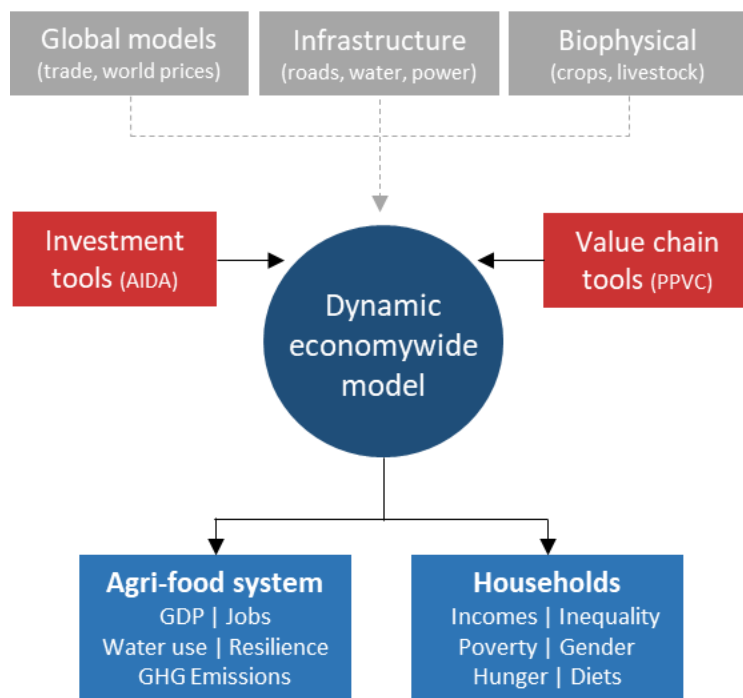
IFPRI's Rural Investment and Policy Analysis (RIAPA) system is used. [RIAPA](#) is IFPRI's primary tool for economywide analysis. The RIAPA model is an analytical tool used to assess the economy-wide impacts of policies and investments. It is designed to help policymakers understand the trade-offs associated with policy choices in agricultural and rural investment and to better grasp the linkages within the agrifood system (AFS) and between AFS and other sectors of the economy.

The RIAPA model uses detailed representations of the economy depicted within Social Accounting Matrices (SAMs), which enable analysts to measure impacts throughout the AFS and its interconnectedness with the broader economy. This includes analyzing how policies affecting farmers can have spillover effects on input supply, trade, agroprocessing, or food service sectors and vice versa. One of RIAPA's key features is its ability to capture macro-micro linkages, which means it can interpret how economy-wide changes will affect individual households and people. This is especially valuable for assessing the implications of various shocks or interventions on poverty, diet quality, and women's inclusion, using survey-based microsimulation models linked to the core computable general equilibrium (CGE) model (Figure 1).

At the center of RIAPA is a Computable General Equilibrium (CGE) model that uses nested production structure, imperfect substitution of traded commodities, and linear expenditure systems of consumer demand. It models consumer and producer behaviors, respectively with utility and profit maximization, adjusting prices for market equilibrium. The dynamic version considers exogenous factors like population growth and urbanization, influencing labor supplies, while sectoral capital accumulation is endogenously determined based on past investments (Diao and Thurlow, 2012).

For this study, the RIAPA model is calibrated to a 2021 SAM for Sudan, providing a detailed breakdown of factors such as capital, labor, and cropland, while allowing for their reallocation across sectors. The model considers the profound impact of international trade on sectoral growth, examining both import competition and export opportunities. In relation to household livelihoods, the RIAPA model recognizes significant variability across regions, distinguishing among representative households. These distinctions are critical for comprehending the dynamics of distributional changes, especially considering variations across locations and endowments. To enhance its accuracy, the model is intricately linked to a microsimulation module, drawing insights from a national household survey.

Figure 1: Modules of the RIAPA modeling system



Source: Authors' configuration based on Diao and Thurlow (2012).

The assumptions shaping the macroeconomic balance in the model are notable, covering the current account, government fiscal balance, and savings/investment accounts. These assumptions, including a fixed exchange rate for maintaining the current account balance, highlight the significance of export-oriented sectors like high-value agriculture. The model adopts a recursive dynamic approach, running simulations for several years. This extended timeframe allows the model to capture the nuanced interplay of exogenous factors, such as demographic shifts and technological changes. Capital accumulation is a key facet, determined endogenously with a focus on the previous period's investment, considering the sectors' current shares of gross operating surplus. In essence, the CGE model stands out for its holistic approach to understanding distributional changes. It achieves this by dissecting growth patterns across sectors and subnational regions, considering the intricate interplay in factor and product markets. This comprehensive perspective, coupled with its explicit definition of the growth–poverty relationship *ex ante*, enables the model to effectively capture and contrast distributional outcomes associated with economic growth across diverse sectors. More details about the model structure, assumptions and equations are provided in the open access documentation by Diao and Thurlow (2012).

The RIAPA framework incorporates several add-on modules for specifying simulation parameters and adding depth to standard CGE model results. They also track specialized outcome indicators including production and employment outcomes, natural resource use, and greenhouse gas emissions. In addition, various survey-based microsimulation modules are incorporated to track welfare outcomes, including [poverty and inequality](#), diet costs and the [ReDD](#) index, and the [WIST](#) indicator.

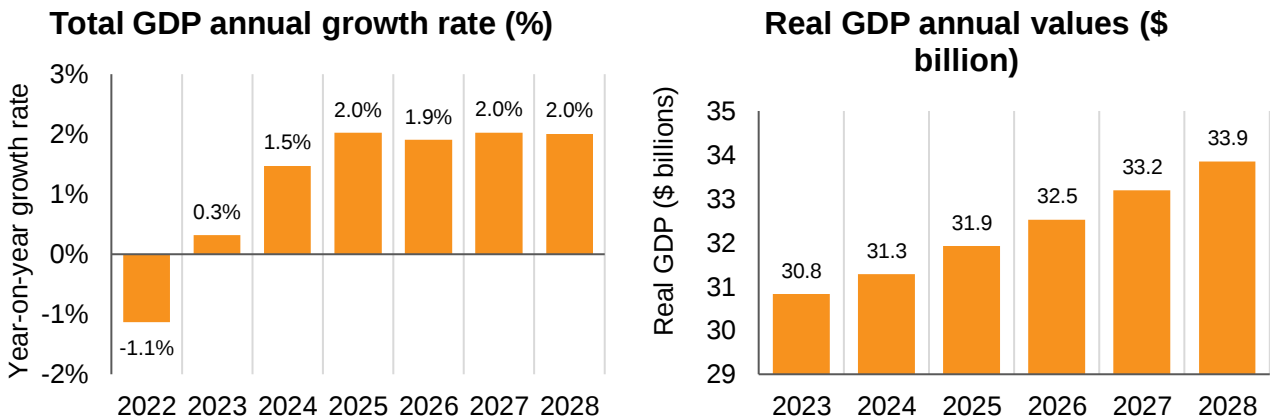
3 DESCRIPTION OF THE SIMULATIONS

This section provides a detailed description of the simulation scenarios depicting the impact of the on-going conflict as well as providing suggestions for economic recovery via improvements in agricultural productivity and changes to the flow of external grants. The first subsection focusses on the pre-conflict counterfactual (baseline) scenario, which will be used as a benchmark for assessing the impact of the conflict on the economy. Subsequently, the war scenarios are described starting with the World Bank's post-conflict projections (hereafter the World bank war scenario) and the International Monetary Fund (IMF) war scenario. Finally, potential recovery scenarios are described including agricultural productivity centered scenarios and external grant centered scenarios.

3.1 Baseline (counterfactual) scenario

Under this scenario, it is assumed that the pre-conflict circumstances continue throughout the period covered (2021-2028). This implies that the April 15th, 2023, conflict had not happened, however, it captures the pre-conflict economic shocks including the October 2021 coup and its implications. We base this on the World Bank's projected GDP growth rates prior to the conflict's onset, as depicted in Figure 2. According to this counterfactual scenario, GDP was expected to grow by an average of 1.6 percent each year between 2023 and 2028. In addition, population and labor force supply was expected to grow by an average of 2.5 percent per year throughout the same period based on the UN (2023) statistic division's projections. In per capita terms, GDP in Sudan was already expected to decline between 2023 and 2028, even before the outbreak of the conflict.

Figure 2: Outlook of Sudan GDP based on World Bank pre-conflict estimates (2022 -2028)



Source: World Bank (2024).

Public sector statistics are also guided by the World Bank estimates with total public revenues and expenditure as percentage of GDP on average through (2020-2025) amounting to 8.8 percent and 13.2 percent, respectively, and average of general government deficit amounting to 4.3 percent as percentage of GDP on average though the same period (Table 1).

Table 1: Public sector indicators as percentage of GDP (percent, 2020-2025)

Indicators	2020	2021	2022	2023	2024	2025	Average
Expenditures	10.7	10.8	11.7	12.5	13.4	13.7	13.2
Revenues	4.8	10.5	10	10.5	11	11.2	8.8
General government balance	-5.9	-0.3	-1.7	-2.0	-2.4	-2.5	-4.3
General government debt	281.4	215.6	183.6	167.3	157.9	149.5	171.2

Source: World Bank (2024).

In this hypothetical scenario, projections were formulated shortly before the onset of the conflict, with the World Bank forecasting a 1.1 percent economic contraction in 2022. This projection contrasted with a more pronounced contraction of 1.9 percent in 2021, attributable to the coup, protests, and shut-downs, as well as a hiatus in external inflows that significantly affected both the services and industry sectors. The economic downturn persisted in 2022, albeit to a lesser extent, owing to the sustained interruption in external inflows, elevated taxes and fees, persistent civil disturbances, and logistical disruptions in the business environment.

Anticipated fiscal trends for 2023 reveal a notable disjunction between projected government revenues and expenditures, indicating a complex financial landscape. Despite the expectation of government revenues falling short of the planned figures for 2023, government expenditure is poised to surpass both the initially envisaged expenditure for the same year and the actual expenditure recorded in 2022 (Table 3).

Table 2: Fiscal sector forecast 2019-2025 (percent of GDP)

Indicators	2020	2021	2022	2023	2024	2025
Overall Balance	-5.9	-0.3	-1.7	-3.5	-3.0	-2.6
Primary Balance	-5.9	-0.3	-1.4	-3.5	-2.9	-2.5
Total Revenues and Grants	4.8	10.5	10.0	5.1	6.0	6.8
Tax Revenues	3.8	4.8	5.8	3.4	3.6	4.0
Taxes on Goods and Services	2.6	3.4	3.7	1.6	1.5	1.8
Direct Taxes	0.7	0.7	1.2	0.6	0.6	0.6
Taxes on International Trade	0.5	0.6	0.9	0.5	0.7	0.7
Other Taxes	0.0	0.0	0.0	0.7	0.8	0.8
Non-Tax Revenues	0.8	4.6	4.2	1.5	2.2	2.6
Grants	0.2	1.1	0.1	0.0	0.0	0.0
Expenditures	10.7	10.8	11.7	8.6	9.0	9.4
Current Expenditures	9.9	9.5	11.0	8.2	9.2	9.0
Wages and Compensation	2.9	2.2	3.5	3.2	3.7	3.5
Goods and Services	0.7	1.5	2.5	2.2	2.6	2.4

Indicators	2020	2021	2022	2023	2024	2025
Interest Payments	0.0	0.0	0.3	0.0	0.1	0.1
Current Transfers	6.3	5.8	4.8	2.8	2.8	3.0
Social Assistance	4.8	4.2	2.9	1.6	2.0	2.3
Other Current Transfers	1.5	1.6	1.9	1.2	0.8	0.7
Capital Expenditures	0.1	0.6	0.4	0.2	0.2	0.2

Source: World Bank (2023)

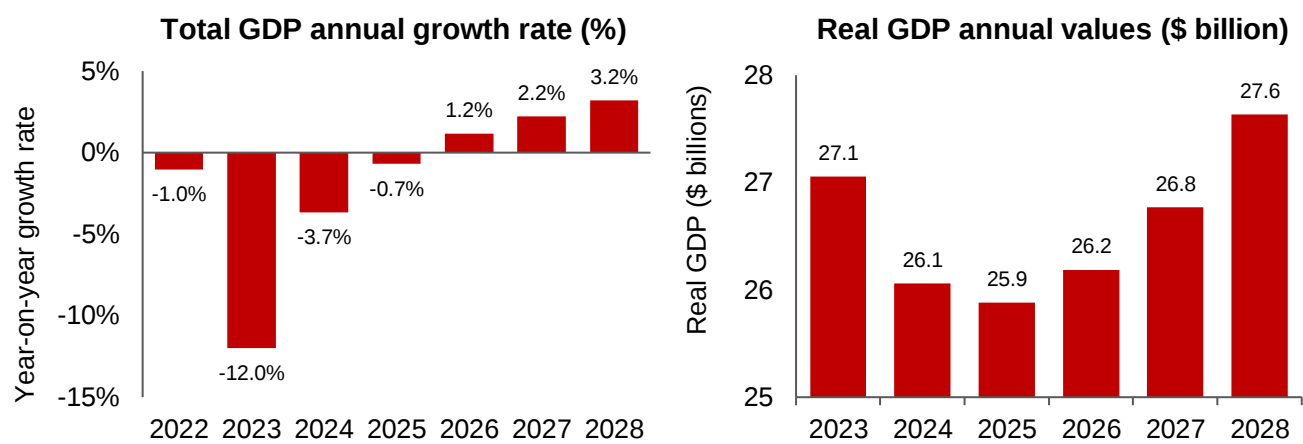
3.2 Ongoing conflict scenarios

The purpose of these scenarios is to simulate the impacts of the current conflict on the economy governed by initial projections of the changes at the overall GDP and supported by detailed information depicting the changes in the domestic and external accounts at the detailed sectoral level. Two magnitudes of the war impact at the overall GDP level are considered considering estimates by the World Bank and the IMF. Other larger estimates of GDP decline in 2023 are suggested by the International Food Policy Research Institute (IFPRI) and Sudan's Ministry of Finance and Economic Planning (Mo-FEP) are not considered in this report (see Siddig et al., 2023; AsharqNewsSUD, 2023). Considering the World Bank and IMF estimates, the focus is on the repercussions of such a decline on income levels and household consumption as well as the prevalence of poverty and undernourishment.

3.2.1 World Bank war scenario

In this scenario, the World Bank post conflict projections are compared to those in the baseline (pre-conflict projections). These estimates suggest a decline in Sudan's GDP by 12 percent (Ezemenari et al., 2023). In 2023, an anticipated substantial contraction in economic output underscores a pronounced economic downturn, attributable to the prevailing war. While the economic contraction in 2024 and 2025 is less severe, registering -3.7 and -0.7 percent, respectively, it signifies a continued decline, albeit at a mitigated pace (Figure 3). The subsequent year, 2026, witnesses a modest recovery, denoted by a GDP growth of 1.2 percent, which increases to 2.2 and 2.3 percent in 2027 and 2028, respectively. This positive trajectory hints at a potential security stabilization and improvement in economic conditions.

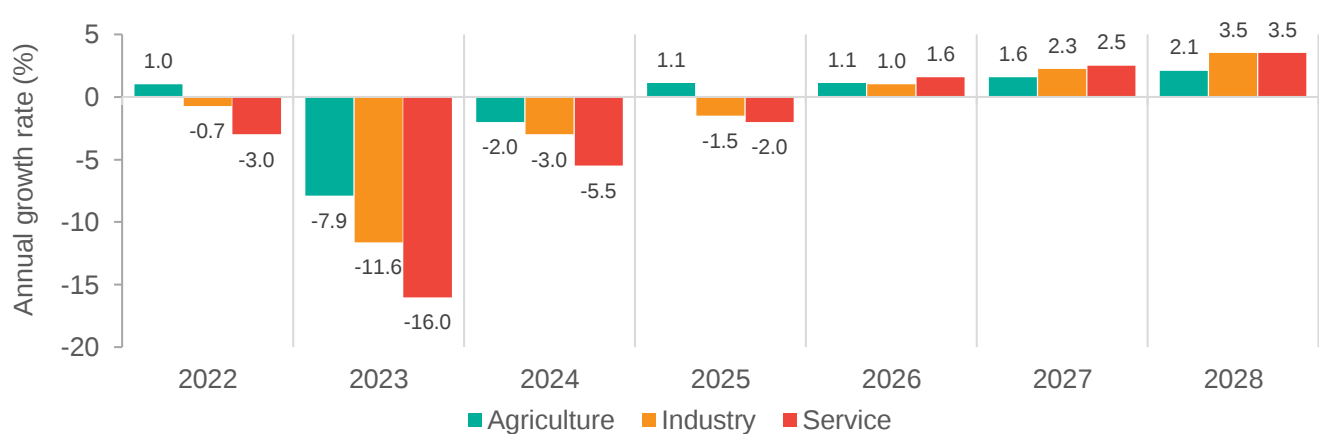
Figure 3: Annual real GDP growth rates (2022 -2028) and values (2020-2028) in the World Bank war scenario



Source: World Bank (2024).

In 2023, a substantial contraction of -7.9 percent is anticipated in the agriculture sector, signaling significant challenges that may impact productivity due to the conflict. This contraction moderates in 2024 to -2 percent before the sector makes a remarkable turnaround as projected for 2025, where agriculture is expected not only to rebound but to achieve growth at 1.1 percent. This positive momentum is forecasted to continue between 2026 and 2028, with the sector expected to register a further growth of 1.1, 1.6 and 2.1 percent in the three years respectively. These growth projections between 2025 and 2028 suggest a robust recovery and potential stabilization in the agriculture sector, demonstrating its resilience and adaptability (Figure 4).

Figure 4: Annual GDP growth rates for agriculture, industry, and service (2022 -2028) in the World Bank War Scenario



Source: World Bank (2024).

On a different trajectory, the industry sector is expected to face a more prolonged recovery. In 2023, it is projected to witness a substantial contraction of -11.6 percent, indicating the severity of challenges

affecting industrial activities. Although the pace of contraction is expected to be lesser in 2024 and 2025 with a decline of -3.0 and -1.5 percent, respectively, the sector is anticipated to fully emerge from negative growth only in 2026, posting a growth rate of 1 percent to be followed by subsequent growth rates of 2.3 percent and 3.5 percent, respectively in 2027 and 2028. The expected delayed recovery in the industry sector suggests lingering challenges or structural adjustments necessary for a comprehensive rebound. Meanwhile, the services sector, which is projected to contract with a growth rate of -16 percent in 2023, is expected to experience a relatively slower recovery. By 2024, the contraction is anticipated to lessen to -5.5 percent, and by 2025, the sector is projected to further improve with a contraction of only -2 percent. The recovery for the service sector is first achieved in 2026 with a growth rate of 1.6 percent, which will be followed by 2.5 percent and 3.5 percent growth in 2027 and 2028, respectively.

In this envisaged scenario, it is posited that the conflict persists until 2024, concluding in the early months of the year. However, the interruption in donor financing, extending well into 2024, ensues due to the necessity for an extended period to negotiate agreements among various stakeholders and establish a new government, compounded by the gradual pace of reform implementation. This projection presupposes the continuation of negotiations, akin to the pre-coup era, resulting in a prolonged delay in the establishment of a civilian government due to the time required for consensus-building.

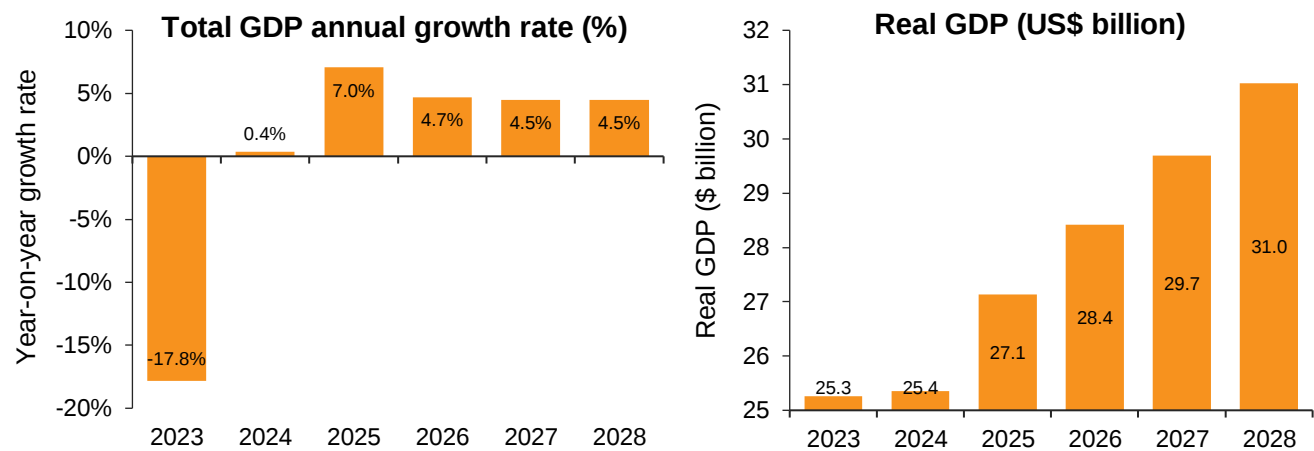
These dynamics are anticipated to impede the pace of recovery. The World Bank's war scenario envisages a more measured and gradual recovery during this transitional phase, attributing the deceleration to challenges in coordination and absorption capacity. Furthermore, the scenario postulates the persistence of the war into the early part of 2024, albeit remaining localized. In this context, economic centers are assumed to manage to function to some extent despite the ongoing conflict.

3.2.2 IMF war Scenario (deeper contraction in 2023 but faster recovery afterwards)

The IMF war scenario delineates a trajectory of accelerated recovery, distinctively contrasting with the World Bank war scenario. Nevertheless, it is premised on the assumption that the initial repercussions of the conflict exert a more pronounced influence on the GDP in 2023. The scenario posits a swift consensus and the establishment of a transitional government, thereby expediting reengagement. This rapid reengagement is envisioned to instill heightened confidence among development partners, consequently eliciting increased external inflows, both from the public and private sectors. This heightened support is anticipated to underpin a comparably robust resurgence and growth. Furthermore, the scenario assumes the cessation of hostilities at the onset of 2024.

According to the IMF war scenario in 2023, the GDP is anticipated to undergo a significant contraction of -18 percent. However, a positive shift is expected in 2024 with a modest growth of 0.3 percent, and this upward trajectory is projected to strengthen further in 2025 with a substantial growth of 7.0 percent followed by 4.7, and 4.5 percent in the subsequent years. Looking at the GDP in current prices, the values stand at US\$ 25.3 billion in 2023, US\$ 25.4 billion in 2024, and US\$ 27.1 billion in 2025. In essence, while 2023 indicates a considerable economic decline, subsequent years forecast a positive trend, particularly highlighted by notable growth in 2025 which shows a faster recovery compared to the World Bank war scenario (Figure 5).

Figure 5: Annual real GDP growth rates and values (2023-2028) in the IMF war scenario



Source: IMF-WEO (2023).

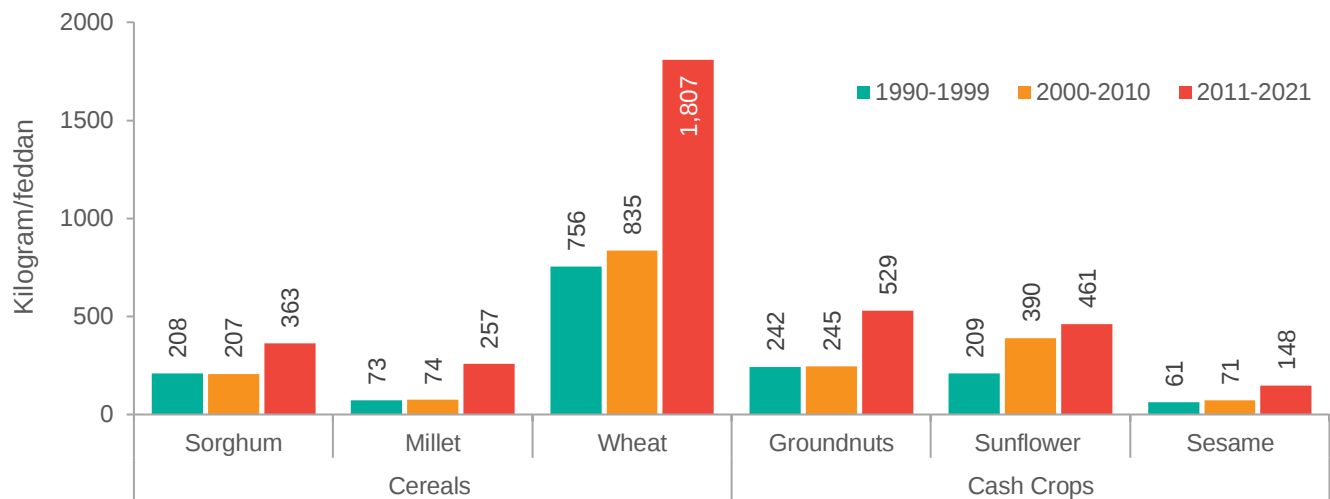
3.3 Accelerated recovery scenarios

3.3.1 Agricultural productivity bounce-back

Agriculture plays a central role in Sudan's economy, serving as its backbone and holding crucial importance in terms of contribution to GDP, employment, and livelihoods as well as the food security. During the last decade, its contribution to GDP was second after the services sector, amounting to 26.1 percent in 2021, while services sector contributed 51.7 percent (CBoS, 2021). Nevertheless, the agricultural sector contributes significantly to employment as 47.4 percent of labor work in the sector (PRSP, 2021). And it also stands as the primary employer of skilled labor, with approximately 36 percent of them engaged in agriculture, in contrast to 11 percent employed in the services sector (Elbadawi et al., 2023).

Sudan's agricultural landscape encompasses three distinct crop production systems: irrigated, mechanized rainfed, and traditional rainfed farming systems. Approximately, 88 percent of the national cultivated area is dedicated to dryland farming, contributing significantly, around 75 percent, to the production of national food grains with two-thirds of the population engaging in or rely on dryland farming as the main source of economic activity (Elbadawi et al., 2022). However, Sudan's agriculture is characterized by low land and labor productivity. Although the agricultural productivity of crops has increased during the past three decades (Figure 6), yet it is far below productivity of peer countries (Elbadawi et al., 2023; Alhelo et al., 2023).

Figure 6: Crop productivity (kilograms/feddan) by decade (1990–2021)



Source: Alhelo et al. (2023).

A pivotal factor contributing to low agricultural productivity in Sudan is the underutilization of key inputs crucial for enhancing productivity, notably the insufficient application of fertilizers and improved seeds. This issue is compounded by a lack of education and training in contemporary agricultural practices, hindering the adoption of efficient techniques (Alhelo et al., 2023). Moreover, inadequate investment in agricultural research and development restricts the availability of advanced crop varieties and technologies that can bolster productivity. The sector is further challenged by the impact of climate change and unpredictable weather patterns, resulting in adverse effects on crop yields and subsequent reductions in productivity. Limited access to credit and financial services poses a significant constraint, impeding farmers' capacity to invest in modern technologies and improve overall farming practices. Additionally, inappropriate pricing policies, exemplified by subsidies or price controls, introduce distortions to market signals, leading to inefficiencies in resource allocation within the agricultural sector. Addressing these multifaceted challenges necessitates comprehensive interventions, encompassing increased education, targeted research and development, climate-resilient strategies, enhanced financial access, and nuanced pricing policies tailored to optimize agricultural productivity in the Sudanese context.

The goal of this scenario is assessing the impacts of recovering all conflict-driven agricultural yield losses by 2026 on poverty, hunger, diet quality, jobs and economywide growth, to inform identification and prioritization of areas of reform and investments for inclusive growth. IFPRI's Sudan SAM covers 19 primary agricultural sectors or commodities. The scenario examines the role of enhanced productivity in the agricultural sector's recovery process. It acknowledges that widespread underutilization and destruction of capital have impacted all sectors due to the conflict. However, the agricultural sector is expected to exhibit relatively less damage in terms of its land and capital resources, attributed to the predominantly urban nature of the conflict. This differential impact highlights the potential resilience and quicker recovery of agriculture compared to other sectors, underscoring its critical role in post-conflict economic regeneration.

Drawing insights from countries like Syria and Yemen, the recovery process in the vital economic sectors is expected to be gradual, emphasizing the complex challenges caused by conflict in the different sectors. However, based on the impact of the war in comparator countries, the agricultural sector is the most resilient sector in face of conflict (Figure A1). In Sudan, the agricultural sector has a great potential in leading recovery after conflict.

In the context of the World Bank scenario, agriculture emerges as a key player in driving recovery. Despite experiencing a significant contraction of 7.9 percent in 2023, the agriculture sector shows remarkable resilience, rebounding with growth of 0.9 percent in 2024 and further expanding by 1.1 percent in 2025. This recovery is attributed to the sector's ability to adapt, implement reforms, and benefit from improved conditions post-conflict.

On the other hand, the industrial sector faces a more prolonged recovery, with a substantial contraction of -11.6 percent in 2023. Although the pace of contraction moderates to -0.4 percent in 2024, the sector only fully emerges from negative growth in 2025, posting a growth rate of 1 percent. This slower recovery indicates persistent challenges within the industrial sector due to the distortions in factories which were highly centralized in Khartoum state, the epicenter of the fighting.

However, according to the world bank war scenario, the services sector experiences a more protracted recovery compared to agriculture and industry. Despite significant contractions of -16 percent in 2023, -2.3 percent in 2024, and -1.6 percent in 2025, this sector lags in bouncing back. Displacement, migration, and the severe impact on banking, health, and education services contribute to the prolonged recovery of the services sector. The damage to critical infrastructure (such as the 2 bridges which were destroyed in Khartoum), including communication networks, airports, and business services, further impedes the quick restoration of normalcy.

In an alternative scenario geared toward faster recovery, such as the IMF war scenario, the emphasis lies in the country's swift mobilization of resources, including bilateral assistance, domestic mobilization, and foreign investments. These elements play a critical role in extensive rebuilding efforts and the overall promotion of recovery. The speedy resolution of the conflict and the establishment of a stable government are central components, necessitating efficient collaboration among stakeholders, encompassing both military and civilian entities, to facilitate swift decision-making. The formation of a transitional government is imperative for instilling confidence and expediting critical reforms. The overarching objective is to prompt international re-engagement swiftly, attracting substantial financial support and investments. Timely rehabilitation of infrastructure and vital sectors, coupled with comprehensive revitalization of businesses, serves to mitigate the adverse impacts of the conflict. Effective governance, complemented by transparent regulations, becomes instrumental in attracting investments and fostering sustained economic growth.

3.3.2 External grants scenarios

After the transformative events of the 2018 revolution and the termination of Omar al-Bashir's three-decade's rule, the establishment of a transitional government marked a pivotal phase in Sudan's engagement with the international community. The year 2020 saw notable developments, including Sudan's removal from the United States' list of State Sponsors of Terrorism (SSTL) in December and the clearance of arrears to the World Bank and African Development Bank (AfDB) in March and May 2020, respectively. A pivotal development occurred on May 17, 2020, when a development partner conference in Paris aimed to promote international investment in Sudan (IMF, 2021a).

In response to the need for economic stabilization and the laying of foundations for sustainable inclusive growth, the transitional government (TG) formulated a home-grown reform program. This initiative, supported by the International Monetary Fund (IMF), materialized through a request for a Staff-Monitored Program (SMP) in June 2020. The reforms encompassed measures to stabilize the economy, shift from fuel subsidization to a market-oriented economy, and introduce direct social assistance, exemplified by the Sudan Family Support Program, with a primary aim of reducing poverty. Fiscal, public

financial management, and monetary and exchange rate reforms were integral components of these efforts.

By the second review of the SMP in June 2021, the TG demonstrated satisfactory implementation of the benchmarks, making it eligible for an upper credit tranche with the IMF and establishing a commendable track record of economic reforms. A Poverty Reduction Strategy Paper (PRSP) was concurrently developed, paving the way for Sudan's entry into the Heavily Indebted Poor Countries (HIPC) decision point. Subsequently, the TG sought a 39-month arrangement under the Extended Credit Facility, aligning its goals with the pursuit of the HIPC Completion Point and the framework for inclusive growth outlined in the PRSP.

Building on the outlined developments, it is crucial to underscore that, creditors representing an impressive 76 percent of the net present value (NPV) of eligible debt, have affirmed their commitment to providing their allocated portion of debt relief under the HIPC Initiative (IMF, 2021c). Moreover, in conjunction with the successful clearance of arrears, Sudan became eligible to access an estimated US\$ 2 billion in International Development Association (IDA) financing (IMF, 2021b). These designated funds are poised to play a pivotal role in supporting policy reforms and initiatives directed at fostering entrepreneurship among women and youth, enhancing critical road infrastructure, expanding electricity accessibility, and contributing to investments in key sectors such as agriculture, water supply, natural resource management, human capital, and support for displaced populations (IMF, 2021b).

Despite these positive developments, a significant setback occurred three months after reaching the HIPC decision point with a military takeover on October 25, 2021. This event led to the freezing of all negotiations between international financial institutions (IFIs) and the military government regarding HIPC and associated development assistance. Nevertheless, before the conflict, efforts persisted to reach a political agreement that would restore civilian governance, with the potentially reigniting discussions about HIPC and the development grants the Sudanese transitional government could receive. Therefore, stopping the war and formulating a civilian transitional government might be associated with a resume of negotiations regarding the suspended development grants.

This hypothetical scenario explores the different impacts of external grants in a context where the political landscape shifts towards reconciliation and a civilian-led government. The scenario is analyzed through three distinct approaches: first, by evaluating the impact when these grants are predominantly invested in rehabilitation, infrastructure development, and essential services such as electricity and water supply; second, by considering the grants being primarily allocated to social protection, especially cash transfers, as an extension of the Family Support Program initiated during the transitional government; second, and third, by examining the outcome when grants are distributed between social protection and infrastructural investment. Each approach offers insights into how external financial support can be strategically utilized in different sectors to support the nation's development and recovery.

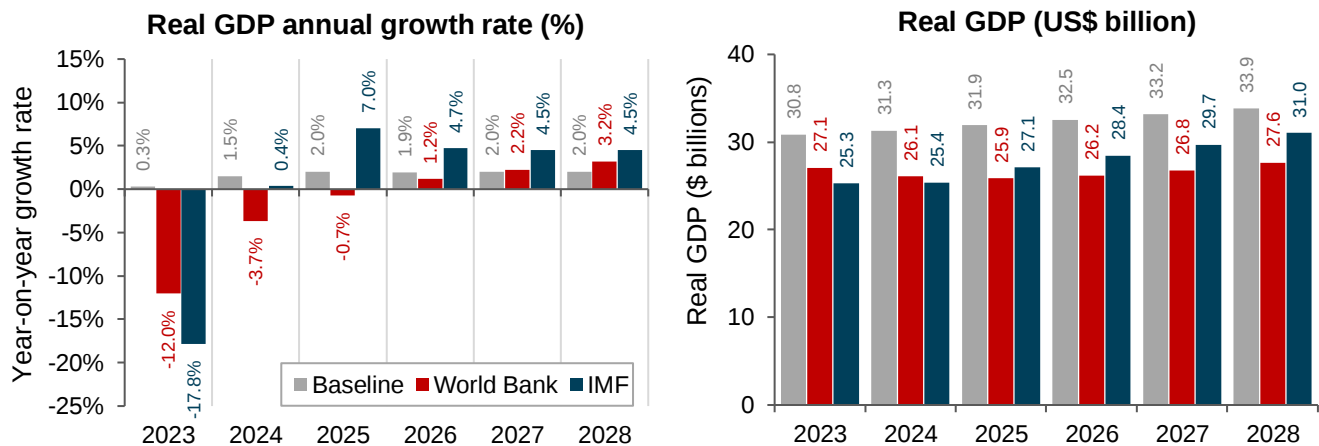
4 RESULTS AND DISCUSSION

4.1 Impact of the conflict on economic growth

The trajectory of Sudan’s economic growth, as depicted in Figure 7, illustrates the profound impact of conflict on national economic performance. The baseline scenario, which represents the anticipated growth pattern in the absence of conflict, indicates modest yet positive growth rates leading into 2023. This scenario was abruptly upended by the advent of war on April 15, 2023, necessitating a recalibration of expectations by the World Bank and the International Monetary Fund (IMF).

In 2023, the baseline scenario predicted a real GDP growth of 0.3%, which was quickly negated by a marked contraction, as represented by the World Bank’s estimate of a 12.0% decrease and the IMF’s more dire prediction of a 17.8% reduction in growth. This contraction far exceeds the anticipated growth and is indicative of the immediate economic shock induced by the conflict. The data for 2024 demonstrates a continuation of economic decline, with the GDP value falling significantly short of the baseline projection of 31.3 billion US dollars to reach only 25.3 billion according to the World Bank and 26.1 billion as per IMF estimations. This discrepancy highlights the enduring impact of the conflict and the challenges to economic recovery.

Figure 7: Simulated annual real GDP growth rates and values (2023-2028)



Source: Results of Sudan RIAPA Framework.

As we progress through the estimates, the years 2025 to 2027 show gradual, albeit inconsistent, recovery from the fall of 2023. The World Bank and IMF estimates suggest a slow reversion towards positive growth, although remaining below the baseline predictions. This pattern reflects the resilience of the Sudanese economy and the gradual adaptation to the prevailing conditions of conflict. The projections for 2028 present a cautious yet noteworthy return to growth, with the World Bank and IMF forecasting a GDP close to the baseline figures at 27.6 and 31.0 billion US dollars, respectively. The positive growth rates across all scenarios signal a potential stabilization and adaptive recovery of the Sudanese economy despite the ongoing challenges. The estimations shown in Figure 7 thus conveys a dual narrative: the immediate and severe economic ramifications of conflict, followed by a period of adjustment and partial recovery. The variance between the baseline scenario and the revised projections underscores

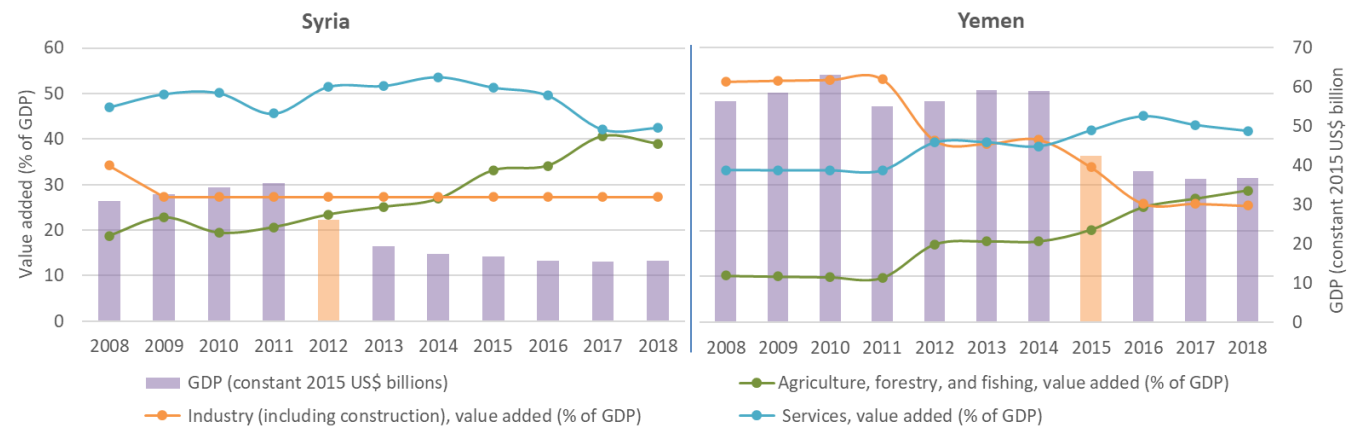
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APPENDIX

Figure A 1: GDP and sectoral contributions in Syria and Yemen before and after conflicts



Source: World Bank (2023).