INTERNATIONAL MONETARY FUND
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GHANA

Joint IMF and World Bank Debt Sustainability Analysis[1]

Prepared by the staffs of the International Monetary Fund and
the International Development Association

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The external debt sustainability analysis (DSA) indicates that Ghana's external debt dynamics is subject to moderate risk of debt distress, and when taken together with domestic debt developments, the overall assessment suggests that Ghana's debt distress has increased compared to the 2007 DSA.[2] This results from the recent rapid accumulation of external and domestic public debt contracted on commercial terms, and high current account and fiscal deficits that expose the country to structural vulnerabilities in the event of a reversal of favorable terms of trade.

Two alternative scenarios are also examined in the Joint DSA. The first alternative scenario combines lower GDP growth but the same level of external borrowing projected under the baseline scenario. This scenario indicates that the risk of debt distress could become high if higher economic growth does not materialize. The second alternative scenario simulates the impact of recent oil discoveries on exports and economic growth. This second alternative scenario indicates that, if oil-related fiscal revenues are used efficiently, the risk of debt distress could become low.

A. Background

1. The debt relief provided by the IMF, the World Bank and the AfDF under the Multilateral Debt Relief Initiative (MDRI) helped reduce Ghana's total public debt to

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[1] Prepared by IMF and World Bank staffs in collaboration with the Ghanaian Authorities.

[2] *Staff Guidance Note on the Application of the Joint Fund-Bank Debt Sustainability Framework for Low-Income Countries*.

about 42 percent of GDP in 2006 from 78 percent of GDP in 2005 (Table 1).
[6] Public external debt declined to US$2,177 million at end-2006 (17 percent of GDP) from US$6348 million in 2005 (59 percent of GDP). However, domestic debt increased to US$3,133 million (25 percent of GDP) in 2006 from US$1,997 million in 2005 (19 percent of GDP) on account of financing the rising fiscal deficit by issuing bonds with longer maturities in the domestic market.

Table 1. Ghana: Total Government Debt

	2003	2004	2005	2006	2007
			(In millions of US dollars)		
1. EXTERNAL DEBT	**7,549**	**6,448**	**6,348**	**2,177**	**3,587**
Multilateral Institutions	5,058	5,287	5,565	1,327	1,710
International Development Association (IDA)	3,965	4,012	4,336	803	1,137
International Monetary Fund (IMF)	453	447	424	158	167
African Development Bank Group (AfDB)	501	551	555	141	153
Other	139	277	251	225	254
Official bilateral	2,223	922	602	732	956
Commercial 1/	268	239	180	118	920
2. DOMESTIC DEBT	**1,540**	**1,868**	**1,997**	**3,133**	**3,969**
Banking System	899	1,402	1,755	2,431	2,748
Non-Bank sector	641	466	242	637	785
Non-residents	-	-	-	66	437
3. TOTAL GOVERNMENT DEBT (1 + 2)	**9,089**	**8,315**	**8,345**	**5,311**	**7,556**
			(in percent of GDP)		
Memorandum items					
Government Debt	**119.1**	**93.7**	**77.8**	**41.7**	**49.8**
External debt	99.0	72.6	59.2	17.1	23.7
Domestic debt	20.2	21.0	18.6	24.6	26.2

Source: Ministry of Finance and Bank of Ghana.

1/ Includes a bond placement in September 2007.

[6] *Initiative for Heavily Indebted Poor Countries (HIPC) and Multilateral Debt Relief Initiative–Status of Implementation.*

2. **Ghana's public and publicly guaranteed debt increased to about 50 percent of GDP at end-2007** to finance higher public investment, specifically the expansion of the country's electricity generation capacity and the development of the road network. Most of this new debt has been contracted on commercial terms (59 percent) in the international capital market, export credit agencies, and local-currency denominated government bonds. In particular, in September 2007, the authorities placed US$750 million in Eurobonds with a coupon of 8.5 percent at 10-year maturity, which was sold at a spread of 387 basis points over U.S. Treasuries for the equivalent period. The remaining part of the new external public debt has been contracted on concessional terms with multilateral institutions and bilateral official creditors (Table 1).

B. Macroeconomic and Financing Assumptions

3. **The macroeconomic framework takes into consideration the impact of the planned fiscal adjustment on growth in 2008-2009, while it is assumed that the economy will return to sustained growth over the medium term.** The Joint DSA assumes continued macroeconomic stability over the medium term, the fiscal deficit decreases to 7 percent of GDP while access to external financing amounts to an average of 6 percent of GDP. Inflation projections take into consideration increasing oil and food prices in the international market in the short term, and the implementation of tight monetary policy under the central bank's inflation targeting framework (Box 1).

4. **Borrowing assumptions reflect the need to maintain a sizeable public investment program over the medium term**. Based on discussions with the authorities, gross concessional flows are assumed to remain at between 6 and 7 percent of GDP through 2013, while nonconcessional borrowing is expected to gradually increase to 3 percent of GDP over the same period on account of the implementation of the government's public investment program (Table 2). Interest rates reflect current IDA-blend terms for concessional borrowing and market conditions for commercial loans with borrowing rates at about 9 percent.

Box 1: Ghana: Baseline Scenario Macroeconomic Assumptions

Growth. Real GDP growth decelerates to 5.8 percent in 2009-10 due to fiscal adjustment and the impact of higher utility prices on the output of the manufacturing sector. Thereafter, the real GDP grows at an average of 6 percent over the period 2011-2028, driven by steady agricultural performance, stronger activity in the construction sector related to public capital expenditure, and investments in the mining sector.

Inflation. The inflation rate is projected to increase to 13.5 percent in 2008 on account of high oil and food prices and domestic demand pressures. Inflation is expected to decrease gradually to an average of about 9 percent in 2009-10. Over the medium term, and as result of tight monetary policy, inflation is projected to decrease to the long-term central bank target of 5 percent.

The fiscal deficit is assumed to decrease to an average of about 7 percent of GDP over the long-term. The partial elimination of subsidies in the electricity sector would help reduce the fiscal deficit to 7 percent of GDP in the long-term from 10.3 percent of GDP in 2008, while **tax revenue performance** would remain at about 25 percent of GDP due to the continuation of strong tax administration policies over the medium term.

External current account. The current account deficit will gradually decrease from 13.2 percent of GDP to about 9 percent of GDP over the medium term, as oil imports moderate and exports receipts increased due to a sustained growth effort in the cocoa and mining sectors. **The reserve coverage in months of imports** of goods and services (G&S) would gradually increase to 5 months in the long-term from its current level of 2 months of imports.

Exports of goods and services. Exports are projected to grow at an annual rate of 8 percent in the period 2008-15, and thereafter at 6 percent on average until 2028. Projections assume that mineral products and cocoa would continue to be the main Ghanaian exports over the long-term.

Remittances are assumed to reach a peak of about 13 percent of GDP in 2013 and remain at that level over the long term. **Foreign direct investment** is envisaged to average 7 percent of GDP over the projection period reflecting capital flows needed to maintain the production level and competitiveness of the mining sector in the long-term.

Official external grants are assumed to remain constant at about 3 percent of GDP over the long-term, while **concessional loan financing** is projected to decrease to about 1 percent of GDP over the long-term. In addition, it is assumed that **the sovereign bond** issued in September 2007 would be fully repaid in 2017, as originally scheduled.

Table 2. Ghana: Capital Flows (gross), 2008–2013
(In million of US dollars)

	Committed			Projected		
	2008	2009	2010	2011	2012	2013
I. Grants	596	704	787	872	939	1,024
In percent of GDP	3.4	3.7	3.9	3.9	3.9	3.8
II. Concessional borrowing	696	579	638	614	560	560
In percent of GDP	4.0	3.1	3.1	2.8	2.3	2.1
III. Commercial borrowing	125	205	272	320	570	820
In percent of GDP	0.7	1.1	1.3	1.4	2.3	3.1
Total External Financing (I + II + III)	1,417	1,488	1,696	1,806	2,070	2,404
In percent of GDP	8.1	7.9	8.3	8.2	8.5	9.0

Source: Ministry of Finance.

C. Baseline Scenario

The external baseline DSA scenario shows that Ghana is at moderate risk of debt distress. The external and fiscal DSA assume decreasing fiscal deficit due to measures to reduce partially energy subsidies, the continuation of strong tax revenue performance, and macroeconomic stability. These efforts would in turn support the expansion of the private sector and sustain GDP growth over the medium-term.

External debt sustainability

5. **External debt burden indicators are below the thresholds in the baseline scenario, but all indicators steadily increase over the long term.**[7] Ghana's external debt burden indicators remain below the established CPIA-dependent thresholds during the projection period, while these debt indicators increased over the long-term due to moderate GDP and export growth performance. All in all, external debt would increase from about 24 percent of GDP in 2007 to about 40 percent of GDP in 2028 reflecting increasing commercial financing.

[7] The World Bank Country Policy and Institutional Assessment (CPIA) classifies Ghana as a strong performer. The debt burden thresholds for strong policy performers are 200, 50, and 300 for the NPV of debt in percent of exports, GDP, and revenue, respectively. Under the same strong policy classification, thresholds for debt service are 25 and 35 percent of exports and revenue, respectively.

6. **Ghana's risk of debt distress is moderate, as stress tests show that debt burden indicators breach the thresholds in four out of five bound standard stress tests.**[8] The stress tests indicate that some relevant shocks that breach the thresholds include a one-time 30 percent depreciation and contracting government debt in less favorable terms. In addition, a stress test that reduces non-debt creating flows, including current transfers and FDI, to their historical average level minus one standard deviation increases the NPV of debt-to-GDP ratio close to or above the thresholds for the period 2012-2020.[9] The same type of shock would increase the debt service-to-exports ratio above its indicative threshold of 25 percent. The deterioration of these indicators under a non-debt creating shock illustrates the relevance of FDI and remittances to maintaining long term external stability, and the urgency of implementing structural reforms that could help sustain higher economic growth than the one projected in this DSA.

Public debt sustainability

7. **The baseline scenario shows that Ghana's total public debt increases from about 50 percent of GDP in 2007 to 81 percent of GDP in 2028.** This increase in public debt is well above the authorities' reference level of 60 percent of GDP, as indicated in the 2008 Budget Act. The NPV of debt-to-revenue and grants ratio would increase from about 166 percent in 2008 to 281 percent in 2028, as a result of a protracted fiscal adjustment due to high government expenditure in 2008-2014 in spite of strong tax revenue performance.

8. **Sensitivity analysis suggests that maintaining the current fiscal stance would result in a sharp increase across all debt indicators and high fiscal vulnerability**. If the primary balance remains at its projected 2008 level (7.4 percent of GDP), the NPV of debt-to-GDP ratio would triple in a twenty-year period (rising from 46 percent in 2008 to 134 percent in 2028), while the NPV of debt-to-revenue ratio would increase to 464 percent from 166 percent over the same period. In addition, the debt service-to-revenue ratio would increase up to 69 percent in 2028 from 26 percent in 2008, if the primary deficit is maintained at its 2008 level. Overall, stress tests indicate that fiscal adjustment and a prudent debt management and debt policy strategy need to be implemented to preserve debt sustainability in the long-term.

[8] The *Staff Guidance Note on the Application of the Joint Fund-Bank Debt Sustainability Framework for Low-Income Countries* defines a "moderate risk of debt distress" when: "alternative scenarios or stress tests result in a significant rise in debt-service indicators over the projection period, the nearing or breaching of debt or debt-service thresholds, even though the baseline scenario does not indicate a breach of the relevant thresholds."

[9] The time series on FDI shows a structural permanent increase starting in 2003. As a result of this analysis, the stress test on lower non-debt creating flows was estimated by using an FDI historical average based on 5-year period (2003-2007), rather than the standard 10-year period.

D. Alternative Scenarios

Two alternative scenarios are briefly described in this section. The first scenario illustrates the impact of lower real GDP growth rate if, for instance, the planned increase in public investment are not adequately selected or implemented. The second scenario shows the impact of oil exports on growth and debt sustainability. This second scenario is based on preliminary estimates of crude oil exports with a 90 percent confidence and their likely impact on fiscal revenue.

Alternative scenario: Low-GDP-Growth with Baseline Borrowing

9. **If the actual GDP growth rate is lower than in the baseline scenario, the risk of debt distress would be high**. This alternative scenario illustrates what could happen if borrowing is contracted as projected in the baseline scenario, but GDP growth remains at a low level because low-return projects were selected. Under these circumstances, external debt increases to about 57 percent of GDP in 2028 (compare to 40 percent of GDP in the baseline). This result underscores the importance of having a debt management strategy that is complemented by an institutional framework that elicits the selection of high return public projects with significant impact on productivity and economic growth.

10. **Under this low growth-baseline borrowing scenario, external debt burden indicators breach the indicative policy thresholds under stress tests.** A stress test in which government borrowing is contracted under less favorable financial terms would increase the NPV of external debt-to-GDP ratio to 90 percent in 2028 from 20 percent in 2008 breaching the 50 percent threshold for strong performers. Under the same type of stress test, the NPV of debt-to-exports ratio increases to about 222 percent in 2028 from 45 percent in 2008. Overall, the external DSA in the low-GDP-growth scenario shows a more vulnerable economy to changes in the financing terms for the government.

11. **Sensitivity analysis under the low-GDP-growth scenario indicates that total public debt is significantly vulnerable to a fiscal shock**. If the primary balance remains at its projected 2008 level, the NPV of debt-to-GDP ratio would increase to 131 percent in 2028 from 33 percent in 2008, while the NPV of debt-to-revenue and grants ratio would increase to 447 percent from about 116 percent under the same type of shock. In addition, the debt service-to-revenue ratio would increase up to 107 percent in 2028 from 26 percent in 2008. Overall, stress tests in the low-growth scenario show that fiscal efforts and sound debt management are required to avoid a fast accumulation of total government debt.

OIL SCENARIO[10]

12. **The recent oil discoveries in Ghana would create a new exporting sector that has the potential of guaranteeing much needed additional fiscal resources to achieve MDGs and to finance higher growth**. Preliminary estimates of the oil discoveries indicate that oil reserves could be at about 500 million of barrels, and when they are commercially exploited could generate additional fiscal revenues (including taxes, royalties, and direct participation on production) of about 3 to 4 percent of GDP on average for the next 20- to 30-year period. Thus, oil exports might help finance growth, achieve export diversification, and reach MDGs, if resources are used efficiently.[11]

13. **The oil scenario shows that debt burden indicators improve considerably over the long term.** The main result of the oil export scenario is that the NPV of external-debt-to-GDP ratio converges to about 9 percent of GDP in 2028 and NPV of external-debt-to-export ratio decreases to 34 percent. Oil production would definitely improve the macroeconomic situation in Ghana, as the NPV of total government debt would decrease to about 70 percent of GDP in 2028 (Table 3). All in all, Ghana's risk of debt distress could be classified as low in the oil scenario, as all stress test indicators remain below the indicative debt burden thresholds.

[10] At present, oil reserves have not yet been declared commercially viable. The IMF and the World Bank are working with a prudent size of oil reserve projection, which, according to oil experts, has a 90 percent confidence of being declared commercially viable. Also, the projections assume that oil revenues are used entirely to retire public debt rather than to finance additional public spending. Other aspects about the oil sector can be found on the annex to this supplement.

[11] Appendix I describes the methodology used to incorporate the oil sector into the macroeconomic framework, oil production assumptions, and its related fiscal impact on revenues and financing needs.

Table 3. Ghana: External Debt Sustainability Indicators under Alternative Scenarios

	Thresholds	2008	2018	2028
		Baseline Scenario		
NPV of Debt to GDP ratio	50	20	35	40
NPV of debt to exports ratio	200	45	109	150
Debt service to exports ratio	25	3	11	23
		Low-GDP-growth Scenario		
NPV of Debt to GDP ratio		20	38	56
NPV of debt to exports ratio		45	122	185
Debt service to exports ratio		3	12	29
		Oil-exporting Scenario		
NPV of Debt to GDP ratio		20	22	9
NPV of debt to exports ratio		45	69	34
Debt service to exports ratio		3	9	7

Source: DSA estimates.

F. Conclusions

14. ***The external DSA indicates that Ghana's external debt dynamics is subject to moderate risk of debt distress, and when taken together with domestic debt developments, the overall assessment suggests that Ghana's debt distress has increased compared to the 2007 DSA.***[12] This results from the recent rapid accumulation of external and domestic public debt contracted on commercial terms, and high current account and fiscal deficits that exposed the country to structural vulnerabilities in the event of a reversal of favorable terms of trade. The alternative scenario of low growth-baseline borrowing also indicates that debt sustainability could deteriorate significantly, if higher economic growth does not materialize. Under an alternative oil scenario and assuming efficient use of additional oil-related fiscal revenues, the risk of debt distress could become low.

[12] *Staff Guidance Note on the Application of the Joint Fund-Bank Debt Sustainability Framework for Low-Income Countries*.

15. **Stress tests applied to total public debt underscore the need of maintaining a sound fiscal policy and the urgency of implementing structural reforms aimed at achieving higher growth and diversification of exports**. While diversifying exports and implementing structural reforms would contribute toward reducing Ghana's external vulnerabilities, these should be complemented by the implementation of prudent debt management and debt strategy policies as well as developing a sound institutional framework for selecting high-return public investment projects. Implementing these policies is critical to help preserve debt sustainability.

Table 1. Ghana: External Debt Sustainability Framework, Baseline Scenario, 2007-2028 1/
(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average 6/	Standard Deviation 6/	Projections									
	2005	2006	2007			2008	2009	2010	2011	2012	2013	2008-13 Average	2018	2028	2018-28 Average
External debt (nominal) 1/	**59.2**	**17.1**	**23.7**			**24.8**	**26.7**	**28.9**	**30.4**	**31.7**	**33.2**		**38.6**	**39.6**	
o/w public and publicly guaranteed (PPG)	59.2	17.1	23.7			24.8	26.7	28.9	30.4	31.7	33.2		38.6	39.6	
Change in external debt	-13.5	-42.1	6.5			1.1	1.9	2.2	1.5	1.3	1.5		1.2	0.1	
Identified net debt-creating flows	-10.7	-8.3	1.1			5.3	3.7	2.1	0.9	0.0	-0.4		-0.5	-0.7	
Non-interest current account deficit	**4.8**	**5.9**	**9.7**	6.8	4.9	**12.3**	**11.9**	**10.4**	**9.0**	**8.4**	**7.9**	10.0	**7.2**	**5.9**	6.8
Deficit in balance of goods and services	25.7	24.7	26.5			28.2	27.6	25.2	23.3	22.7	22.3		22.4	22.1	
Exports	36.1	40.2	39.8			43.7	43.5	43.0	42.0	40.2	38.2		32.0	26.4	
Imports	61.7	65.0	66.3			71.8	71.1	68.2	65.4	62.9	60.5		54.4	48.6	
Net current transfers (negative = inflow)	-19.8	-16.7	-16.3	-17.6	3.9	-15.7	-16.9	-16.9	-16.9	-16.9	-16.8	-16.7	-16.6	-16.1	-16.5
o/w official	-5.4	-3.8	-4.2			-3.4	-3.7	-3.9	-3.9	-3.9	-3.8		-3.6	-3.1	
Other current account flows (negative = net inflow)	-1.0	-2.2	-0.4			-0.1	1.2	2.1	2.6	2.6	2.4		1.3	-0.1	
Net FDI (negative = inflow)	**-5.2**	**-8.0**	**-7.0**	-6.7	2.9	**-6.6**	**-7.6**	**-7.7**	**-7.4**	**-7.4**	**-7.4**	-7.3	**-7.3**	**-7.2**	-7.3
Endogenous debt dynamics 2/	**-10.3**	**-6.1**	**-1.6**			**-0.4**	**-0.6**	**-0.6**	**-0.7**	**-1.0**	**-0.9**		**-0.3**	**0.5**	
Contribution from nominal interest rate	2.3	3.2	1.2			0.9	0.7	0.8	0.9	0.9	1.0		1.7	2.5	
Contribution from real GDP growth	-3.5	-3.2	-0.9			-1.3	-1.3	-1.4	-1.6	-1.9	-2.0		-2.1	-1.9	
Contribution from price and exchange rate changes	-9.0	-6.1	-1.8			...	...	...	...	...	...		...	...	
Residual (3-4) 3/	**-2.8**	**-33.8**	**5.4**			**-4.2**	**-1.8**	**0.2**	**0.6**	**1.3**	**1.9**		**1.6**	**0.8**	
o/w exceptional financing	-3.3	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
NPV of external debt 4/	...	...	19.6			19.6	21.0	22.6	23.8	25.2	27.1		34.9	39.7	
In percent of exports	...	...	49.2			44.9	48.2	52.5	56.6	62.7	70.9		109.1	150.3	
NPV of PPG external debt	**...**	**...**	**19.6**			**19.6**	**21.0**	**22.6**	**23.8**	**25.2**	**27.1**		**34.9**	**38.3**	
In percent of exports	**...**	**...**	**49.2**			**44.9**	**48.2**	**52.5**	**56.6**	**62.7**	**70.9**	56.0	**109.1**	**150.3**	121.5
In percent of government revenues	**...**	**...**	**86.9**			**85.2**	**88.7**	**94.1**	**96.2**	**100.1**	**106.2**	95.1	**136.7**	**153.9**	142.0
Debt service-to-exports ratio (in percent)	**17.0**	**17.5**	**5.2**			**3.2**	**2.5**	**2.6**	**2.9**	**3.8**	**4.4**	3.2	**11.2**	**22.9**	15.6
PPG debt service-to-exports ratio (in percent)	**17.0**	**17.5**	**5.2**			**3.2**	**2.5**	**2.6**	**2.9**	**3.8**	**4.4**	3.2	**11.2**	**22.9**	15.6
PPG debt service-to-revenue ratio (in percent)	**25.7**	**32.1**	**9.1**			**6.0**	**4.6**	**4.6**	**5.0**	**6.0**	**6.7**	5.5	**14.0**	**23.5**	18.0
Total gross financing need (billions of U.S. dollars)	0.6	0.6	0.7			1.2	1.0	0.8	0.6	0.6	0.6		1.5	4.5	
Non-interest current account deficit that stabilizes debt ratio	18.2	47.9	3.2			11.2	10.0	8.2	7.5	7.1	6.4		6.0	5.9	
Key macroeconomic assumptions															
Real GDP growth (in percent)	5.9	6.4	6.3	5.1	0.9	6.5	5.8	5.8	6.0	6.8	6.8	6.3	6.0	5.3	5.7
GDP deflator in US dollar terms (change in percent)	14.1	11.5	12.1	4.4	15.9	8.1	2.2	1.9	2.6	3.0	3.3	3.5	2.7	2.7	2.8
Effective interest rate (percent) 5/	3.8	6.3	8.1	6.1	2.9	4.4	3.1	3.2	3.2	3.3	3.6	3.5	5.0	6.8	5.6
Growth of exports of G&S (US dollar terms, in percent)	11.0	32.3	17.9	10.9	10.9	26.3	7.7	6.6	6.2	5.2	4.7	9.5	6.0	6.4	6.1
Growth of imports of G&S (US dollar terms, in percent)	23.6	24.8	21.6	11.6	15.0	24.7	7.0	3.4	4.2	5.8	6.2	8.5	7.3	7.2	7.2
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	36.0	27.5	26.8	24.0	13.7	7.3	22.5	-6.1	-15.1	-8.5
Aid flows (in billions of US dollars) 7/	0.6	0.7	0.9			0.9	0.9	1.0	1.2	1.3	1.4		2.3	5.3	
o/w Grants	0.6	0.7	0.9			0.8	0.7	0.8	0.9	1.0	1.1		1.6	2.9	
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/	...	...	...			6.6	5.1	5.3	5.1	4.6	4.3	5.2	3.3	2.1	3.0
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			68.5	62.8	61.6	61.4	53.6	47.5	59.3	33.7	21.5	31.2
Memorandum items:															
Nominal GDP (billions of US dollars)	10.7	12.7	15.2			17.4	18.9	20.3	22.1	24.3	26.8		42.6	94.5	
(NPVt-NPVt-1)/GDPt-1 (in percent)						3.0	3.1	3.4	3.3	3.9	4.6	3.6	4.8	3.6	4.0

Source: Staff simulations.

1/ Includes both public and private sector external debt.
2/ Derived as [r - g - r(1+g)]/(1+g+r+gr) times previous period debt ratio, with r = nominal interest rate; g = real GDP growth rate, and r = 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. Ghana: Sensitivity Analyses for Key Indicators of Public and Publicly Guaranteed External Debt, 2007-28
(In percent)

	Projections											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	**2018**	2028
NPV of debt-to-GDP ratio												
Baseline	20	21	23	24	25	27	29	31	33	33	**35**	40
A. Alternative Scenarios												
A1. Key variables at their historical averages in 2008-27 1/	20	14	11	8	7	8	8	10	11	11	**12**	20
A2. New public sector loans on less favorable terms in 2008-27 2/	20	22	25	28	31	34	37	41	44	45	**48**	62
B. Bound Tests												
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	20	21	23	25	26	28	30	32	34	34	**36**	41
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	20	24	32	33	34	36	37	38	40	39	**40**	41
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	20	24	30	32	34	36	39	41	44	44	**46**	53
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	20	34	48	48	49	50	50	50	51	49	**49**	44
B5. Combination of B1-B4 using one-half standard deviation shocks	20	29	42	43	44	45	46	48	49	48	**49**	48
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	20	30	32	34	36	38	41	44	47	47	**49**	56
NPV of debt-to-exports ratio												
Baseline	45	48	53	57	63	71	80	89	98	101	**109**	150
A. Alternative Scenarios												
A1. Key variables at their historical averages in 2007-26 1/	45	32	25	20	19	20	23	28	33	33	**38**	76
A2. New public sector loans on less favorable terms in 2007-26 2/	45	51	59	66	77	89	102	116	129	137	**149**	235
B. Bound Tests												
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	45	48	53	57	63	71	80	89	98	101	**109**	150
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	45	60	86	90	98	107	117	126	135	137	**145**	179
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	45	48	53	57	63	71	80	89	98	101	**109**	150
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	45	77	111	115	121	130	137	143	149	149	**154**	166
B5. Combination of B1-B4 using one-half standard deviation shocks	45	64	87	91	98	106	115	122	130	132	**138**	164
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	45	48	53	57	63	71	80	89	98	101	**109**	150
NPV of debt-to-revenue ratio												
Baseline	85	89	94	96	100	106	114	122	130	130	**137**	154
A. Alternative Scenarios												
A1. Key variables at their historical averages in 2007-26 1/	85	59	44	34	30	30	33	38	44	43	**48**	77
A2. New public sector loans on less favorable terms in 2007-26 2/	85	94	106	113	122	134	146	159	172	177	**187**	241
B. Bound Tests												
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	85	90	97	99	103	110	118	126	134	134	**141**	159
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	85	103	134	134	136	140	146	151	156	154	**159**	160
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	85	102	125	128	133	141	152	162	172	173	**182**	205
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	85	143	199	196	194	195	197	197	198	193	**193**	170
B5. Combination of B1-B4 using one-half standard deviation shocks	85	124	173	172	173	177	182	187	191	188	**192**	186
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	85	126	133	136	142	150	161	173	184	184	**194**	218
(In percent)												
Debt service-to-exports ratio												
Baseline	3	2	3	3	4	4	5	7	8	15	**11**	23
A. Alternative Scenarios												
A1. Key variables at their historical averages in 2008-27 1/	3	2	2	1	2	2	2	2	3	9	**5**	13
A2. New public sector loans on less favorable terms in 2008-27 2/	3	2	3	3	4	4	5	6	8	14	**10**	31
B. Bound Tests												
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	3	2	3	3	4	4	5	7	8	15	**11**	23
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	3	3	3	5	6	7	8	10	12	20	**15**	27
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	3	2	3	3	4	4	5	7	8	15	**11**	23
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	3	2	4	6	7	8	10	13	15	21	**17**	25
B5. Combination of B1-B4 using one-half standard deviation shocks	3	3	3	5	6	6	8	10	12	19	**15**	25
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	3	2	3	3	4	4	5	7	8	15	**11**	23
Debt service-to-revenue ratio												
Baseline	6	5	5	5	6	7	8	9	11	19	**14**	23
A. Alternative Scenarios												
A1. Key variables at their historical averages in 2008-27 1/	6	5	3	2	3	3	3	3	4	11	**6**	13
A2. New public sector loans on less favorable terms in 2008-27 2/	6	5	5	5	6	6	7	8	10	18	**13**	32
B. Bound Tests												
B1. Real GDP growth at historical average minus one standard deviation in 2008-09	6	5	5	5	6	7	8	9	11	20	**14**	24
B2. Export value growth at historical average minus one standard deviation in 2008-09 3/	6	5	5	7	8	9	10	13	14	22	**17**	24
B3. US dollar GDP deflator at historical average minus one standard deviation in 2008-09	6	5	6	7	8	9	10	12	15	26	**19**	31
B4. Net non-debt creating flows at historical average minus one standard deviation in 2008-09 4/	6	5	7	10	11	12	15	18	19	27	**21**	26
B5. Combination of B1-B4 using one-half standard deviation shocks	6	5	7	9	10	11	13	16	18	27	**21**	28
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008 5/	6	6	7	7	9	9	11	13	16	27	**20**	33
Memorandum item:												
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	36	27	27	24	14	7	3	0	-3	-5	**-6**	-15

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. Ghana: Public Sector Debt Sustainability Framework, Baseline Scenario, 2005-2028
(In percent of GDP, unless otherwise indicated)

	Actual					Estimate	Projections								
	2005	2006	2007	Historical Average 5/	Standard Deviation 5/	2008	2009	2010	2011	2012	2013	2008-13 Average	2018	2028	2014-28 Average
Public sector debt 1/	77.1	41.9	49.8			51.4	56.2	60.1	63.1	65.5	67.1		73.9	81.0	
o/w foreign-currency denominated	59.2	17.1	23.7			24.8	26.7	28.9	30.4	31.7	33.2		38.6	39.6	
Change in public sector debt	...	-35.2	7.9			1.5	4.9	3.8	3.0	2.4	1.6		1.1	0.1	
Identified debt-creating flows	...	-5.5	0.5			0.9	4.3	3.3	2.5	2.0	1.3		0.9	0.1	
Primary deficit	-0.7	4.2	6.0	1.9	2.1	7.4	8.2	6.8	6.2	5.9	5.1	6.6	3.3	1.5	2.9
Revenue and grants	29.1	27.4	28.6			27.9	27.6	28.1	28.8	29.2	29.4		29.1	28.9	
of which : grants	5.2	5.4	6.0			4.9	3.9	4.1	4.1	4.0	3.9		3.6	3.1	
Primary (noninterest) expenditure	28.4	31.5	34.6			35.2	35.7	34.9	35.0	35.1	34.5		32.4	30.4	
Automatic debt dynamics	...	-8.9	-4.0			-5.1	-3.2	-3.2	-3.2	-3.5	-3.5		-2.4	-1.4	
Contribution from interest rate/growth differential	...	-4.8	-2.6			-3.8	-3.1	-3.2	-3.1	-3.2	-3.1		-2.1	-1.1	
of which : contribution from average real interest rate	...	-0.2	-0.2			-0.8	-0.3	-0.1	0.3	0.8	1.1		2.0	3.0	
of which : contribution from real GDP growth	...	-4.6	-2.5			-3.0	-2.8	-3.1	-3.4	-4.0	-4.2		-4.1	-4.1	
Contribution from real exchange rate depreciation	...	-4.1	-1.4			-1.3	-0.1	0.0	-0.2	-0.3	-0.4		...	...	
Other identified debt-creating flows	-1.5	-0.8	-1.5			-1.4	-0.7	-0.3	-0.4	-0.4	-0.3		0.0	0.0	
Privatization receipts (negative)	-0.2	0.0	-0.8			-0.9	-0.3	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)	-1.2	-0.8	-0.6			-0.4	-0.4	-0.3	-0.4	-0.4	-0.3		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	...	-29.7	7.4			0.7	0.6	0.5	0.5	0.4	0.4		0.2	0.0	
NPV of public sector debt	37.8	42.6	45.7			46.2	50.5	53.8	56.4	59.0	61.0		70.2	81.0	
o/w foreign-currency denominated	19.9	17.8	19.6			19.6	21.0	22.6	23.8	25.2	27.1		34.9	39.7	
o/w external	19.9	17.8	19.6			19.6	21.0	22.6	23.8	25.2	27.1		34.9	39.7	
NPV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	...	...	...			19.5	20.4	20.2	20.5	21.1	21.0		21.7	24.9	
NPV of public sector debt-to-revenue and grants ratio (in percent)	130.1	155.6	160.1			165.8	183.1	191.4	195.6	201.9	207.2		240.9	280.7	
NPV of public sector debt-to-revenue ratio (in percent)	158.8	194.2	203.0			200.8	213.7	223.8	228.0	233.9	239.2		275.3	314.3	
o/w external 3/	...	...	86.9			85.2	88.7	94.1	96.2	100.1	106.2		136.7	153.9	
Debt service-to-revenue and grants ratio (in percent) 4/	12.5	12.3	10.9			25.7	23.3	25.2	25.8	27.5	28.6		36.1	48.8	
Debt service-to-revenue ratio (in percent) 4/	15.3	15.4	13.8			31.1	27.2	29.4	30.1	31.9	33.0		41.3	54.6	
Primary deficit that stabilizes the debt-to-GDP ratio	...	39.3	-1.9			5.8	3.3	3.0	3.2	3.5	3.4		2.2	1.4	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	5.9	6.4	6.3	5.1	0.9	6.5	5.8	5.8	6.0	6.8	6.8	6.3	6.0	5.3	5.7
Average nominal interest rate on forex debt (in percent)	...	1.6	5.9	3.7	3.1	4.8	3.4	3.5	3.5	3.5	3.7	3.7	5.2	6.9	5.7
Average real interest rate on domestic currency debt (in percent)	...	4.1	-2.8	0.6	4.9	-5.8	-2.5	-1.8	-0.3	1.1	1.8	-1.3	2.7	2.8	2.6
Real exchange rate depreciation (in percent, + indicates depreciation)	-9.6	-7.5	-8.4	1.1	22.7	-5.7	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	15.0	12.8	14.4	20.1	7.7	16.2	10.4	9.4	8.0	6.5	5.9	9.4	5.0	5.0	5.2
Growth of real primary spending (deflated by GDP deflator, in percent)	2.3	18.3	16.6	10.1	13.6	8.5	7.3	3.3	6.3	7.0	5.0	6.2	4.6	4.6	4.8
Grant element of new external borrowing (in percent)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

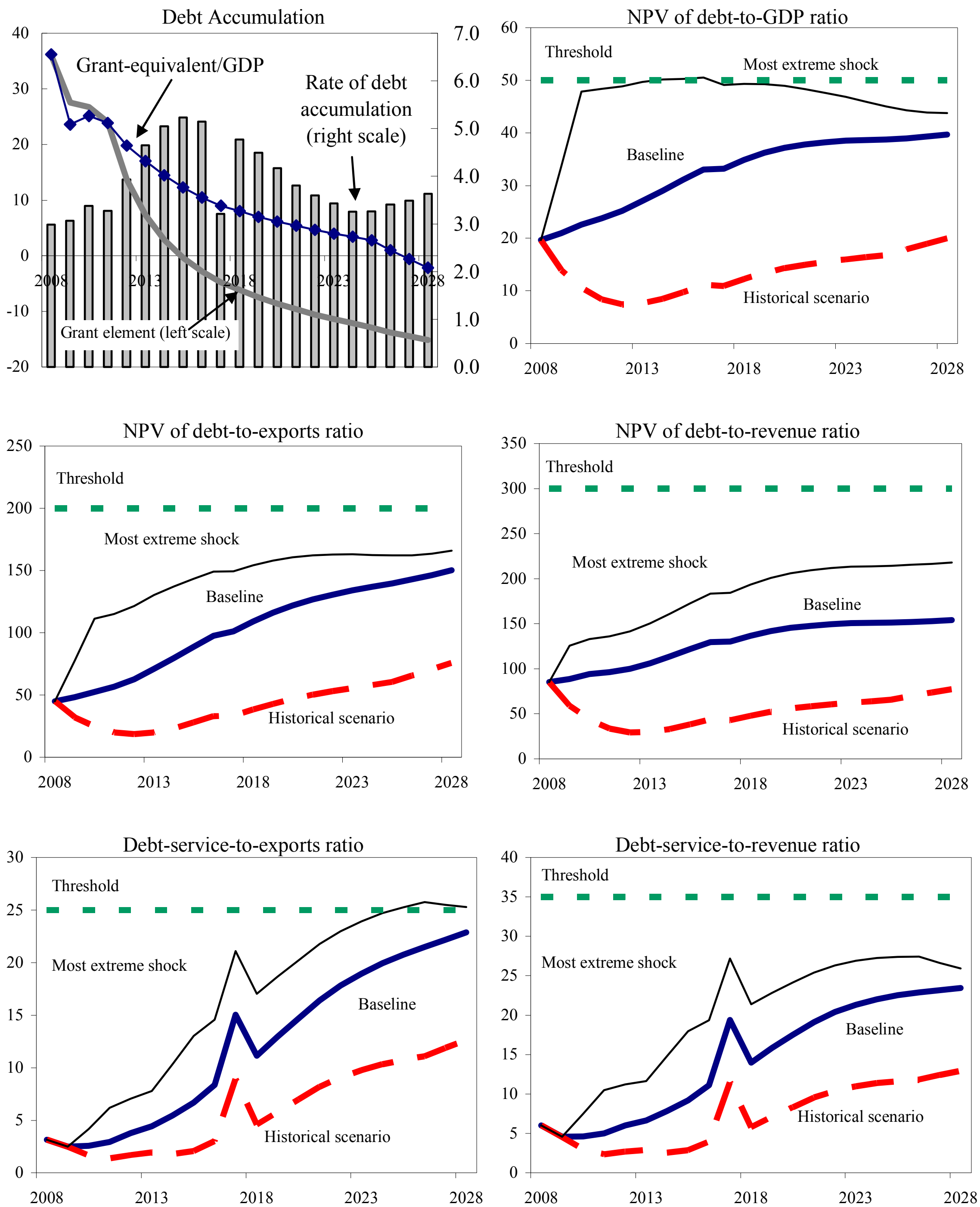
Sources: Country authorities; and Fund staff estimates and projections.
1/ [Indicate coverage of public sector, e.g., general government or nonfinancial public sector. Also whether net or gross debt is used.]
2/ Gross financing need is defined as the primary deficit plus debt service plus the stock of short-term debt at the end of the last period.
3/ Revenues 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.

Table 4. Country: Sensitivity Analysis for Key Indicators of Public Debt 2008-2028

		Projections						
	2008	2009	2010	2011	2012	2013	2018	2028
NPV of Debt-to-GDP Ratio								
Baseline	46	51	54	56	59	61	70	81
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	46	45	44	43	44	44	51	68
A2. Primary balance is unchanged from 2008	46	50	54	57	61	65	88	134
A3. Permanently lower GDP growth 1/	46	51	54	57	60	62	74	92
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009-2010	46	52	56	60	63	66	78	94
B2. Primary balance is at historical average minus one standard deviations in 2009-2010	46	47	47	50	53	56	66	78
B3. Combination of B1-B2 using one half standard deviation shocks	46	46	46	49	52	54	65	77
B4. One-time 30 percent real depreciation in 2009	46	59	62	64	66	68	79	98
B5. 10 percent of GDP increase in other debt-creating flows in 2009	46	60	63	65	67	69	76	85
NPV of Debt-to-Revenue Ratio 2/								
Baseline	166	183	191	196	202	207	241	281
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	166	163	157	150	149	149	172	232
A2. Primary balance is unchanged from 2008	166	180	191	199	210	222	301	464
A3. Permanently lower GDP growth 1/	166	184	193	197	205	211	253	318
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009-2010	166	187	200	207	215	223	267	324
B2. Primary balance is at historical average minus one standard deviations in 2009-2010	166	169	169	175	182	189	226	271
B3. Combination of B1-B2 using one half standard deviation shocks	166	167	165	170	178	184	222	266
B4. One-time 30 percent real depreciation in 2009	166	215	221	222	227	232	272	339
B5. 10 percent of GDP increase in other debt-creating flows in 2009	166	217	223	225	230	233	262	295
Debt Service-to-Revenue Ratio 2/								
Baseline	26	23	25	26	28	29	36	49
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	26	23	18	18	20	21	32	44
A2. Primary balance is unchanged from 2008	26	23	24	26	29	31	44	69
A3. Permanently lower GDP growth 1/	26	23	25	26	28	29	38	54
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009-2010	26	24	26	28	29	31	39	54
B2. Primary balance is at historical average minus one standard deviations in 2009-2010	26	23	20	21	25	27	35	47
B3. Combination of B1-B2 using one half standard deviation shocks	26	24	19	19	25	27	35	47
B4. One-time 30 percent real depreciation in 2009	26	24	27	28	30	31	41	57
B5. 10 percent of GDP increase in other debt-creating flows in 2009	26	23	37	30	30	30	37	51

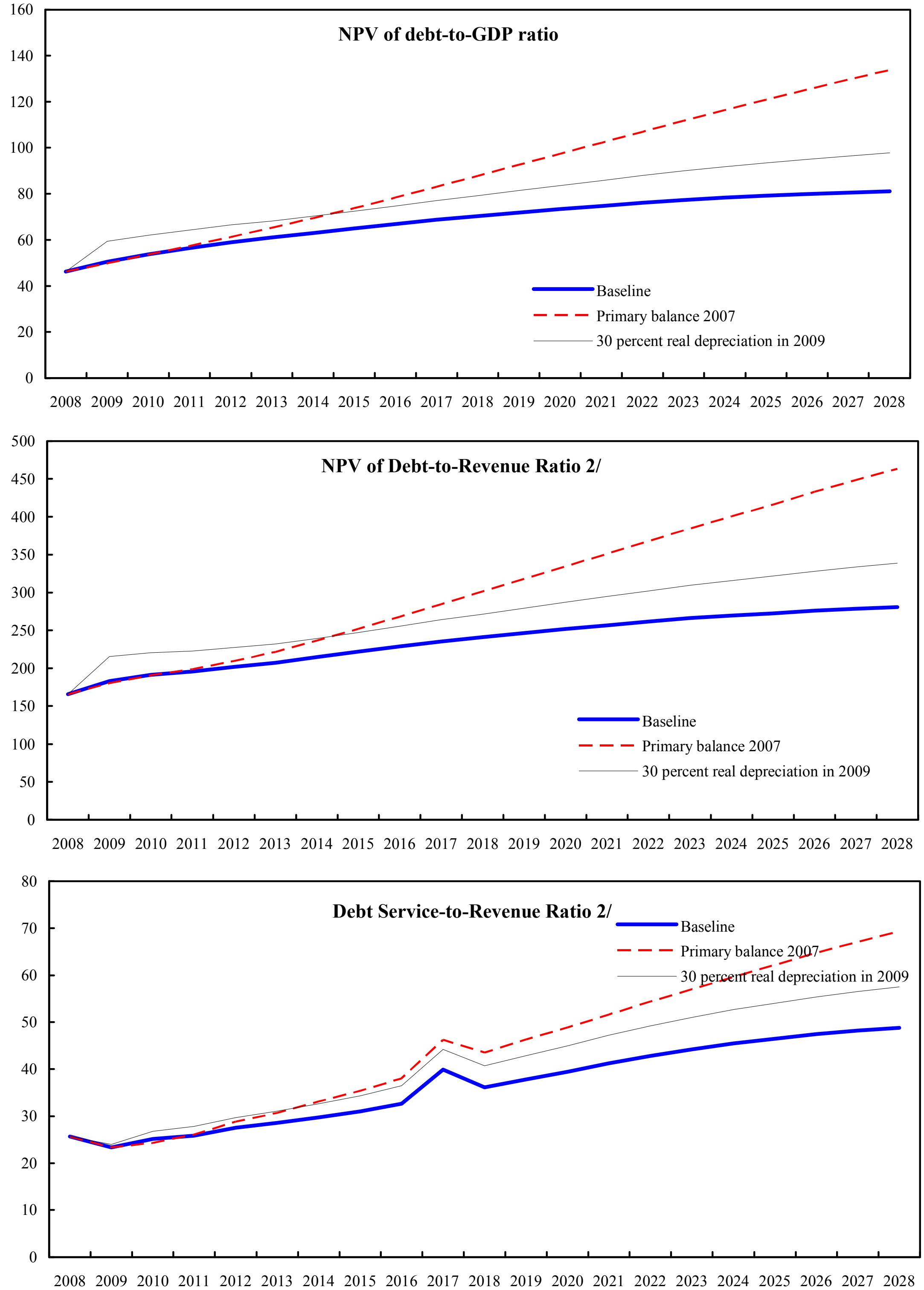
Sources: Country authorities; and Fund staff estimates and projections.
1/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of 20 (i.e., the length of the projection period).
2/ Revenues are defined inclusive of grants.

Figure 1. Ghana: Indicators of Public and Publicly Guaranteed External Debt
Baseline, 2008-2028



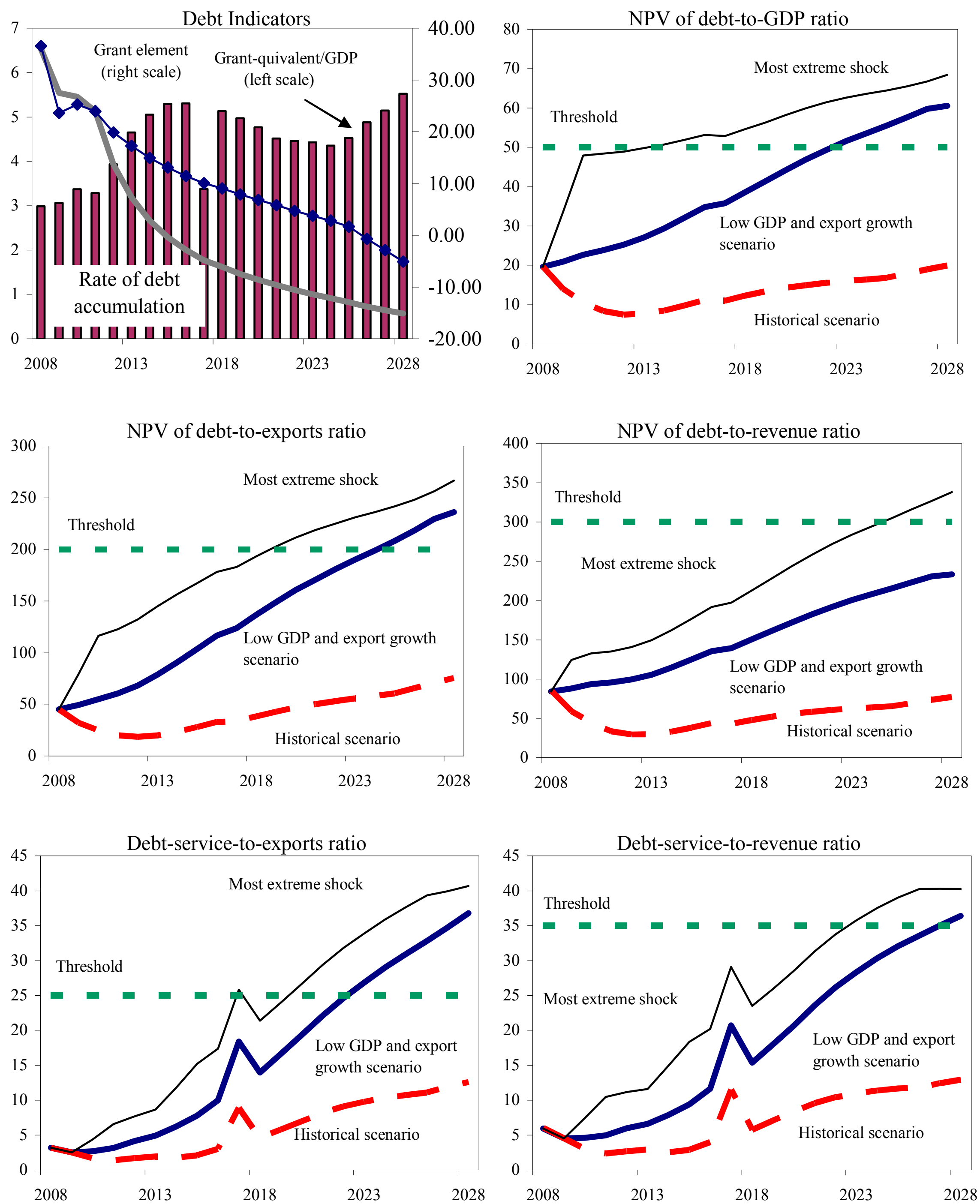
Source: Staff projections and simulations.

Figure 2.Ghana: Indicators of Public Debt Under Alternative Stress Tests, 2008-2028 1/



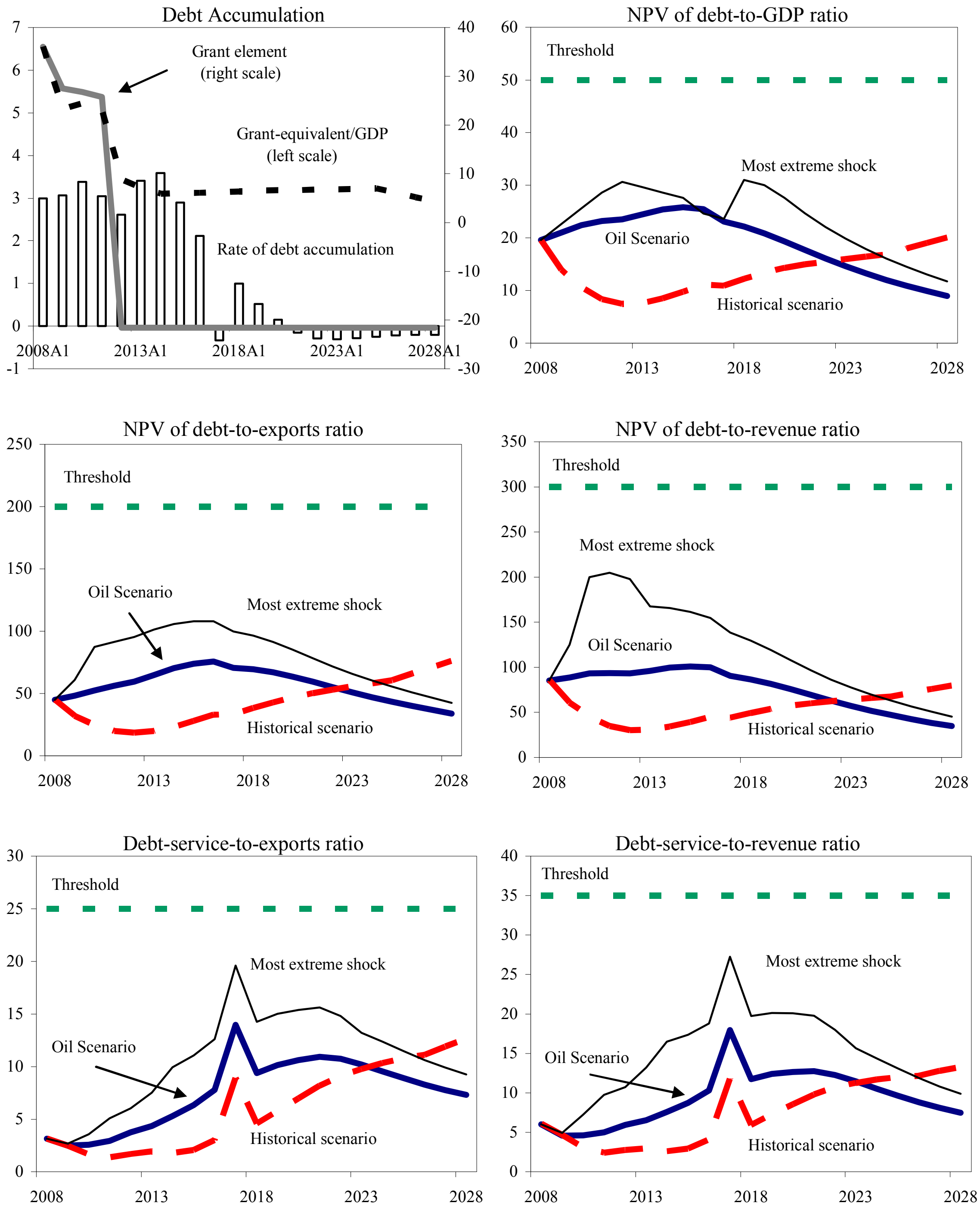
Source: Staff projections and simulations.
1/ Most extreme stress test is test that yields highest ratio in 2018.
2/ Revenue including grants.

Figure 3. Ghana: Indicators of Public and Publicly Guaranteed External Debt
Alternative Low GDP and Export Growth Scenario, 2008-2028



Source: Staff projections and simulations.

Figure 4. Ghana: Indicators of Public and Publicly Guaranteed External Debt
Oil Exporting Scenario, 2008-2028



Source: Staff projections and simulations.