



# CHAD

## STAFF REPORT FOR THE 2016 ARTICLE IV CONSULTATION— DEBT SUSTAINABILITY ANALYSIS

July 7, 2016

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*The debt sustainability analysis (LIC-DSA) shows that Chad remains at high risk of debt distress, based on an assessment of public external debt, reflecting vulnerabilities that concentrate in the short term. The assessment of high risk is reinforced by vulnerabilities related to domestic debt and by the recent accumulation of a small amount of external arrears to multilateral creditors. A number of debt indicators exhibit temporary and small breaches of their indicative thresholds, while the external debt service-to-revenue ratio exhibits a relatively protracted and moderate breach. These breaches reflect low government oil revenue and high debt service payments on external debt falling due in the short term. Although the debt indicators remain well below their indicative thresholds in the medium to long run, the DSA confirms that Chad is susceptible to external macroeconomic shocks such as the ongoing oil price shock. Preserving solvency in the current environment requires a deep fiscal adjustment supported by prudent debt management policies and advancing structural reforms that lead to economic diversification and sustained growth.<sup>1</sup>*

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<sup>1</sup> Chad's average CPIA over 2012-14 is estimated at 2.6. This corresponds to a weak policy performance under the Debt Sustainability Framework for Low-Income Countries (LIC-DSA).

## BACKGROUND

### Public External Debt

**1. Chad's external public debt hovered around 20 percent of GDP over the decade after the start of oil production in 2003.** Debt owed to multilateral institutions and traditional bilateral donors has been basically constant in nominal terms over the last few years. Chad has instead relied more on non-traditional creditors (e.g., China, Libya) and commercial credits to address its financing needs, including to tackle its infrastructure deficit. There is no recorded external private debt in Chad.

**2. The external public debt-to-GDP ratio increased in 2013-14 following two non-concessional oil sales' advance operations with Glencore Energy.** In 2013, the authorities signed two agreements for a total of US\$ 600 million with Glencore Energy, in the form of oil sales' advances to cover budget shortfalls as revenues collapsed as oil volumes fell sharply. In 2014, a new commercial borrowing operation for US\$ 1.4 billion was contracted by SHT (a state-owned oil company) to finance the purchase of Chevron's shares in Chad's largest oil consortium in June of that year. After these operations, the external public debt-to-GDP ratio rose above 27 percent of GDP in 2014.

**3. As of end-2014, nearly half of Chad's debt was commercial debt (Text Table 1).** In addition, around 40 percent was owed to multilateral creditors, and less than 20 percent to bilateral creditors (the bulk of which was owed to non-Paris Club creditors).

**4. In late 2015, a rescheduling agreement with Glencore consolidated the two oil sales' advance operations, extending their maturities.** The agreement consolidated the remaining balance of the two loans and extended its maturity from 4 to 6-7 years. The rescheduling agreement implied an increase in the original debt's net present value, but improved Chad's debt service profile over the medium term by better matching debt service to the anticipated path of oil receipts.

**5. Following the achievement of the HIPC completion point in April 2015, Chad was able to secure at least US\$756 million in debt relief.** This amount includes MDRI relief from International Development Association (IDA) and African Development Bank (AfDB), forgiveness from the IMF, and a hundred percent cancellation from the Paris Club. Regarding non-Paris Club members, the authorities have signed a new agreement with the Saudi authorities which reschedules their remaining amount on IDA comparable terms.

**Text Table 1. Chad: External Debt Stock at Year-End, 2001–2014**  
(Billions of CFA francs)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Total</b>	794.3	786.3	736.6	797.2	898.9	896.2	776.9	839.4	786.2	1,016.7	1,226.3	1,299.6	1,410.7	2,010.2
(Percent of GDP)	55.8	54.1	44.5	32.6	24.4	24.3	20.0	16.8	18.9	19.2	20.2	21.0	22.8	27.1
<b>Multilateral</b>	678.1	687.7	652.5	715.3	810.2	805.5	693.6	725.7	683.6	758.6	767.3	771.4	719.9	734.8
IMF	65.3	67.3	57.0	47.7	47.5	37.4	24.3	20.1	12.6	8.3	4.6	2.4	0.9	11.1
World Bank/IDA	380.6	398.3	394.0	444.5	507.8	486.1	435.6	435.7	402.7	429.1	420.7	414.8	387.8	397.4
African Development Fund/Bank	182.8	169.8	159.9	168.5	179.8	205.8	174.1	195.4	185.5	207.7	209.4	200.4	181.4	180.7
EIB	3.9	7.9	7.3	13.0	13.0	12.4	9.0	9.0	8.7	10.2	9.9	10.1	10.1	8.9
Others	45.5	44.4	34.2	41.6	62.0	63.8	50.6	65.5	74.2	103.3	122.7	143.7	139.7	136.7
<b>Bilateral</b>	116.2	98.6	84.1	81.9	88.8	90.7	83.3	113.6	102.6	258.1	296.1	311.1	283.2	334.0
Paris Club official debt	30.2	25.8	24.0	25.2	24.3	23.2	20.1	19.1	17.1	16.5	17.0	15.8	13.8	11.5
Non-Paris Club official debt	86.1	72.7	60.1	56.7	64.4	67.5	63.3	94.5	85.5	241.6	279.1	295.3	269.4	322.5
of which: China, People's Republic	28.6	25.4	22.0	13.6	15.4	13.9	-	21.9	20.4	23.3	66.1	85.9	83.3	129.0
Libya	-	-	-	-	-	-	-	-	-	148.9	149.3	150.0	133.9	139.6
India	-	-	-	-	-	11.3	14.8	22.7	21.4	23.7	22.4	20.8	18.3	21.1
<b>Commercial 1/</b>											162.9	217.1	407.6	941.5

1/ Commercial debt includes debt signed with CNPC and Glencore.

Source: World Bank, Chadian authorities, selected creditors, and staff estimates. The concept of debt used here includes both contracted and guaranteed debt. Figures are based on historical data as of end-2014. The official external debt stock data underestimate the actual level of external debt. For example, some project loan disbursements are recognized only after a lag. This table has discrepancies with corresponding fiscal or balance of payments flow estimates, giving rise to residuals in the sustainability analysis.

## Public Domestic Debt

**6. The stock of public domestic debt has increased in recent years, reaching 9 percent of GDP at end-2014 (Text Table 2).** This growth is the result of drawing down the statutory advances provided by BEAC (the regional central bank), the sale of five-year savings bonds (CFAF 108 billion in 2011, and CFAF 90 billion in 2013), a CFAF 50 billion loan from Republic of Congo (in 2012), a CFAF 15 billion loan from Equatorial Guinea (in 2013), and the use of commercial bank loans (which increased from CFAF 9 billion in 2013 to CFAF 127 billion in 2014). The stock of public domestic debt includes a balance of CFAF 52 billion in treasury arrears at end-December 2014. Additionally, short-term domestic obligations include the issuance of 3-month Treasury bills before the end of 2014 (CFAF 27.5 billion, at a weighted average annual interest rate of 2.8 percent).

**7. The stock of domestic debt rose to 16 percent of GDP in 2015; in part a result of the authorities stepping up their domestic debt issuance program in the CEMAC market.** Chad issued its first ever Treasury bills in the last quarter of 2014. Treasury bills have been regularly issued throughout 2015, with a gradual extension of maturities (up to one year) and interest rates below 3.4 percent. During 2015, the Treasury issued CFAF 156 billion (gross) in Treasury bills. The issuance of Treasury bonds amounted to CFAF 139 billion between July and December 2015, with maturities

of two, three and five years, and an effective interest rate on average of 4.3 percent.<sup>2</sup> Some of these Treasury bonds were used in swap operations involving the exchange of commercial bank loans, which explains the reduction in the stock of those loans from CFAF 127 billion in 2014 to CFAF 56 billion in 2015.

**Text Table 2. Chad: Stock of Domestic Debt at Year-End, 2011-2015**  
(Billions of CFA francs)

	2011	2012	2013	2014	2015
<b>Total</b>	<b>501.3</b>	<b>548.0</b>	<b>584.8</b>	<b>658.9</b>	<b>1050.8</b>
<b>(Percent of GDP)</b>	<b>8.7</b>	<b>8.7</b>	<b>9.1</b>	<b>9.6</b>	<b>16.3</b>
Central Bank financing	241.9	241.9	222.5	222.5	454.6
<i>Statutory advances</i>	208.6	208.6	187.8	187.8	280.0
<i>Exceptional advance</i>					140.0
<i>Consolidated debt</i>	33.3	33.3	34.7	34.7	34.7
Commercial banks' loans	8.5	8.5	8.5	127.3	56.4
2011 Bond <sup>1</sup>	107.6	107.6	80.7	53.8	26.9
2013 Bond <sup>1</sup>			90.3	72.2	54.2
Treasury Bonds <sup>2</sup>					139.3
Republic of Congo		50.3	40.3	30.3	20.3
Equatorial Guinea			15.0	13.3	11.7
Domestic arrears	56.4	50.3	39.9	51.8	199.8
Others <sup>3</sup>	86.9	89.4	87.7	87.7	87.7
<i>Memo items:</i>					
<i>Treasury Bills</i>				27.5	79.0

Source: Chadian authorities.

1/ Issued through banks' syndication.

2/ Auctioned in the regional securities' market.

3/ Legal commitments, standing payment orders, and accounting arrears.

**8. Domestic financing in 2015 included additional advances from BEAC.** The 2015 statutory and extraordinary advances (CFAF 92.6 billion and CFAF 140 billion, respectively) have a maturity of 10 years, a grace period of 3 years, and an interest rate equivalent to BEAC's rediscount rate.

**9. As of end-2015, the government accrued a sizable amount of domestic payment arrears.** The balance of treasury arrears increased from CFAF 52 billion at end-December 2014 to around CFAF 200 billion (3.1 percent of GDP) in 2015.

<sup>2</sup> For a detailed analysis, see Selected Issues Paper (SIP) on Chad's first steps in the regional public securities market.

## DSA ASSUMPTIONS

**10. The DSA incorporates an updated debt database.** The historical information on external debt has been updated, as of December 2014, according to the latest World Bank-DRS database. Preliminary estimates on external debt are used for 2015.

**11. The assumptions underpinning the DSA reflect the persistent oil price shock and security challenges, and the analysis is conducted under a baseline (current policies) scenario.** The financing gap in 2015 was covered through central bank advances, spending cuts, increased net domestic financing, and Fund disbursements under the ECF arrangement. The projected financing gap in 2016 is assumed to be financed through a combination of further fiscal adjustment and the mobilization of additional domestic financing and external concessional loans. As in the previous DSA update, the analysis incorporates the rescheduling consolidating the various non-concessional oil sales' advance operations, and exceptional receipts from divestments in the oil sector.

**12. Oil production and revenue:** Chad's medium- and long-term macroeconomic outlook is characterized by a small decline in oil production in 2016-17 followed by gradual increases when new fields come on line, but a steady decline of oil production over the longer term.<sup>3</sup> The baseline projection for oil production in 2016 is fairly conservative, as prospects could somewhat improve in the context of the recent recovery in oil prices.

- Oil production is expected to rise from 144,000 bpd in 2015 to about 173,000 bpd in 2018-19. This oil production boom will likely be temporary; proven reserves in the new fields are much smaller than that in the original Doba basin and will also likely be nearly exhausted around 2030. Hence, oil production and exports are projected to decline steadily to negligible levels beyond 2030. Obviously, these prospects might change with new oil exploration activities or with the development of new oil extraction techniques.
- Chad's oil trades below the WEO reference price, reflecting a quality discount and transport cost of US\$ 6-9 per barrel. For the medium term (five-year horizon) the price of Chadian oil is assumed to increase from US\$ 34 per barrel (all discounts included) in 2016 to US\$ 53 per barrel in 2020, in line with the trend projected in the IMF's World Economic Outlook (WEO). From 2021 onward, the price is assumed to increase, on average, by around 3 percent per year in U.S. dollar terms (Box 1).
- At the time of the Second Review under the ECF arrangement in December 2015, staffs worked with a Chadian oil price assumption of US\$ 47 per barrel for 2016.

<sup>3</sup> Oil production at the Doba oilfield (exploited by the Esso-led consortium) started in 2003, reached its peak of 63 million barrels in 2005 and, absent other oil developments, will decline with annual output projected to become negligible beyond 2030. In 2011, oil production began at a second oil field, Bongor, operated by CNPC (about one-third the size of the Doba field). Exports of crude oil from Bongor started in 2014. Oil from another smaller operator (Caracal, formerly Griffiths) started to be produced in late 2013.

**13. Fiscal policy:** The analysis assumes a sustained fiscal adjustment throughout the entire projection in response to the current adverse macroeconomic conditions and in transition to the post-oil era, with the non-oil primary deficit (NOPD) reduced to about 6 percent of non-oil GDP by 2020. The gradual recovery in oil prices is expected to help oil revenues increase from 3 percent of non-oil GDP in 2016 to 7 percent of non-oil GDP in 2020. Over the longer term, it is assumed that dwindling oil revenues will be partly offset by a stabilization of total government primary spending at around 21 percent of GDP, while the primary balance will be adjusted gradually to reach a small deficit of less than 3 percent of non-oil GDP by 2036. The latter is projected to be achieved mainly by: (i) gradually increasing non-oil revenues (from about 9 percent of non-oil GDP at present to about 18 percent of non-oil GDP by 2036);<sup>4</sup> (ii) maintaining total investment outlays around 10 percent of non-oil GDP in the long term; and (iii) cutting recurrent spending, notably, by streamlining transfers and subsidies to public enterprises (at present, jointly accounting for about 5 percent of non-oil GDP). The analysis also assumes a strategy for clearing domestic arrears and avoiding further accumulation going forward.

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<sup>4</sup> This assumes that Chad improves its tax effort in line with the CEMAC average. A recent FAD mission estimated a non-oil tax revenue gap above 5 percent of non-oil GDP, while the 2013 Article IV staff report estimated even a larger gap.

### Box 1. Chad: Macroeconomic Assumptions, 2016–2036

**Real GDP growth** is driven by a sharp slowdown of non-oil production in the short term and a secular decline in oil production since 2019, with upside risk over the long run given oil exploration activities. Non-oil GDP growth is projected at 4 percent per year over the medium to long term, driven by agriculture, commerce, and transportation.

**Inflation** is assumed to stabilize at 3 percent, consistent with the CEMAC convergence criterion. The disruptions to cross-border trade flows with Cameroon and Nigeria might continue to lead to increased volatility on domestic prices in the short run.

As mentioned above, the **fiscal outlook** features a modest increase in oil revenues in the medium term but a decline in the long term. The NOPD is projected at 6 percent of non-oil GDP in 2020. The medium-term outlook for non-oil revenue is relatively low as a result of the regional security shock and a slowdown in demand from Nigeria, but a recovery is assumed in the long run. The long-run fiscal adjustment would maintain an appropriate level of investment and social spending to ensure steady growth and poverty reduction.

The evolution of the **external current account** deficit will be largely driven by oil price path. The current account deficit is projected to fall from 9 percent of GDP in 2016 to 6 percent of GDP in 2020, thanks to an increase in oil export values. After 2020, barring new oil discoveries, the external current account is projected to remain in deficit due to lower crude oil exports, stabilizing at around 4 percent of GDP beyond 2030. Non-oil sector imports are assumed to evolve in line with non-oil GDP over the projection horizon, while oil sector imports would decrease over the medium to long term as foreign direct investment declines too.

Although investments from oil companies are envisaged to decline in the short run, **foreign direct investment (FDI)** is expected to be above 5 percent of GDP in 2016 due to exceptional receipts (estimated at CFAF 100 billion) linked to divestments in the oil sector. FDI is assumed to stabilize in 2017-20 at around 4 percent of GDP before it declines to an average of 2 percent of GDP in 2021-35 in line with the assumption of maturing oil fields and amortized investments.

**External financing:** The analysis incorporates the rescheduling agreement with Glencore that consolidates the remaining balance of the loans and extended its maturity from 4 to 6-7 years. Under the ECF-supported program, external financing is assumed to be on concessional terms over the medium to long term.

**Domestic financing:** Domestic financing assumptions consider a continued placement of domestic debt instruments and exclude further utilization of BEAC advances.

### Text Table 3. Chad: Medium-Term Projections

	2015	2016	2017	2018	2019	2020	2021	2016-21 Avg.	2022-36 Avg.
<b>Real GDP growth (percent per year)</b>	1.8	-1.1	1.7	5.2	8.2	3.4	3.5	3.5	3.1
<b>Oil</b>	32.2	-4.8	-3.2	12.5	27.6	-0.2	-0.3	5.3	-5.6
<b>Non-oil</b>	-2.9	-0.3	2.7	3.8	4.3	4.4	4.4	3.2	4.2
<b>Consumer price inflation (percent per year)</b>	3.7	0.0	5.2	3.0	3.0	3.0	3.0	2.9	...
<b>External current account balance (percent of GDP)</b>	-12.4	-8.7	-7.8	-7.3	-5.7	-6.2	-5.9	-6.9	-4.3
<b>Exports of goods and services (percent of GDP)</b>	15.4	14.8	14.2	15.2	15.5	14.3	13.7	14.6	6.6
	(In percent of non-oil GDP)								
<b>Government revenue and grants</b>	15.2	16.7	17.3	18.2	20.8	20.9	24.5	19.7	21.5
<i>Of which: oil revenue</i>	2.6	3.4	4.3	4.9	7.4	7.2	11.3	6.4	5.3
<i>Of which: grants</i>	4.3	4.9	4.3	4.2	4.1	4.0	3.3	4.1	3.1
<b>Government expenditure (commitment basis)</b>	21.4	20.1	18.9	19.7	20.6	20.8	22.4	20.4	21.8
<b>Overall fiscal balance (incl. grants; cash basis)</b>	-5.1	-4.2	-2.5	-2.2	-1.0	-0.7	-0.3	-1.8	-0.6
<b>Non-oil primary fiscal bal. (excl. grants; commitment basis)</b>	-9.8	-7.0	-5.0	-5.0	-5.8	-5.9	-7.5	-6.0	-4.6
<b>Memorandum items:</b>									
<b>Chadian crude oil price (US\$/barrel)</b>	43.4	33.8	45.2	48.5	50.8	52.7	54.3	47.6	68.1

Sources: Chadian authorities; and IMF staff estimates and projections

## EXTERNAL DSA

**14. The evolution of external debt is driven by the government's borrowing strategy which envisages a reasonable volume of project and budget support loans from both traditional and non-traditional sources and no further usage of commercial loans.** Under Chad's supported ECF program, external financing is assumed to be on concessional terms over the medium to long term mostly financed by disbursements from multilaterals (47 percent) such as the IMF, WB, AfDB, Islamic Development Bank, and the European Union and other non-traditional partners (48 percent) such as Saudi Arabia or Kuwait. This leads to a grant element of an average of 37.3 percent over the projection period (Figure 1a).

**15. Under the baseline scenario, two of the external debt indicators are above their critical thresholds, indicating a high risk of debt distress** (Table 1, Figure 1).<sup>5</sup> The debt-service-to exports ratio shows a temporary and small breach of its indicative threshold. The debt service-to-revenue ratio exhibits a more protracted and moderate breach in the 2016-2018 period. These breaches reflect the substantial reduction in government oil revenue and the spike in debt service payments falling due in the next few years for the non-concessional loan contracted with Glencore. Conditional to the assumptions of the baseline scenario (including a sustained fiscal adjustment), the external debt indicators remain well below their indicative thresholds in the medium to long run.<sup>6</sup>

### Stress tests

**16. Under alternative scenarios, Chad's external debt risk outlook remains high.**<sup>7</sup> In particular, bounds tests highlight the susceptibility of external debt to shocks, especially in the short term (Table 2, Figure 1). If main economic variables remain at their historical averages, all debt indicators but two remain below their indicative thresholds. Under the historical scenario, a breach of the debt service-to-revenue ratio occurs in 2016-20. Bounds tests reveal that Chad is most vulnerable to an adverse shock to exports and a scenario that combines different types of macroeconomic shocks. A one-time depreciation shock (30 percent nominal depreciation in 2017) also generates vulnerability in some external debt indicators. These shocks have the potential to

<sup>5</sup> Arrears vis-à-vis the WB and the AfDB, were incurred during the first half of 2016, respectively at €869,000 and €80,000. These were cleared in early July.

<sup>6</sup> The residuals in Table 1 are associated with the government's purchase of shares in the country's largest oil consortium in 2014, which was financed with a foreign commercial loan (around CFA 690 billion); the significant debt relief in 2015; and a substantial loss in international reserves in 2015 and 2016. The existence of historical and projected residuals can also be explained by shortcomings in quality affecting the balance of payments' data.

<sup>7</sup> A comparison of the current bounds tests with those in the previous DSA reveals a better long-term performance of some external debt indicators. This is, however, due to technical reasons: the last DSA calibrated shocks during the 10-year period beginning in 2003 as Chad's oil production was just beginning, and therefore gave an unusually high estimated standard deviation for exports.



raise all debt indicators above their indicative thresholds, especially over the short term. The PV of debt-to-exports ratio is particularly sensitive to a poor export performance, showing a moderate and protracted breach under this stress test.

## PUBLIC DSA

**17. The assessment of Chad's overall risk of debt sustainability does not substantially change when domestic debt is included in the analysis** (Tables 2 and 3, Figure 2). The public debt indicators are mostly driven by the external debt component. But as a result of the accumulation of domestic arrears and the increased issuances of debt securities in the regional market, the PV of debt-to-GDP ratio shows a breach in 2016 under the baseline scenario. The domestic debt component would fall from 21 percent of GDP in 2016 to 13 percent of GDP in 2020 and will continue a steady decline until it reaches about 8 percent of GDP in 2036. Altogether, the public debt stock decreases from 45 percent of GDP in 2016 to 26 percent of GDP in 2020 until it stabilizes around an average of 18 percent of GDP in 2022-36.<sup>8</sup>

**18. Standard stress tests indicate sustainability risks in the short run.** In particular, a real depreciation shock in 2016 could impair public debt sustainability in the period 2016-18 (Most Extreme Shock in Figure 2 and Bound Tests in Table 4).

## CONCLUSION

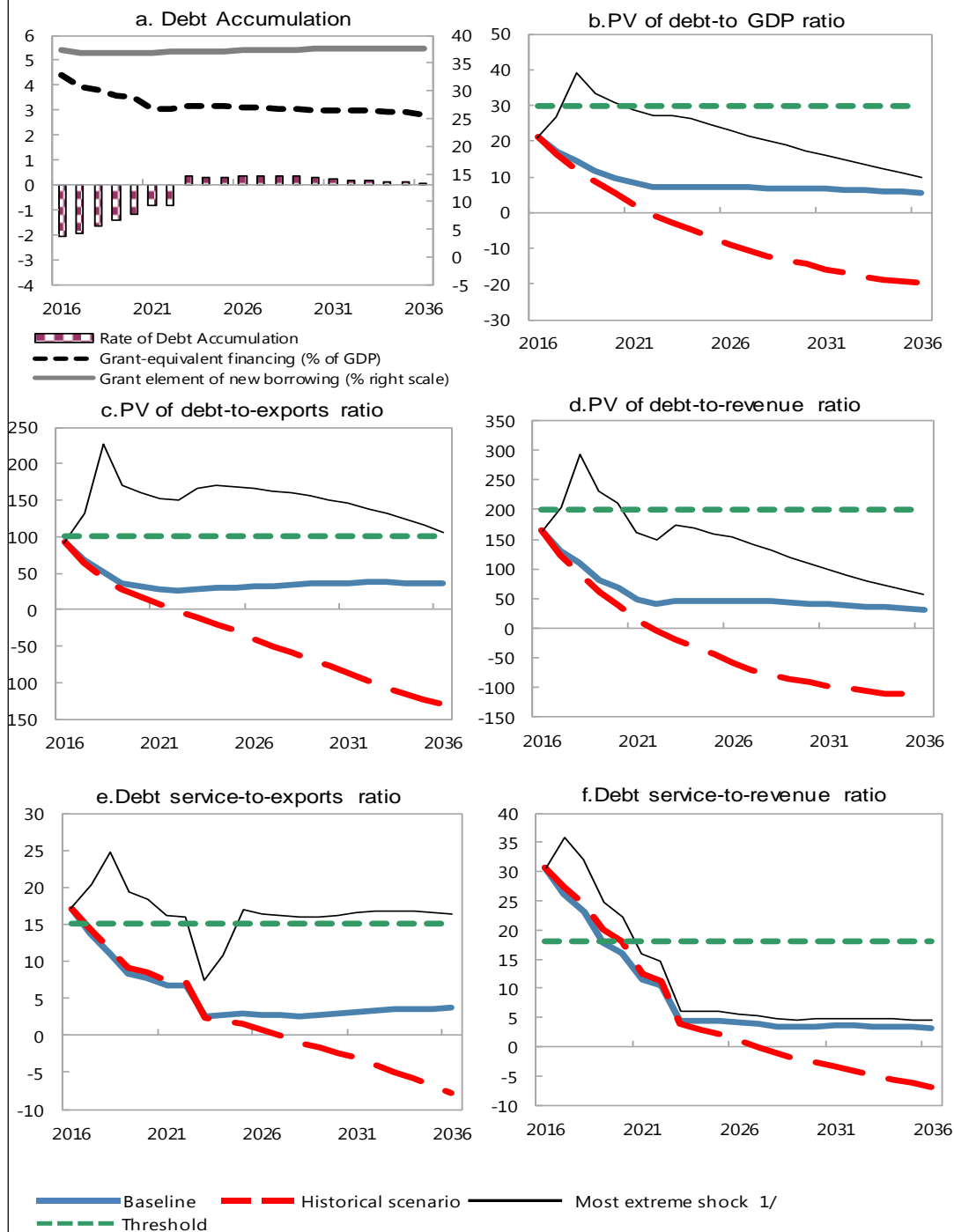
**19. Chad remains at high risk of debt distress, based on an assessment of public external debt, with vulnerabilities concentrated in the short term. The inclusion of Chad's domestic debt in the analysis reinforces the conclusions of the external DSA.** On account of the persistent decline in oil prices, the baseline scenario shows breaches of some indicators at the beginning of the projection period, while over the long term all indicators are markedly below their thresholds. Preserving debt solvency, however, is conditional on the substantial fiscal adjustment assumed under the baseline projection. In the event of a sustained rebound in the oil price and with improvements in the policy environment, the assessment of the debt sustainability could improve to moderate risk, as suggested under alternative scenarios. Furthermore, arrears on debt to the WB and the AfDB that have been recently accumulated have been resolved shortly. In the presence of the exhaustibility and volatility of oil revenues, it is necessary to strengthen fiscal and debt management, maintain a prudent external and domestic borrowing policy, and make further progress in diversifying the economy. The effective functioning of the recently revamped inter-ministerial debt coordination units will be important for strengthening the capacity to record and monitor public debt. In addition, the government will start issuing annual debt management reports since 2016 (with support from two Fund TA missions), and will undertake institutional improvements in the management of spending arrears in line with Fund TA recommendations.

**20. The assumptions and conclusions of the DSA were discussed with the authorities, who broadly concurred with the staff assessment.** The authorities acknowledged potential concerns

<sup>8</sup> In Table 3, the residuals for 2016 partially reflect some still unidentified sources of (domestic) financing.

on debt sustainability and highlighted the Glencore loans as a key factor behind the external risk rating. They raised questions about the criteria behind the CPIA score, and expect that progress with ongoing reforms will result in an improvement of this score and a related increase in external debt burden thresholds. They also acknowledged the importance of technical assistance in their current efforts to improve debt management. As for diversifying the economy, they discussed the government's focus on agro-pastoral activities and agreed with the need to improve the business climate for the private sector.

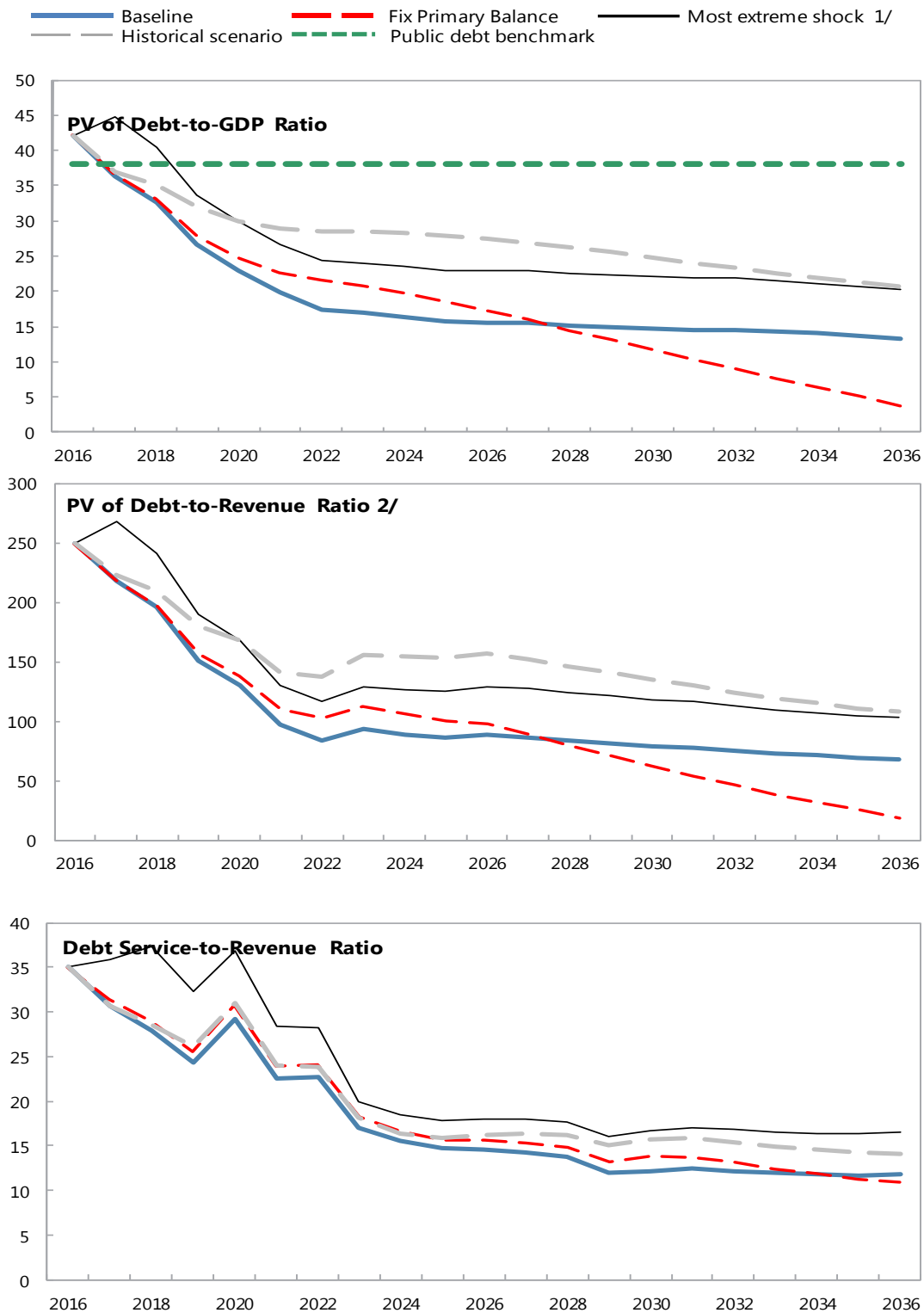
**Figure 1. Chad: Indicators of Public and Publicly Guaranteed External Debt under Alternatives Scenarios, 2016-2036 1/**



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio on or before 2026. In figure b. it corresponds to a Combination shock; in c. to a Exports shock; in d. to a Combination shock; in e. to a Exports shock and in figure f. to a One-time depreciation shock

**Figure 2. Chad: Indicators of Public Debt Under Alternative Scenarios, 2016-2036 1/**



Sources: Country authorities; and staff estimates and projections.  
 1/ The most extreme stress test is the test that yields the highest ratio on or before 2026.  
 2/ Revenues are defined inclusive of grants.

Table 1 .Chad: External Debt Sustainability Framework, Baseline Scenario, 2013-2036 1/

(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average <sup>6/</sup>	Standard Deviation <sup>6/</sup>	Projections						2016-2021			2022-2036		
	2013	2014	2015			2016	2017	2018	2019	2020	2021	Average	2026	2036	Average		
<b>External debt (nominal) 1/</b>	<b>21.2</b>	<b>29.2</b>	<b>25.1</b>			<b>23.9</b>	<b>20.2</b>	<b>17.6</b>	<b>14.5</b>	<b>12.8</b>	<b>11.7</b>		<b>10.2</b>	<b>7.7</b>			
<i>of which: public and publicly guaranteed (PPG)</i>	21.2	29.2	25.1			23.9	20.2	17.6	14.5	12.8	11.7		10.2	7.7			
Change in external debt	1.1	8.0	-4.2			-1.1	-3.8	-2.5	-3.1	-1.7	-1.2		-0.1	-0.5			
Identified net debt-creating flows	4.3	2.3	15.5			3.6	2.8	1.3	0.4	2.0	1.9		2.9	2.1			
<b>Non-interest current account deficit</b>	<b>8.6</b>	<b>8.3</b>	<b>11.3</b>	<b>4.2</b>	<b>7.1</b>	<b>7.5</b>	<b>6.9</b>	<b>6.6</b>	<b>5.2</b>	<b>5.8</b>	<b>5.6</b>		<b>4.7</b>	<b>3.1</b>			4.2
Deficit in balance of goods and services	9.7	12.6	16.5			16.5	12.9	10.7	6.4	6.6	6.2		6.9	5.7			
Exports	33.5	31.5	26.6			22.9	25.0	27.7	31.7	30.4	30.2		22.2	15.2			
Imports	43.2	44.1	43.1			39.5	37.9	38.4	38.1	37.0	36.4		29.1	20.9			
Net current transfers (negative = inflow)	-5.1	-7.9	-7.1	-5.6	1.6	-7.8	-6.6	-6.5	-5.8	-5.6	-5.2		-4.8	-3.5			-4.4
<i>of which: official</i>	-1.5	-4.4	-3.0			-3.2	-2.3	-2.3	-2.0	-1.8	-1.6		-1.8	-1.6			
Other current account flows (negative = net inflow)	3.9	3.6	1.9			-1.2	0.5	2.4	4.6	4.8	4.7		2.6	0.9			
<b>Net FDI (negative = inflow)</b>	<b>-4.0</b>	<b>-5.2</b>	<b>-5.1</b>	<b>-4.9</b>	<b>2.0</b>	<b>-5.4</b>	<b>-4.6</b>	<b>-5.0</b>	<b>-3.9</b>	<b>-3.7</b>	<b>-3.6</b>		<b>-1.6</b>	<b>-0.8</b>			-1.5
<b>Endogenous debt dynamics 2/</b>	<b>-0.3</b>	<b>-0.8</b>	<b>9.4</b>			<b>1.5</b>	<b>0.5</b>	<b>-0.3</b>	<b>-0.8</b>	<b>-0.1</b>	<b>-0.2</b>		<b>-0.2</b>	<b>-0.2</b>			
Contribution from nominal interest rate	0.6	0.7	1.2			1.2	0.9	0.7	0.5	0.4	0.3		0.1	0.1			
Contribution from real GDP growth	-1.1	-1.4	-0.7			0.3	-0.4	-1.0	-1.3	-0.5	-0.4		-0.3	-0.3			
Contribution from price and exchange rate changes	0.2	-0.2	8.8			...	...	...	...	...	...		...	...			
<b>Residual (3-4) 3/</b>	<b>-3.2</b>	<b>5.7</b>	<b>-19.7</b>			<b>-4.8</b>	<b>-6.5</b>	<b>-3.8</b>	<b>-3.5</b>	<b>-3.7</b>	<b>-3.0</b>		<b>-3.0</b>	<b>-2.6</b>			
<i>of which: exceptional financing</i>	0.0	0.0	-7.8			-0.9	-0.7	-0.4	-0.3	-0.3	-0.3		-0.2	-0.1			
PV of external debt 4/	...	...	22.6			21.0	17.2	14.5	11.5	9.7	8.4		7.0	5.4			
In percent of exports	...	...	85.0			91.8	68.9	52.5	36.3	31.9	27.9		31.4	35.5			
<b>PV of PPG external debt</b>	<b>...</b>	<b>...</b>	<b>22.6</b>			<b>21.0</b>	<b>17.2</b>	<b>14.5</b>	<b>11.5</b>	<b>9.7</b>	<b>8.4</b>		<b>7.0</b>	<b>5.4</b>			
<b>In percent of exports</b>	<b>...</b>	<b>...</b>	<b>85.0</b>			<b>91.8</b>	<b>68.9</b>	<b>52.5</b>	<b>36.3</b>	<b>31.9</b>	<b>27.9</b>		<b>31.4</b>	<b>35.5</b>			
<b>In percent of government revenues</b>	<b>...</b>	<b>...</b>	<b>238.4</b>			<b>164.0</b>	<b>131.1</b>	<b>109.1</b>	<b>79.1</b>	<b>66.7</b>	<b>47.3</b>		<b>46.7</b>	<b>31.5</b>			
<b>Debt service-to-exports ratio (in percent)</b>	<b>4.0</b>	<b>15.6</b>	<b>9.5</b>			<b>17.1</b>	<b>13.7</b>	<b>11.1</b>	<b>8.2</b>	<b>7.7</b>	<b>6.8</b>		<b>2.7</b>	<b>3.6</b>			
<b>PPG debt service-to-exports ratio (in percent)</b>	<b>4.0</b>	<b>15.6</b>	<b>9.5</b>			<b>17.1</b>	<b>13.7</b>	<b>11.1</b>	<b>8.2</b>	<b>7.7</b>	<b>6.8</b>		<b>2.7</b>	<b>3.6</b>			
<b>PPG debt service-to-revenue ratio (in percent)</b>	<b>7.1</b>	<b>29.8</b>	<b>26.8</b>			<b>30.6</b>	<b>26.0</b>	<b>23.2</b>	<b>17.9</b>	<b>16.1</b>	<b>11.4</b>		<b>4.1</b>	<b>3.2</b>			
Total gross financing need (Billions of U.S. dollars)	0.8	1.1	0.9			0.6	0.7	0.6	0.5	0.7	0.6		0.8	1.1			
Non-interest current account deficit that stabilizes debt ratio	7.5	0.3	15.4			8.7	10.6	9.1	8.2	7.5	6.8		4.8	3.6			
<b>Key macroeconomic assumptions</b>																	
Real GDP growth (in percent)	5.7	6.9	1.8	4.8	4.1	-1.1	1.7	5.2	8.2	3.4	3.5	3.5	3.1	3.3	3.1		
GDP deflator in US dollar terms (change in percent)	-1.0	0.7	-23.2	1.1	13.0	-3.1	9.1	1.9	5.1	3.5	1.6	3.0	2.9	2.8	2.7		
Effective interest rate (percent) 5/	3.3	3.6	3.3	2.1	1.2	4.5	4.2	3.8	3.3	2.8	2.2	3.5	1.2	1.2	1.2		
Growth of exports of G&S (US dollar terms, in percent)	-8.6	1.4	-34.1	0.9	19.4	-17.4	20.7	18.7	30.3	3.0	4.2	9.9	0.9	3.1	1.2		
Growth of imports of G&S (US dollar terms, in percent)	-7.7	9.9	-23.7	7.8	17.9	-12.3	6.5	8.5	12.9	4.2	3.3	3.8	2.2	3.3	2.1		
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	37.4	36.9	36.7	36.8	36.9	36.9	37.0	37.3	37.7	37.4		
Government revenues (excluding grants, in percent of GDP)	18.5	16.5	9.5			12.8	13.1	13.3	14.5	14.6	17.8		15.0	17.1	16.2		
Aid flows (in Billions of US dollars) 7/	0.4	0.4	0.4			0.5	0.5	0.5	0.5	0.5	0.5		0.7	1.1			
<i>of which: Grants</i>	0.3	0.3	0.4			0.4	0.4	0.4	0.4	0.5	0.4		0.6	1.0			
<i>of which: Concessional loans</i>	0.1	0.1	0.1			0.0	0.1	0.1	0.1	0.1	0.1		0.1	0.1			
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			4.4	4.0	3.8	3.6	3.5	3.1		3.1	2.8	3.0		
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			87.8	84.2	83.2	83.0	82.9	79.1		83.5	90.3	85.3		
<b>Memorandum items:</b>																	
Nominal GDP (Billions of US dollars)	13.0	13.9	10.9			10.4	11.6	12.4	14.1	15.1	15.9		20.7	37.5			
Nominal dollar GDP growth	4.7	7.7	-21.8			-4.2	10.9	7.2	13.8	7.1	5.2	6.6	6.1	6.2	5.9		
PV of PPG external debt (in Billions of US dollars)	...	...	2.4			2.2	2.0	1.8	1.6	1.5	1.3		1.5	2.0			
(PVt-PVt-1)/GDPt-1 (in percent)	...	...	...			-2.1	-1.9	-1.6	-1.4	-1.2	-0.8	-1.5	0.4	0.0	0.2		
Gross workers' remittances (Billions of US dollars)	...	...	...			...	...	...	...	...	...		...	...			
PV of PPG external debt (in percent of GDP + remittances)	...	...	22.6			21.0	17.2	14.5	11.5	9.7	8.4		7.0	5.4			
PV of PPG external debt (in percent of exports + remittances)	...	...	85.0			91.8	68.9	52.5	36.3	31.9	27.9		31.4	35.5			
Debt service of PPG external debt (in percent of exports + remittance)	...	...	9.5			17.1	13.7	11.1	8.2	7.7	6.8		2.7	3.6			

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private sector external debt.

2/ Derived as  $[r - g - p(1+g)] / (1+g+p+gp)$  times previous period debt ratio, with  $r$  = nominal interest rate;  $g$  = real GDP growth rate, and  $p$  = 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. Projections also include contribution from price and exchange rate changes

4/ Assumes that PV 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 PV of new debt).

Table 2a. Chad: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2016-2036								
(In percent)								
	Projections							
	2016	2017	2018	2019	2020	2021	2026	2036
<b>PV of debt-to GDP ratio</b>								
<b>Baseline</b>	21	17	15	11	10	8	<b>7</b>	5
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2016-2036 1/	21	16	12	9	5	2	<b>-9</b>	-20
A2. New public sector loans on less favorable terms in 2016-2036 2/	21	17	15	12	11	10	<b>9</b>	9
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2017-2018	21	17	15	12	10	9	<b>7</b>	6
B2. Export value growth at historical average minus one standard deviation in 2017-2018 3/	21	22	29	25	23	21	<b>17</b>	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2017-2018	21	21	21	17	14	12	<b>10</b>	8
B4. Net non-debt creating flows at historical average minus one standard deviation in 2017-2018 4/	21	20	20	17	15	14	<b>11</b>	6
B5. Combination of B1-B4 using one-half standard deviation shocks	21	27	39	33	31	29	<b>23</b>	10
B6. One-time 30 percent nominal depreciation relative to the baseline in 2017 5/	21	24	20	16	13	12	<b>10</b>	7
<b>PV of debt-to-exports ratio</b>								
<b>Baseline</b>	92	69	52	36	32	28	<b>31</b>	35
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2016-2036 1/	92	65	44	28	18	8	<b>-40</b>	-130
A2. New public sector loans on less favorable terms in 2016-2036 2/	92	70	54	39	35	32	<b>41</b>	56
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2017-2018	92	69	53	36	32	28	<b>31</b>	36
B2. Export value growth at historical average minus one standard deviation in 2017-2018 3/	92	133	227	169	160	152	<b>165</b>	105
B3. US dollar GDP deflator at historical average minus one standard deviation in 2017-2018	92	69	53	36	32	28	<b>31</b>	36
B4. Net non-debt creating flows at historical average minus one standard deviation in 2017-2018 4/	92	80	73	53	49	45	<b>49</b>	41
B5. Combination of B1-B4 using one-half standard deviation shocks	92	124	193	145	138	131	<b>142</b>	87
B6. One-time 30 percent nominal depreciation relative to the baseline in 2017 5/	92	69	53	36	32	28	<b>31</b>	36
<b>PV of debt-to-revenue ratio</b>								
<b>Baseline</b>	164	131	109	79	67	47	<b>47</b>	31
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2016-2036 1/	164	124	92	62	37	13	<b>-60</b>	-116
A2. New public sector loans on less favorable terms in 2016-2036 2/	164	133	113	84	73	54	<b>61</b>	50
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2017-2018	164	132	115	84	70	50	<b>49</b>	33
B2. Export value growth at historical average minus one standard deviation in 2017-2018 3/	164	171	218	171	156	119	<b>114</b>	43
B3. US dollar GDP deflator at historical average minus one standard deviation in 2017-2018	164	162	157	114	96	68	<b>67</b>	45
B4. Net non-debt creating flows at historical average minus one standard deviation in 2017-2018 4/	164	153	152	115	102	76	<b>73</b>	36
B5. Combination of B1-B4 using one-half standard deviation shocks	164	204	293	230	210	162	<b>154</b>	56
B6. One-time 30 percent nominal depreciation relative to the baseline in 2017 5/	164	181	151	110	92	65	<b>65</b>	44

**Table 2a. Chad: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2016-2036 (continued)**  
(In percent)

<b>Debt service-to-exports ratio</b>								
<b>Baseline</b>	17	14	11	8	8	7	<b>3</b>	4
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2016-2036 1/	17	14	12	9	9	7	<b>1</b>	-8
A2. New public sector loans on less favorable terms in 2016-2036 2/	17	14	11	8	8	7	<b>3</b>	5
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2017-2018	17	14	11	8	8	7	<b>3</b>	4
B2. Export value growth at historical average minus one standard deviation in 2017-2018 3/	17	20	25	19	18	16	<b>16</b>	16
B3. US dollar GDP deflator at historical average minus one standard deviation in 2017-2018	17	14	11	8	8	7	<b>3</b>	4
B4. Net non-debt creating flows at historical average minus one standard deviation in 2017-2018 4/	17	14	11	9	8	7	<b>5</b>	5
B5. Combination of B1-B4 using one-half standard deviation shocks	17	18	20	16	15	13	<b>14</b>	14
B6. One-time 30 percent nominal depreciation relative to the baseline in 2017 5/	17	14	11	8	8	7	<b>3</b>	4
<b>Debt service-to-revenue ratio</b>								
<b>Baseline</b>	31	26	23	18	16	11	<b>4</b>	3
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2016-2036 1/	31	27	24	20	18	12	<b>1</b>	-7
A2. New public sector loans on less favorable terms in 2016-2036 2/	31	26	23	18	16	12	<b>5</b>	5
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2017-2018	31	26	24	19	17	12	<b>4</b>	3
B2. Export value growth at historical average minus one standard deviation in 2017-2018 3/	31	26	24	20	18	13	<b>11</b>	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2017-2018	31	32	33	26	23	16	<b>6</b>	5
B4. Net non-debt creating flows at historical average minus one standard deviation in 2017-2018 4/	31	26	24	19	17	12	<b>7</b>	5
B5. Combination of B1-B4 using one-half standard deviation shocks	31	30	30	25	23	16	<b>15</b>	9
B6. One-time 30 percent nominal depreciation relative to the baseline in 2017 5/	31	36	32	25	22	16	<b>6</b>	4
<i>Memorandum item:</i>								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	36	36	36	36	36	36	<b>36</b>	36
Sources: Country authorities; and staff estimates and projections.								
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 interest rate on new borrowing is by 2 percentage points higher than in the baseline. 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. Chad: Public Sector Debt Sustainability Framework, Baseline Scenario, 2016-2036

(In percent of GDP, unless otherwise indicated)

	Actual			Average <sup>5/</sup>	Standard Deviation <sup>5/</sup>	Estimate					Projections				
	2013	2014	2015			2016	2017	2018	2019	2020	2021	2016-21 Average	2026	2036	2022-36 Average
<b>Public sector debt 1/</b>	30.3	39.2	42.6			45.0	39.3	35.6	29.6	26.1	23.0	33.1	18.8	15.7	17.9
<i>of which: foreign-currency denominated</i>	21.2	29.2	25.1			23.9	20.2	17.6	14.5	12.8	11.7		10.2	7.7	
Change in public sector debt	1.6	8.9	3.4			2.4	-5.7	-3.7	-6.0	-3.5	-3.1		-0.2	-0.5	
Identified debt-creating flows	-0.3	-1.5	5.3			-2.4	-4.7	-3.5	-6.4	-3.8	-4.9		-0.9	-0.5	
Primary deficit 6/	1.3	2.6	2.8	0.6	4.0	-1.7	-2.5	-2.1	-2.9	-2.4	-3.8	-2.6	0.0	0.2	-0.3
Revenue and grants	20.8	18.5	12.9			16.9	16.6	16.7	17.7	17.6	20.4		17.7	19.7	
<i>of which: grants</i>	2.3	2.0	3.4			4.1	3.5	3.4	3.1	3.1	2.6		2.8	2.6	
Primary (noninterest) expenditure	22.1	21.1	15.7			15.2	14.1	14.5	14.8	15.2	16.7		17.8	19.9	
Automatic debt dynamics	-1.1	0.3	3.2			1.4	-1.7	-1.0	-3.1	-1.1	-0.8		-0.7	-0.6	
Contribution from interest rate/growth differential	0.9	-1.4	-2.5			3.0	-2.4	-1.1	-3.0	-0.9	-1.2		-0.7	-0.6	
<i>of which: contribution from average real interest rate</i>	2.5	0.6	-1.9			2.5	-1.7	0.8	-0.3	0.1	-0.3		-0.1	0.0	
<i>of which: contribution from real GDP growth</i>	-1.6	-2.0	-0.7			0.5	-0.7	-1.9	-2.7	-1.0	-0.9		-0.6	-0.5	
Contribution from real exchange rate depreciation	-2.0	1.7	5.7			-1.5	0.7	0.1	-0.1	-0.2	0.3		...	...	
Other identified debt-creating flows	-0.5	-4.4	-0.7			-2.1	-0.5	-0.4	-0.3	-0.3	-0.3		-0.2	-0.1	
Privatization receipts (negative)	0.0	-4.0	-0.4			-1.6	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)	-0.5	-0.4	-0.3			-0.5	-0.5	-0.4	-0.3	-0.3	-0.3		-0.2	-0.1	
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	1.9	10.4	-1.9			4.8	-1.0	-0.1	0.4	0.3	1.8		0.7	0.0	
<b>Other Sustainability Indicators</b>															
<b>PV of public sector debt</b>	...	...	40.2			42.1	36.3	32.5	26.6	23.0	19.8		15.6	13.4	
<i>of which: foreign-currency denominated</i>	...	...	22.6			21.0	17.2	14.5	11.5	9.7	8.4		7.0	5.4	
<i>of which: external</i>	...	...	22.6			21.0	17.2	14.5	11.5	9.7	8.4		7.0	5.4	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	3.8	8.4	8.5			5.5	4.1	4.3	3.2	4.5	2.7		4.5	4.4	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	310.5			249.1	218.3	195.2	150.6	130.5	96.8		87.9	67.7	
PV of public sector debt-to-revenue ratio (in percent)	...	...	423.2			328.0	276.9	244.5	183.1	158.1	110.8		104.2	78.2	
<i>of which: external 3/</i>	...	...	238.4			164.0	131.1	109.1	79.1	66.7	47.3		46.7	31.5	
Debt service-to-revenue and grants ratio (in percent) 4/	12.3	31.7	40.7			35.0	30.6	27.9	24.4	29.2	22.5		14.6	11.8	
Debt service-to-revenue ratio (in percent) 4/	13.8	35.5	55.5			46.1	38.8	34.9	29.6	35.4	25.8		17.3	13.6	
Primary deficit that stabilizes the debt-to-GDP ratio	-0.3	-6.3	-0.6			-4.1	3.2	1.5	3.1	1.1	-0.6		0.2	0.7	
<b>Key macroeconomic and fiscal assumptions</b>															
Real GDP growth (in percent)	5.7	6.9	1.8	4.8	4.1	-1.1	1.7	5.2	8.2	3.4	3.5	3.5	3.1	3.3	3.1
Average nominal interest rate on forex debt (in percent)	3.3	3.6	3.3	2.1	1.2	4.5	4.2	3.8	3.3	2.8	2.2	3.5	1.2	1.2	1.2
Average real interest rate on domestic debt (in percent)	3.8	-0.1	-0.7	2.6	3.8	2.0	-3.0	1.9	-1.3	-0.3	-0.1	-0.1	0.7	1.2	0.9
Real exchange rate depreciation (in percent, + indicates depreciation)	-9.4	8.4	21.2	3.3	14.8	-5.6	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	-1.9	3.2	3.0	1.2	3.7	0.2	5.3	0.3	3.8	2.9	2.9	2.6	2.9	3.0	2.9
Growth of real primary spending (deflated by GDP deflator, in percent)	-0.8	-0.4	-32.3	-3.2	10.2	-7.6	-2.4	9.7	10.7	6.2	13.8	5.1	4.3	2.6	4.1
Grant element of new external borrowing (in percent)	...	...	...	...	...	37.4	36.9	36.7	36.8	36.9	36.9	37.0	37.3	37.7	...

Sources: Country authorities; and staff estimates and projections.

1/ The coverage of public sector debt comprises the obligations of the central government, including commercial debt. The definition of debt corresponds to gross debt.

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 excluding 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.

6/ The primary deficit in the DSA grosses up oil revenue and debt service on the oil sales advances (in contrast to the fiscal tables in the Staff Report)



Table 4. Chad: Sensitivity Analysis for Key Indicators of Public Debt 2016-2036

	Projections							
	2016	2017	2018	2019	2020	2021	2026	2036
<b>PV of Debt-to-GDP Ratio</b>								
<b>Baseline</b>	42	36	33	27	23	20	16	13
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	42	37	35	32	30	29	27	21
A2. Primary balance is unchanged from 2016	42	37	33	28	25	23	17	4
A3. Permanently lower GDP growth 1/	42	37	34	28	26	24	26	39
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2017-2018	42	37	35	30	27	25	25	27
B2. Primary balance is at historical average minus one standard deviations in 2017-2018	42	41	41	35	31	28	25	22
B3. Combination of B1-B2 using one half standard deviation shocks	42	39	39	33	30	27	25	23
B4. One-time 30 percent real depreciation in 2017	42	45	40	34	30	27	23	20
B5. 10 percent of GDP increase in other debt-creating flows in 2017	42	43	39	33	30	27	24	21
<b>PV of Debt-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	249	218	195	151	130	97	88	68
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	249	222	209	180	168	141	157	108
A2. Primary balance is unchanged from 2016	249	219	196	156	138	110	97	19
A3. Permanently lower GDP growth 1/	249	219	199	158	143	114	141	194
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2017-2018	249	219	207	165	149	118	137	137
B2. Primary balance is at historical average minus one standard deviations in 2017-2018	249	242	243	194	176	138	143	112
B3. Combination of B1-B2 using one half standard deviation shocks	249	233	231	184	166	131	139	116
B4. One-time 30 percent real depreciation in 2017	249	268	241	189	168	129	129	103
B5. 10 percent of GDP increase in other debt-creating flows in 2017	249	254	232	184	166	130	134	107
<b>Debt Service-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	35	31	28	24	29	23	15	12
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	35	31	29	26	31	24	16	14
A2. Primary balance is unchanged from 2016	35	31	29	26	31	24	16	11
A3. Permanently lower GDP growth 1/	35	32	29	26	32	25	17	19
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2017-2018	35	32	30	27	32	25	17	17
B2. Primary balance is at historical average minus one standard deviations in 2017-2018	35	31	29	27	32	24	19	16
B3. Combination of B1-B2 using one half standard deviation shocks	35	31	30	27	32	25	18	16
B4. One-time 30 percent real depreciation in 2017	35	36	37	32	37	28	18	16
B5. 10 percent of GDP increase in other debt-creating flows in 2017	35	31	30	27	31	24	18	15

Sources: Country authorities; and staff estimates and projections.

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

2/ Revenues are defined inclusive of grants.