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SUDAN: JOINT BANK-FUND DEBT SUSTAINABILITY ANALYSIS

Based on the joint Bank-Fund Low-Income Country Debt Sustainability Framework, this note assesses the sustainability of Sudan's total public debt.[1] *The results confirm that the country is in debt distress. Under the baseline scenario, all debt ratios, except those for debt service, remain above their indicative thresholds over the medium- to longer-term, despite reasonably prudent macroeconomic policies and assumed higher oil revenues over the projection period. Moreover, with its heavy reliance on oil, Sudan is highly vulnerable to both oil volume and price shocks as illustrated by a lower oil price scenario. Finally, Sudan's debt indicators would decrease if it curtails recourse to any additional nonconcessional borrowing. It will therefore be critical for Sudan to maintain sound policies consistent with a prudent borrowing strategy for the medium and long term.*

I. INTRODUCTION

1. **This is Sudan's first debt sustainability analysis (DSA) prepared under the new joint Bank-Fund Low-Income Country (LIC) Debt Sustainability Framework (DSF)**. The framework follows a clear methodology for assessing the risk of debt distress in LICs, based on projections of five debt burden indicators (under both baseline and standardized stress-test scenarios), namely the net present value (NPV) of external debt-to-GDP ratio; the NPV of external debt-to-export ratio; the NPV of external debt-to- revenue ratio; debt service-to-export ratio; and debt service-to- revenue ratio.[2] Empirical evidence suggests low-income countries with a better quality of policies and institutions can sustain a higher level of external debt. The LIC DSA framework, therefore, compares forecasts of these debt burden indicators with policy-dependent thresholds using the World Bank's Country Policy and Institutional Assessment (CPIA).[3]

2. **Despite the numerous challenges in implementing various peace agreements, Sudan has endeavored to maintain a focus on ensuring high levels of economic growth**

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[1] This DSA has been jointly prepared by the World Bank and Fund staff and in collaboration with the Sudanese authorities.

[2] Resolving Sudan's debt overhang remains a high priority for the government. The authorities believe that debt relief under the HIPC Initiative and the MDRI will play a crucial part in helping Sudan to normalize its relations with creditors and assume a path to achieving sustainable development goals. This DSA does not address HIPC eligibility. Sudan is potentially eligible for HIPC and MDRI debt relief. However, determining whether or not it qualifies for HIPC debt relief will require a HIPC-specific analysis that will be carried on at an appropriate time in the dialogue with Sudan.

[3] The CPIA ranks Sudan as a poor performer, with a 2004-2006 average score of 2.6. The policy-dependent debt burden thresholds for countries in this category are: (a) NPV of debt-to-GDP ratio of 30 percent; (b) NPV of debt-to-export ratio of 100 percent; (c) NPV of debt-to-revenue ratio of 200 percent; (d) debt service-to-export ratio of 15 percent; and (e) debt service-to-revenue ratio of 25 percent.

within an environment of macroeconomic stability. Economic growth was strong in 2006, reflecting a substantial increase in oil production (albeit less than expected) and a vibrant nonoil sector. However, 12-month inflation nearly tripled to some 16 percent on account of an increase in administered prices (fuels and transportation) in the third quarter of 2006, but the rate declined to single digits by the first quarter of 2007. Partly as a result of the increase in inflation, the dinar appreciated by some 21 percent in real effective terms in 2006. The fiscal position deteriorated markedly in 2006 to a deficit of 4.2 percent of GDP, reflecting mostly a shortfall in oil revenue (relative to budget) linked to Dar blend crude. Similarly, the external current account position also deteriorated to a deficit of 13.1 percent of GDP in 2006, contributing to a notable drop in foreign exchange reserves of the central bank, which in turn led to a slowdown in money and credit growth in the second half of 2006.

II. EVOLUTION AND STRUCTURE OF TOTAL EXTERNAL DEBT

3. **Despite Sudan's strong economic growth over the last seven years, its external debt, most of which is in arrears, remains high**. Based on the available data, the end-2006 stock of public and publicly-guaranteed debt is estimated at US$27 billion in nominal terms This increase largely reflects a US$6.3 billion buildup in arrears to official bilateral (Paris Club and non-Paris Club) creditors, and new drawings of some US$520 million from Arab multilateral and bilateral creditors (mainly from China and India). Sudan has been making partial debt service payments to almost all multilateral creditors. Sudan has also paid selected bilateral creditors that have provided new financing in recent years.

4. **The structure of Sudan's external debt has remained broadly unchanged since 2000, although there has been an increase in nonconcessional borrowing, mainly from China and India**. In nominal term, roughly two-thirds of end-2006 total external debt was owed to official bilateral creditors (Text Table 1), which was almost equally divided between Paris Club and non-Paris Club creditors. Of the remainder, multilateral institutions accounted for about 16 percent of Sudan's total debt, while its debt to commercial banks and suppliers accounted for some 18 percent.

5. **Sudan contracted US$589 million of new nonconcessional loans in 2006**, which adds to the already unsustainable debt burden of the country. Of this contracted total, US$392 million was from India, US$182 million from China, and a small amount from Turkey. The total amount of contracted nonconcessional loans was below the IMF staff-monitored program ceiling of US$700 million. Of these contracted loans, only US$286 million was actually disbursed in 2006. However, the authorities note that their strategy to foster national unity and peace agreements with Darfur and the eastern region

Text Table 1. Sudan: Composition of External Debt, 2006

(In million US dollars)

Total public and publicly guaranteed external debt	26,588
Multilateral Creditors	4,262
Paris Club Creditors	8,821
Non-Paris Club Creditors	8,647
Commercial Banks	3,960
Suppliers	897

Source: Central Bank of Sudan and staff estimates.

calls for undertaking substantial infrastructure and investment projects, and that given the limited fiscal space and lack of access to concessional financing, they have little choice but to resort to other less desirable means of financing.

III. External Debt Sustainability

Baseline Scenario

6. **The baseline scenario (Tables 1 and 2 and Figure 1), shows that Sudan is in debt distress**. This scenario is based on a set of reasonably prudent macroeconomic assumptions and oil sector developments presented in Boxes 1 and 2, respectively. The baseline results indicate that apart from the ratio of NPV of debt-to-revenue from 2009 onwards, all three debt-burden indicators are expected to remain above their policy-dependent thresholds in the period 2007–17. The NPV of debt-to-GDP ratio is expected to decline from 47 percent in 2007 to 34 percent in 2017, which is still 4 percentage points higher than the indicative threshold. The NPV of debt-to-exports is expected to fall from 284 percent in 2007 to 203 percent in 2009, but to increase thereafter to 429 percent in 2017, which is substantially higher than the indicative threshold of 200 percent; this more or less reflects the projected path of oil exports that shows a noticeable steady decline after 2009. The NPV of debt-to-revenue is projected to decline from an average of about 240 percent a year in 2007 and 2008 to remain below its threshold of 200 percent through much of the forecast period through 2012, but is expected to breach the threshold by 7 percentage points in 2017. The two debt service indicators (debt service-to-exports ratio and debt service-to-revenue ratio) are expected to remain below their policy-dependent thresholds throughout the forecast period 2007–2027. However, these indicators are misleading in that the macroeconomic framework for the baseline assumes servicing of only new obligations falling due, including highly concessional multilateral debt, and no servicing of the more than US$24 billion in arrears. For example, in 2006, Sudan paid US$377 million in debt service, while accruing some UD$124 million in additional arrears.

Standardized Sensitivity Analysis

7. **Under the new sustainability framework, the various standard stress tests conducted are distinguishable between alternative scenarios, based on permanent modifications of key baseline assumptions, and bound tests, representing temporary deviations—although some with permanent level effects.** There are two alternative scenarios: (A1) a historical scenario in which the main variables that determine debt dynamics (namely, real GDP growth; inflation, measured by changes in the U.S. dollar GDP deflator; the noninterest external current account in percent of GDP; and nondebt-creating flows in percent of GDP) are assumed to remain at their 10-year historical averages. This allows for a realistic comparison of the baseline projections with the country's own history. The second alternative scenario (A2) is a financing scenario in which new borrowing is assumed to be on less favorable terms (a 2 percentage points higher interest rate) throughout the projection period. The bound tests (B1 through B6) apply two-period/one standard deviation negative shocks to the key macroeconomic variables (the above-mentioned

parameters plus export growth, a combined one-half deviation shock, and a one-time 30 percent depreciation of the Sudanese pound). The impact of these various stress tests for the key debt-burden indicators are presented in Table 2 and illustrated in Figure 1.

Box 1. Sudan: Macroeconomic Assumptions 2007–27

Real GDP is assumed to grow at an annual average rate of about 12 percent a year during 2007–09, boosted by further increases in oil production and a continued strong recovery (10 percent) in the non-oil economy. However, after the strong oil GDP growth, (an average 26 percent) during the period, the average GDP growth is forecast to fall to 5½ percent per annum during 2010–27. The non-oil sector will benefit in this period from wide-ranging macroeconomic and structural reforms, especially the financial, social, and infrastructure improvements, which will help remove impediments to growth and speed up diversification of the domestic economy. Some of the macroeconomic assumptions are on the optimistic side, suggesting that the debt situation could be even worse than what is projected in the analysis.

Exports are projected to grow at a rate of 30 percent a year during 2007–09, reflecting largely strong oil export performance, and will decline thereafter at an average rate of about 2½ percent per year through 2027. Similarly, oil exports are projected to grow at an average annual rate of 26½ percent during 2007–09, and then decline at an annual average rate of almost 12 percent a year through 2027. Although it would peak in 2009, oil is expected to continue to be the dominant element through much of the forecast period. Its share in total exports is projected to fall from 95 percent in 2009 to 50 percent in 2021, and further to 17 percent in 2027.

Imports are projected to grow by about 12 percent annually through 2009, reflecting sharp increases in capital spending, but the average rate is expected to fall to under 6 percent a year thereafter.

The current account deficit is projected to average about 8½ percent of GDP annually during 2007–09, but will improve markedly thereafter to an annual average of 3 percent of GDP through 2007. The improvement in the current account after 2009 is expected to come from lower imports and stronger net external transfer inflows, mostly driven by remittances. Meanwhile, net international reserves of the central bank are expected to increase sharply from US$1.3 billion (1.4 months of imports) in 2007 to US$6.3 billion (3.9 months of imports) in 2017, and the import coverage is forecast to increase to 4.6 months through 2027.

Debt assumptions include continued repayment of selected creditors on outstanding debt (and continued accumulation of arrears on other outstanding obligations), and scheduled amortization and interest obligations on new borrowing. Disbursement of new loans is projected at about $300 million per year in the medium term (2008-12) and about $380 million on average over the long term (2013-27), with a grant element of just under 35 percent.

Box 2. Sudan: Oil Sector Developments

Oil is a dominant sector in Sudan, accounting for almost two-thirds of GDP. Average daily production rose from 287,000 barrels per day (bpd) in 2005 to 364,000 bpd in 2006. While this increase in output was notable, it was well below the expected level of 492,000 bpd envisioned at the beginning of the year. Technical problems caused delays in production of Dar blend from new fields until the fourth quarter of 2006. Many of the technical problems continued into the first quarter of 2007, limiting production which is now projected to average about 505,000 (bpd). Assuming some new discoveries, oil production is expected to average about 730,000 bpd in 2010–13, and the level of output is projected to start a gradual descent to reach 292,000 bpd by 2027.

Oil currently accounts for about 95 percent of exports and about 50–60 percent of government revenue. Government oil revenue reached US$4.2 billion in 2006, compared with US$2.3 billion in 2004, reflecting increases in both production and international prices.

8. **Holding the key debt-dynamics parameters constant over the long term at their historical averages (scenario A1) produces some deterioration in the downward path of both debt and debt service indicators relative to the baseline.** This reflects the recent improvement in key macroeconomic aggregates in the past few years (particularly GDP and export growth) relative to the past decade. Over the projection period, a 2 percentage points higher interest rate (scenario A2) somewhat flattens the downward path of debt and debt service ratios in all indicators, except in NPV of debt-to-export ratios which show a marked deterioration after 2010 through 2017, mapping the declining path of oil exports during this period. Under these alternative scenarios, however, all of the debt ratios continue to remain above the indicative thresholds over the next decade.

9. **Among the bounded tests, the one-time 30 percent nominal depreciation relative to the baseline in 2008 (B6) proved to be the worst scenario for two of the three debt indicators (the NPV of debt-to-GDP ratio and the NPV of debt-to-revenue ratio).** It would cause the NPV of debt-to-GDP ratio to reach 60 percent in 2008, before gradually declining to 34 percent in 2027, which is still 9 percentage points higher than the baseline and 4 percentage points above the indicative threshold. Similarly, this scenario would cause the NPV of debt-to-revenue ratio to reach 301 percent in 2008, gradually declining thereafter to 228 percent in 2027, which is 63 and 28 percentage points above the baseline and indicative threshold, respectively. In the case of debt- and debt service-to-export ratios, the most challenging outcome would result from lowering the export value growth at its historical average minus one standard deviation in 2008–09 (B2). It would result in the ratio of NPV of debt-to-export to first rise to 370 percent in 2008, reaching 1037 percent in 2017, before falling to 996 percent in 2027, which is still 535 percentage points above the baseline and some 896 percentage points higher than the indicative threshold. The debt service indicator produces a similar pattern, climbing to 26 percent (20 and 11 percentage points above the baseline and the threshold, respectively) in 2017, before falling to 19 percent (4 percentage points above the indicative threshold) in 2027.

10. **These results indicate that under various shocks, the debt situation would remain precarious over the next decade, and that there is little room for any slippages in the implementation of the planned reforms in the fiscal and structural areas.** In addition, in the coming period, improving the debt indicators would depend on obtaining concessional financing, rather than relying on the more expensive nonconcessional borrowing.

Customized Sensitivity Analysis

11. **Oil prices are inherently uncertain and volatile**. The baseline scenario uses IMF World Economic Outlook projections for future oil prices, which are significantly higher than oil price projections from the World Bank. To analyze the debt dynamics under a scenario using oil prices closer to the World Bank projections, an additional stress test is performed using a 20 percent shock to the baseline oil price (scenario A3).

12. **Under this customized scenario, Sudan's external debt indicators worsen significantly** (Figure 2). Most notably, the debt-to-revenue ratio would remain above its 200 percent threshold in this case over the entire period through 2017, suggesting longer-term downside risks. Although debt service indicators remain below their thresholds, they increase significantly due to higher exceptional financing on nonconcessional terms.

IV. TOTAL PUBLIC DEBT SUSTAINABILITY

13. **Under the baseline scenario (Table 3), although the total public sector debt starts at a relatively high level in 2006 (75 percent of GDP), it falls over the medium term to reach 55 percent in 2012**. This is mainly due to the contribution from high real GDP growth envisaged for 2007–12, but also from a reduction in the fiscal deficit over the same period. Public sector debt stocks in NPV terms start at 64 percent in 2006, but falls to 49 percent of GDP in 2012, and to 39 percent in 2027. The debt service-to-revenue ratio is projected to fall from 6 percent in 2006 to 5 percent in 2012 and then stay around 5–6 percent thereafter.

14. **Alternative scenarios (Table 4, Figure 3) show that improving Sudan's public debt indicators depend on the implementation of reforms to improve the fiscal deficit and growth, particularly in the non-oil economy**. The main results are the following:

- Under the no reform scenario, where the primary balance is kept unchanged from 2007 onwards, the NPV of debt-to-GDP would increase to 65 percent in 2017 and the debt service-to-revenue ratio would increase steadily to 11 percent.

- Under the most extreme stress test, where the real GDP growth is at its historical average minus one standard deviation, the NPV of debt-to-GDP would increase to 81 percent in 2017 and the debt service-to-revenue ratio would increase to 16 percent.

V. CONCLUSIONS

15. **Despite its considerable economic progress since 2000 Sudan is in debt distress**. Sudan's external debt ratios are well above the country-specific indicative thresholds during the complete period of analysis. The stress tests indicate that the debt indicators are sensitive to shocks. The sustainability analysis of total public debt strengthens this assessment. The vulnerabilities highlighted by the DSA need to be effectively addressed in the coming period through both proactive public debt and financial management policies.

16. **Sudan should reconsider its external borrowing strategy in light of the future debt service burden that would follow if it took on high volumes of nonconcessional debt**. Further recourse to such borrowing could also jeopardize Sudan's access to possible debt relief.

Table 1. Sudan: External Debt Sustainability Framework, Baseline Scenario, 2007-2027 1/
(In percent of GDP, unless otherwise indicated)

7/13/07 11:03 AM	Actual			Historical Average 6/	Standard Deviation 6/	Projections									
	2004	2005	2006			2007	2008	2009	2010	2011	2012	2007-12 Average	2017	2027	2013-27 Average
External debt (nominal) 1/	**107.6**	**95.5**	**71.0**			**60.0**	**53.4**	**47.5**	**44.6**	**42.3**	**40.3**		**37.4**	**25.6**	
o/w public and publicly guaranteed (PPG)	107.6	95.5	71.0			60.0	53.4	47.5	44.6	42.3	40.3		37.4	25.6	
Change in external debt	-21.6	-12.1	-24.5			-11.0	-6.6	-5.9	-2.9	-2.3	-2.0		-0.8	-1.8	
Identified net debt-creating flows	-23.6	-21.8	-19.1			-3.4	-3.7	-5.0	-1.9	-1.4	-1.7		0.0	-1.3	
Non-interest current account deficit	**5.7**	**9.9**	**14.3**	**9.2**	**2.6**	**10.3**	**8.2**	**5.9**	**6.2**	**5.9**	**5.0**		**4.1**	**1.0**	3.3
Deficit in balance of goods and services	3.8	9.7	10.6			6.4	5.0	2.1	2.6	3.1	2.9		6.5	4.2	
Exports	17.6	17.9	16.1			16.7	17.4	19.2	17.9	16.4	15.2		7.9	5.3	
Imports	21.4	27.6	26.7			23.1	22.4	21.3	20.5	19.4	18.1		14.4	9.5	
Net current transfers (negative = inflow)	-5.2	-6.2	-3.7	-4.5	1.2	-3.0	-3.4	-3.0	-3.0	-3.3	-3.5		-6.5	-5.2	-5.7
o/w official	-0.1	-0.8	-0.9			-0.9	-1.2	-0.9	-0.8	-0.7	-0.7		-0.7	-0.7	
Other current account flows (negative = net inflow)	7.0	6.3	7.4			7.0	6.6	6.8	6.6	6.1	5.6		4.1	2.0	
Net FDI (negative = inflow)	**-6.8**	**-8.4**	**-9.4**	**-5.4**	**2.8**	**-7.7**	**-6.8**	**-5.6**	**-4.9**	**-4.4**	**-4.0**		**-2.7**	**-1.1**	-2.2
Endogenous debt dynamics 2/	**-22.5**	**-23.2**	**-24.0**			**-6.1**	**-5.1**	**-5.4**	**-3.3**	**-2.8**	**-2.7**		**-1.4**	**-1.2**	
Contribution from nominal interest rate	0.8	0.8	0.3			0.3	0.3	0.3	0.2	0.2	0.2		0.1	0.1	
Contribution from real GDP growth	-5.4	-7.2	-8.4			-6.4	-5.4	-5.6	-3.5	-3.0	-2.9		-1.5	-1.3	
Contribution from price and exchange rate changes	-17.8	-16.8	-16.0			…	…	…	…	…	…		…	…	
Residual (3-4) 3/	**2.1**	**9.7**	**-5.4**			**-7.6**	**-3.0**	**-0.9**	**-1.0**	**-0.9**	**-0.3**		**-0.7**	**-0.5**	
o/w exceptional financing	-814.8	-663.0	-440.9			-317.8	-253.7	-221.7	-205.8	-187.6	-176.9		-160.3	-106.7	
NPV of external debt 4/	...	...	54.9			47.4	43.0	39.0	37.2	35.9	34.7		33.9	24.5	
In percent of exports	...	...	341.6			283.5	247.8	202.7	207.5	219.1	227.7		429.0	461.4	
NPV of PPG external debt	**...**	**...**	**54.9**			**47.4**	**43.0**	**39.0**	**37.2**	**35.9**	**34.7**		**33.9**	**24.5**	
In percent of exports	**...**	**...**	**341.6**			**283.5**	**247.8**	**202.7**	**207.5**	**219.1**	**227.7**		**429.0**	**461.4**	
In percent of government revenues	**...**	**...**	**289.1**			**262.3**	**217.2**	**175.1**	**174.0**	**173.7**	**174.1**		**206.9**	**164.6**	
Debt service-to-exports ratio (in percent)	**12.9**	**11.6**	**8.3**			**7.0**	**5.8**	**4.6**	**4.6**	**4.7**	**4.5**		**5.7**	**4.9**	
PPG debt service-to-exports ratio (in percent)	**12.9**	**11.6**	**8.3**			**7.0**	**5.8**	**4.6**	**4.6**	**4.7**	**4.5**		**5.7**	**4.9**	
PPG debt service-to-revenue ratio (in percent)	**11.5**	**9.6**	**7.1**			**6.5**	**5.0**	**3.9**	**3.8**	**3.7**	**3.5**		**2.8**	**1.7**	
Total gross financing need (billions of U.S. dollars)	0.2	1.0	2.3			1.8	1.4	0.8	1.6	1.9	1.6		2.5	0.7	
Non-interest current account deficit that stabilizes debt ratio	27.3	22.0	38.9			21.3	14.9	11.8	9.1	8.1	6.9		4.9	2.8	
Key macroeconomic assumptions															
Real GDP growth (in percent)	5.1	8.6	11.8	6.0	3.3	11.2	10.7	12.6	8.3	7.6	7.5	9.7	4.4	5.1	4.7
GDP deflator in US dollar terms (change in percent)	16.0	18.5	20.0	10.1	7.8	12.2	8.2	6.2	4.5	4.0	3.5	6.4	3.9	4.2	4.0
Effective interest rate (percent) 5/	0.7	1.0	0.5	0.7	0.2	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.3	0.2	0.3
Growth of exports of G&S (US dollar terms, in percent)	46.3	30.6	20.5	29.7	38.8	29.7	24.5	32.6	5.6	2.1	3.6	16.3	-4.8	4.0	1.7
Growth of imports of G&S (US dollar terms, in percent)	38.1	65.6	29.8	22.7	19.1	7.7	16.1	14.2	8.9	5.9	3.7	9.4	3.4	5.9	4.3
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	17.2	17.4	17.6	17.8	18.0	18.2	17.7	19.1	21.5	19.9
Aid flows (in billions of US dollars) 7/	0.0	0.2	0.4			0.4	0.7	0.6	0.6	0.6	0.7		1.0	2.4	
o/w Grants	0.0	0.0	0.2			0.3	0.3	0.4	0.5	0.5	0.6		0.8	2.0	
o/w Concessional loans	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.6	0.6
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			55.6	58.9	62.1	64.2	65.9	67.5		72.3	83.9	76.1
Memorandum items:															
Nominal GDP (billions of US dollars)	21.7	27.9	37.4			46.7	55.9	66.9	75.8	84.8	94.4		137.9	339.2	
(NPVt-NPVt-1)/GDPt-1 (in percent)						4.2	4.2	3.6	3.2	2.9	2.8	3.5	2.5	0.7	2.1

Source: Staff simulations.

1/ Includes both public and private sector external debt.
2/ Derived as $[r - g - \rho(1+g)]/(1+g+\rho+g\rho)$ times previous period debt ratio, with r = nominal interest rate; g = real GDP growth rate, and ρ = growth rate of GDP deflator in U.S. dollar terms.
3/ Includes exceptional financing (i.e., changes in arrears and debt relief); changes in gross foreign assets; and valuation adjustments. For projections also includes contribution from price and exchange rate changes.
4/ Assumes that NPV of private sector debt is equivalent to its face value.
5/ Current-year interest payments divided by previous period debt stock.
6/ Historical averages and standard deviations are generally derived over the past 10 years, subject to data availability.
7/ Defined as grants, concessional loans, and debt relief.
8/ Grant-equivalent financing includes grants provided directly to the government and through new borrowing (difference between the face value and the NPV of new debt).

Table 2. Sudan: Sensitivity Analyses for Key Indicators of Public and Publicly Guaranteed External Debt, 2007-27
(In percent)

	Projections							
7/30/07 12:00 PM	2007	2008	2009	2010	2011	2012	**2017**	2027
NPV of debt-to-GDP ratio								
Baseline	47	43	39	37	36	35	**34**	25
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008-27 1/	47	46	45	43	42	41	**35**	30
A2. New public sector loans on less favorable terms in 2008-27 2/	47	43	39	38	36	35	**35**	25
A3. Twenty percent downward shock to baseline oil price 2008-27.	47	45	41	39	37	36	**35**	25
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	47	46	46	44	42	41	**40**	29
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	47	47	50	48	45	44	**41**	27
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	47	46	43	41	39	38	**37**	27
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	47	47	44	42	40	39	**37**	25
B5. Combination of B1-B4 using one-half standard deviation shocks	47	48	51	49	47	45	**43**	30
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	47	60	54	52	50	48	**47**	34
NPV of debt-to-exports ratio								
Baseline	284	248	203	208	219	228	**429**	461
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2007-26 1/	284	264	235	242	255	267	**448**	558
A2. New public sector loans on less favorable terms in 2007-26 2/	284	249	204	209	221	231	**438**	478
A3. Twenty percent downward shock to baseline oil price 2008-27.	284	331	264	264	274	282	**508**	470
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	284	248	203	208	219	228	**429**	461
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	284	370	522	530	555	573	**1037**	996
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	284	248	203	208	219	228	**429**	461
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	284	268	230	234	246	255	**470**	478
B5. Combination of B1-B4 using one-half standard deviation shocks	284	289	311	317	334	345	**638**	649
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	284	248	203	208	219	228	**429**	461
NPV of debt-to-revenue ratio								
Baseline	262	217	175	174	174	174	**207**	165
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2007-26 1/	262	232	203	203	202	204	**216**	199
A2. New public sector loans on less favorable terms in 2007-26 2/	262	218	176	175	176	176	**211**	171
A3. Twenty percent downward shock to baseline oil price 2008-27.	262	273	215	209	205	203	**229**	167
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	262	234	207	206	205	206	**244**	195
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	262	237	226	222	220	219	**250**	178
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	262	230	193	191	191	191	**227**	181
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	262	235	199	196	195	195	**227**	171
B5. Combination of B1-B4 using one-half standard deviation shocks	262	243	231	229	228	227	**265**	199
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	262	301	242	241	240	241	**286**	228

Table 3b. Sudan: Sensitivity Analyses for Key Indicators of Public and Publicly Guaranteed External Debt, 2007-27 (continued)
(In percent)

	2007	2008	2009	2010	2011	2012	2017	2027
Debt service-to-exports ratio								
Baseline	7	6	5	5	5	5	**6**	5
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008-27 1/	7	5	5	5	5	5	**10**	21
A2. New public sector loans on less favorable terms in 2008-27 2/	7	5	4	4	4	4	**5**	5
A3. Twenty percent downward shock to baseline oil price 2008-27.	7	8	6	6	6	6	**7**	5
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	7	5	4	4	4	4	**5**	4
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	7	7	10	12	12	12	**26**	19
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	7	5	4	4	4	4	**5**	4
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	7	5	5	5	5	5	**9**	7
B5. Combination of B1-B4 using one-half standard deviation shocks	7	6	6	7	7	6	**12**	9
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	7	5	4	4	4	4	**5**	4
Debt service-to-revenue ratio								
Baseline	7	5	4	4	4	3	**3**	2
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008-27 1/	6	5	4	4	4	4	**5**	7
A2. New public sector loans on less favorable terms in 2008-27 2/	6	5	4	3	3	3	**2**	2
A3. Twenty percent downward shock to baseline oil price 2008-27.	7	6	5	5	4	4	**3**	2
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	6	5	4	4	4	3	**3**	2
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	6	5	4	5	5	5	**6**	3
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	6	5	4	4	3	3	**2**	2
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	6	5	4	4	4	4	**4**	2
B5. Combination of B1-B4 using one-half standard deviation shocks	6	5	4	5	5	4	**5**	3
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	6	6	5	5	4	4	**3**	2
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	18	18	18	18	18	18	**18**	18

Source: Staff projections and simulations.

1/ Variables include real GDP growth, growth of GDP deflator (in U.S. dollar terms), non-interest current account in percent of GDP, and non-debt creating flows.
2/ Assumes that the interest rate on new borrowing is by 2 percentage points higher than in the baseline., while grace and maturity periods are the same as in the baseline.
3/ Exports values are assumed to remain permanently at the lower level, but the current account as a share of GDP is assumed to return to its baseline level after the shock (implicitly assuming an offsetting adjustment in import levels).
4/ Includes official and private transfers and FDI.
5/ Depreciation is defined as percentage decline in dollar/local currency rate, such that it never exceeds 100 percent.
6/ Applies to all stress scenarios except for A2 (less favorable financing) in which the terms on all new financing are as specified in footnote 2.

Table 3.Sudan: Public Sector Debt Sustainability Framework, Baseline Scenario, 2004-2027

(In percent of GDP, unless otherwise indicated)

	Actual					Estimate	Projections								
	2004	2005	2006	Historical Average 5/	Standard Deviation 5/	2007	2008	2009	2010	2011	2012	2007-12 Average	2017	2027	2013-27 Average
Public sector debt 1/	109.2	96.1	74.5			70.6	65.3	59.6	57.4	55.7	54.7		55.4	39.6	
o/w foreign-currency denominated	105.0	90.4	65.8			59.8	53.4	47.5	44.6	42.3	40.3		37.4	26.1	
Change in public sector debt	-24.1	-13.1	-21.5			-3.9	-5.3	-5.7	-2.2	-1.6	-1.0		-0.2	-3.4	
Identified debt-creating flows	-26.2	-25.4	-21.2			-6.7	-8.4	-8.5	-4.7	-3.9	-3.2		-2.4	-3.9	
Primary deficit	-3.0	0.5	3.1	-0.6	2.1	2.8	1.9	1.1	1.1	1.0	1.3	1.5	0.9	-1.1	0.3
Revenue and grants	19.7	21.7	19.4			18.7	20.4	22.9	22.0	21.2	20.5		17.0	15.5	
of which : grants	0.0	0.0	0.4			0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	
Primary (noninterest) expenditure	16.8	22.2	22.5			21.5	22.3	24.0	23.1	22.2	21.8		17.8	14.4	
Automatic debt dynamics	-23.2	-25.9	-24.2			-9.3	-10.3	-9.6	-5.8	-4.9	-4.5		-3.3	-2.7	
Contribution from interest rate/growth differential	-7.9	-10.0	-10.2			-7.6	-7.1	-7.6	-4.8	-4.3	-4.0		-2.6	-2.2	
of which : contribution from average real interest rate	-1.4	-1.3	-0.1			-0.1	-0.2	-0.3	-0.3	-0.2	-0.1		-0.3	-0.1	
of which : contribution from real GDP growth	-6.5	-8.7	-10.1			-7.5	-6.8	-7.3	-4.6	-4.1	-3.9		-2.3	-2.1	
Contribution from real exchange rate depreciation	-15.3	-15.9	-14.0			-1.7	-3.2	-2.0	-0.9	-0.6	-0.5		...	...	
Other identified debt-creating flows	0.0	0.0	-0.1			-0.2	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Privatization receipts (negative)	0.0	0.0	-0.1			-0.2	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recognition of implicit or contingent liabilities	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Debt relief (HIPC and other)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Residual, including asset changes	2.1	12.2	-0.3			2.8	3.1	2.8	2.5	2.3	2.2		2.2	0.5	
NPV of public sector debt	91.7	81.0	63.6			58.2	54.9	51.1	50.0	49.3	49.1		51.9	38.5	
o/w foreign-currency denominated	87.5	75.4	54.9			47.4	43.0	39.0	37.2	35.9	34.7		33.9	25.0	
o/w external	87.5	75.4	54.9			47.4	43.0	39.0	37.2	35.9	34.7		33.9	25.0	
NPV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	-1.5	1.8	4.2			3.8	2.9	2.2	2.2	2.1	2.4		1.9	-0.2	
NPV of public sector debt-to-revenue ratio (in percent) 3/	464.3	373.8	327.2			311.8	269.2	223.4	227.4	232.1	239.1		305.4	248.3	
o/w external	442.9	347.8	282.5			253.9	210.9	170.5	169.2	168.8	169.0		199.6	161.5	
Debt service-to-revenue ratio (in percent) 3/ 4/	7.3	5.9	5.9			5.5	5.2	4.8	4.8	5.0	5.2		6.0	6.0	
Primary deficit that stabilizes the debt-to-GDP ratio	21.1	13.6	24.6			6.7	7.2	6.8	3.3	2.6	2.3		1.1	2.2	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	5.1	8.6	11.8	7.1	2.8	11.2	10.7	12.6	8.3	7.6	7.5	9.7	4.4	5.1	4.7
Average nominal interest rate on forex debt (in percent)	1.0	0.9	0.7	0.7	0.2	0.8	1.0	1.2	1.1	1.1	1.0	1.0	0.7	0.5	0.7
Average real interest rate on domestic currency debt (in percent)	-2.3	2.4	6.4	-2.6	6.5	3.5	-1.3	-0.5	1.2	1.9	2.3	1.2	0.9	1.9	1.2
Real exchange rate depreciation (in percent, + indicates depreciation)	-12.6	-16.7	-17.4	-6.8	11.3	-2.9	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	12.9	12.6	6.9	14.1	12.3	3.8	7.6	6.3	4.3	3.7	3.3	4.8	3.8	4.1	3.7
Growth of real primary spending (deflated by GDP deflator, in percent)	30.9	42.7	13.5	23.4	33.7	5.9	15.1	21.2	4.6	3.9	5.7	9.4	0.7	4.4	2.0
Grant element of new external borrowing (in percent)	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Sources: Country authorities; and Fund staff estimates and projections.

1/ [Indicate coverage of public sector, e.g., general government or nonfinancial public sector. Also whether net or gross debt is used.]

2/ Gross financing need is defined as the primary deficit plus debt service plus the stock of short-term debt at the end of the last period.

3/ Revenues including grants.

4/ Debt service is defined as the sum of interest and amortization of medium and long-term debt.

5/ Historical averages and standard deviations are generally derived over the past 10 years, subject to data availability.

Table 4.Sudan: Sensitivity Analysis for Key Indicators of Public Debt 2007-2027

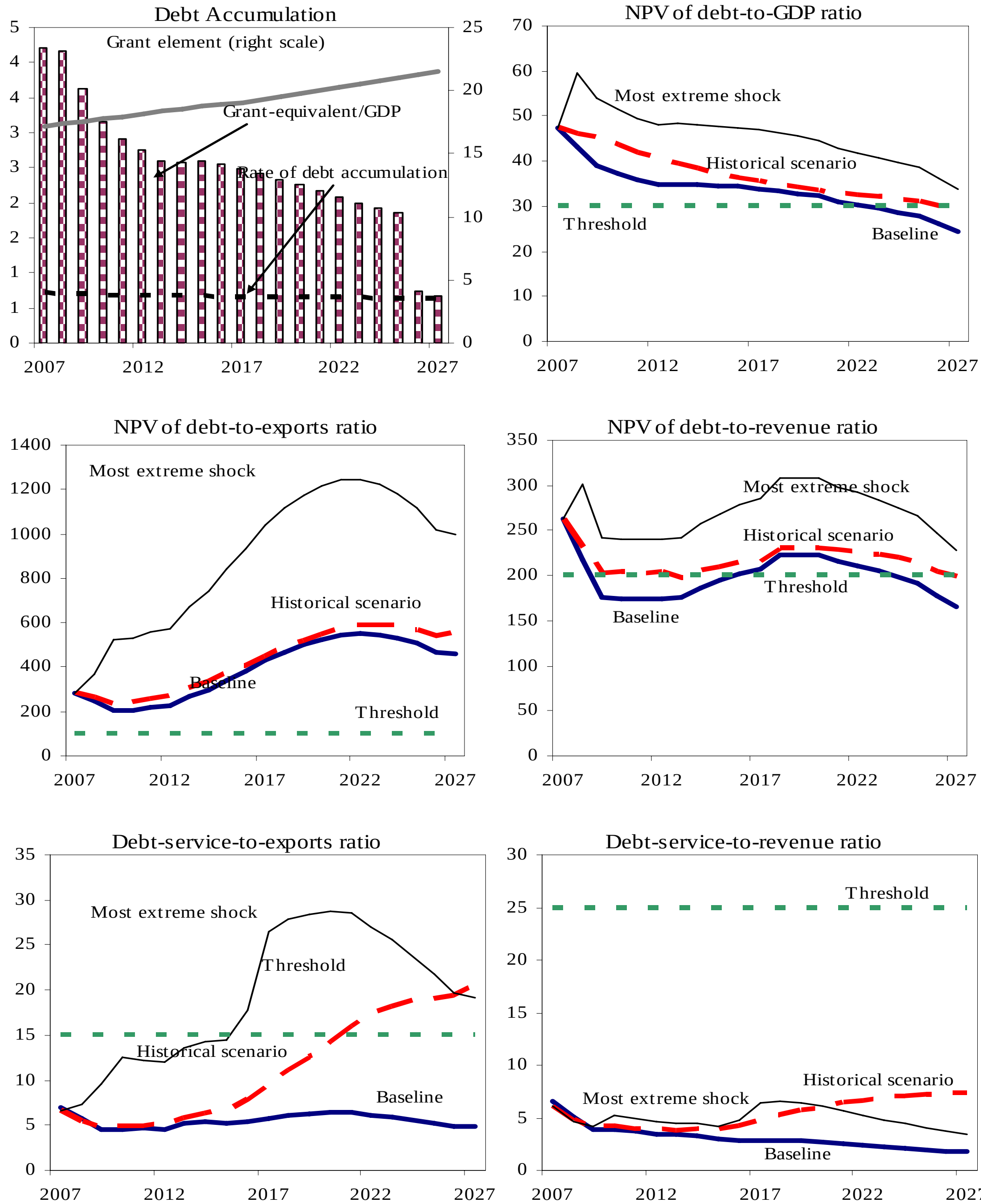
	Projections							
	2007	2008	2009	2010	2011	2012	2017	2027
NPV of Debt-to-GDP Ratio								
Baseline	58	55	51	50	49	49	52	38
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	58	55	52	50	48	47	40	21
A2. Primary balance is unchanged from 2007	58	56	53	53	54	55	65	46
A3. Permanently lower GDP growth 1/	58	55	52	52	52	52	61	61
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	58	59	62	64	65	67	81	76
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	58	58	57	58	61	63	80	90
B3. Combination of B1-B2 using one half standard deviation shocks	58	56	55	54	53	53	57	45
B4. One-time 30 percent real depreciation in 2008	58	72	66	63	62	61	62	47
B5. 10 percent of GDP increase in other debt-creating flows in 2008	58	64	59	57	56	55	57	42
NPV of Debt-to-Revenue Ratio 2/								
Baseline	312	269	223	227	232	239	305	248
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	312	267	227	227	227	228	233	139
A2. Primary balance is unchanged from 2007	312	273	233	243	255	267	380	300
A3. Permanently lower GDP growth 1/	312	271	227	234	243	254	360	393
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	312	291	272	289	306	326	473	487
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	312	282	248	266	285	305	468	583
B3. Combination of B1-B2 using one half standard deviation shocks	312	275	240	245	250	258	335	290
B4. One-time 30 percent real depreciation in 2008	312	354	288	289	290	295	365	303
B5. 10 percent of GDP increase in other debt-creating flows in 2008	312	312	257	259	263	269	336	271
Debt Service-to-Revenue Ratio 2/								
Baseline	6	5	5	5	5	5	6	6
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	6	5	5	4	4	4	1	-1
A2. Primary balance is unchanged from 2007	6	5	5	6	6	7	11	11
A3. Permanently lower GDP growth 1/	6	5	5	5	5	6	9	15
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008-2009	6	5	6	7	8	9	16	24
B2. Primary balance is at historical average minus one standard deviations in 2008-2009	6	5	6	7	8	9	17	33
B3. Combination of B1-B2 using one half standard deviation shocks	6	5	5	5	5	5	6	7
B4. One-time 30 percent real depreciation in 2008	6	6	6	6	6	6	8	9
B5. 10 percent of GDP increase in other debt-creating flows in 2008	6	5	7	7	7	7	10	8

Sources: Country authorities; and Fund staff estimates and projections.

1/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of 20 (i.e., the length of the projection period).

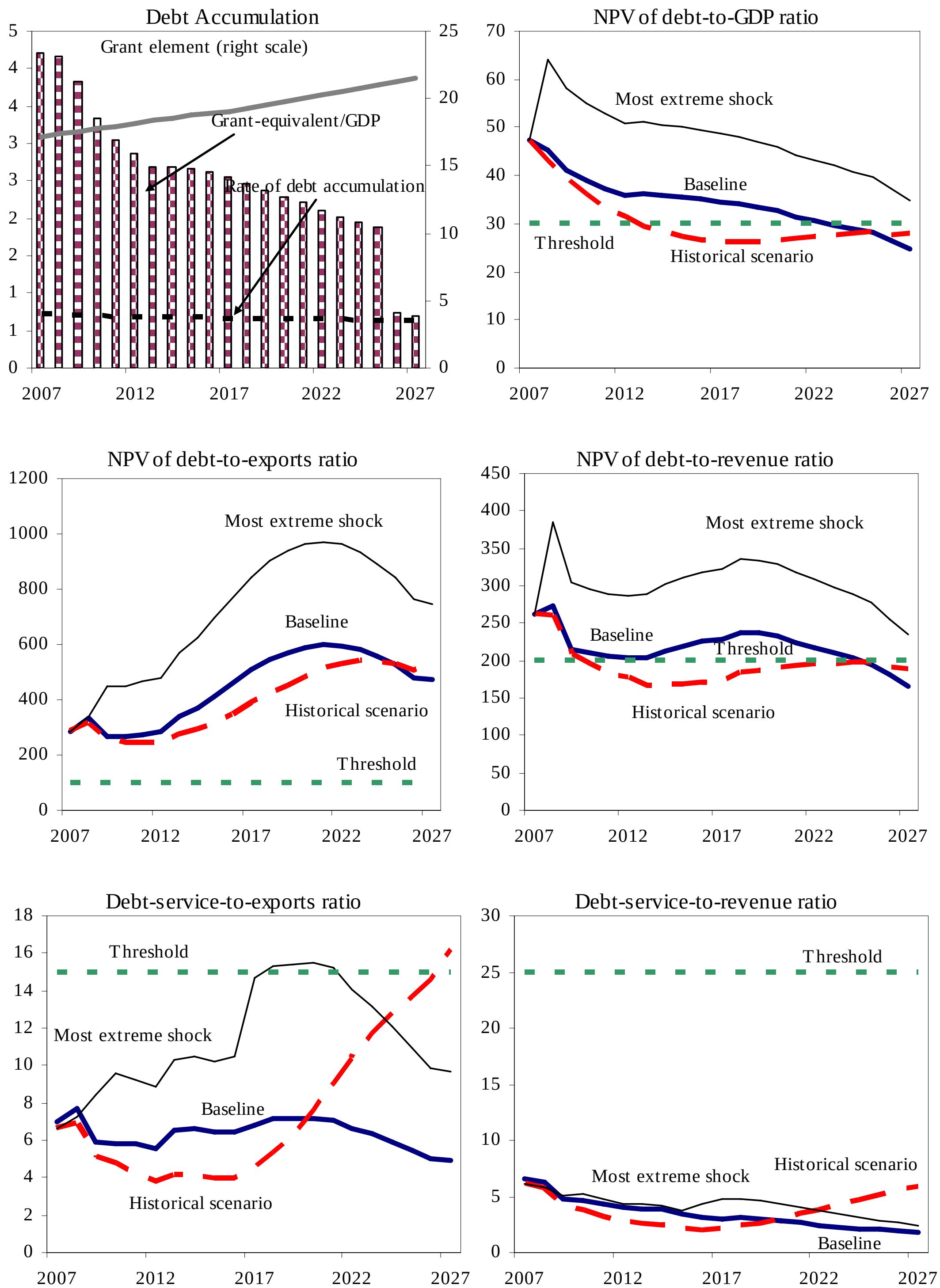
2/ Revenues are defined inclusive of grants.

Figure 1. Sudan: Indicators of Public and Publicly Guaranteed External Debt Under Alternative Scenarios, 2007-2027



Source: Staff projections and simulations.

Figure 2. Sudan: Indicators of Public and Publicly Guaranteed External Debt
Under Oil Price Shock Alternative Scenarios, 2007-2027



Source: Staff projections and simulations.

Figure 3. Sudan: Indicators of Public Debt Under Alternative Scenarios, 2007–2027 1