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GHANA

Joint IMF and World Bank Debt Sustainability Analysis

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International Monetary Fund and the World Bank

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This debt sustainability analysis (DSA) updates the joint IMF/World Bank DSA of May 4, 2011, and reflects the most recent macroeconomic developments, including the authorities' plans to scale up infrastructure investment.[1] *The analysis shows Ghana's external debt burden indicators remaining below their respective indicative thresholds, provided the programmed fiscal consolidation is achieved. However, the risk of external debt distress remains moderate, unchanged from the May DSA. The main vulnerabilities related to a high debt service-to-revenue ratio and continuing risks to the fiscal outlook. Indeed, while overall public sector debt is projected to remain broadly unchanged in relation to GDP, a ratio of 40 percent does not provide strong buffers against shocks, suggesting a case for further gradual consolidation and additional revenue mobilization over the medium term.*

I. Assumptions Underlying the DSA

Baseline macroeconomic assumptions

1. **This DSA is consistent with the macroeconomic framework outlined in the IMF Staff Report for the Fifth Review under the Extended Credit Facility.** Compared to the previous DSA (see Text Table 1 and Box 1),[2] this update is based on:

- *A revised macroeconomic framework*. A combination of fiscal consolidation and disinflation has supported the favorable macroeconomic setting in 2011, and the outlook going forward remains positive. Inflation has stabilized at 8½ percent, and

[1] The DSA presented in this document is based on the standard low-income countries (LIC) DSA framework. See "Debt Sustainability in Low-Income Countries: Further Considerations on an Operational Framework, Policy Implications"http://www.imf.org/external/np/pdr/sustain/2004/091004.htm.
[2] See IMF Country Report No. 11/128 http://www.imf.org/external/pubs/cat/longres.aspx?sk=24912.0

the government is on track to reduce the fiscal deficit (after arrears clearance) by about 2¼ percentage points of (non-oil) GDP. The DSA assumes implementation of agreed policies in 2012 and unchanged policies thereafter, corresponding to a primary fiscal deficit of ½ percent of GDP from 2013 onward. Despite significant export growth, the external current account deficit for 2011 is projected to remain broadly unchanged at 8¼ percent of GDP, reflecting a strong rebound in imports, and to gradually improve in the long run.

- *A revised public investment profile*. The Ghanaian authorities are planning a significant scaling up of infrastructure investment and have negotiated a large financing package of US$3 billion on nonconcessional terms to finance critical investments. The loan amounts are assumed to be disbursed in equal installments of US$750 million a year over a four-year period. Beyond this loan, it is assumed that there will be a general shift toward more nonconcessional external borrowing (NCB) than previously projected.

- *Revised grant financing projections*. Consistent with Ghana's lower middle-income status, it is expected that grant financing will continue to fall over the projection period.

Text Table 1. Key Macroeconomic Assumptions

	2010	2011-16	2017-30
Real GDP growth	(annual percentage change)		
DSA - May 2011	5.7	7.4	5.0
DSA - November 2011	7.7	7.7	5.4
Level of nominal GDP	(in million U.S. dollar, e.o.p.)		
DSA - May 2011	31,084	62,479	215,157
DSA - November 2011	32,321	59,359	181,462
Inflation (GDP deflator)	(annual percentage change)		
DSA - May 2011	14.1	9.1	7.2
DSA - November 2011	17.3	8.9	5.9
Non-interest current account balance	(in percent of GDP)		
DSA - May 2011	-6.6	-3.5	-3.0
DSA - November 2011	-7.6	-4.7	-3.6
Primary fiscal balance	(in percent of non-oil GDP)		
DSA - May 2011	-4.4	0.6	-0.2
DSA - November 2011	-4.3	-1.0	-0.5

Sources: Ghanaian authorities and IMF staff estimates and projections.

Box 1: Baseline Macroeconomic Assumptions

Real GDP growth: Growth has been strong, rising from 4 percent in 2009 to an estimated 13½ percent in 2011, boosted by oil production and robust expansion of the non-oil economy. The overall economy is projected to grow by more than 8 percent in 2012 with a gradual decline to an average of 5½ percent in the long term. Real growth projections are higher than in the previous DSA, but remain conservative. Despite the scaling up of infrastructure investment and the prospect for new oil and gas discoveries to come on stream, average long-term growth is assumed to stay below the 10-year historical average of 5.8 percent..

Inflation: Inflation has fallen to single digits from its peak of more than 20 percent in June 2009. It is expected to remain broadly stable at around 8-9 percent in 2011 and gradually decline to 5½ percent in the long term.

Government balances: Based on the strong performance—particularly on the revenue side—during the first three quarters of the year, the 2011 fiscal deficit target is projected to decline below 5 percent of (non-oil) GDP. After a temporary increase in the deficit in 2012, mainly as a result of one-off retroactive wage payments, it is assumed that the primary deficit will remain unchanged at ½ percent of GDP throughout the projection period.

Current account balance: Ghana's external balance continues to benefit from strong cocoa and gold exports. The non-interest current account deficit is projected to gradually narrow from around 8 percent of GDP in 2011 to 3–4 percent at the end of the projection period, broadly in line with the current account norm produced by the macroeconomic balance approach. Exports are projected to grow at a robust pace to close to 40 percent of GDP by 2031, increasingly supported by nontraditional exports as infrastructure bottlenecks are reduced. Imports are also projected to rise to around 46 percent of GDP, with a significant portion devoted to equipment for new oil fields and government infrastructure projects in the near term.

FDI: In the financial account, non-debt creating inflows (largely composed of foreign direct investment) are projected to decline from the current high levels (around 8 percent of GDP) to about 3-4 percent in the long-term, as the initial investments in the oil and gas sector abate. The baseline assumes that oil extraction is limited to the Jubilee 1 field, with oil-related investments projected to decelerate. This is a conservative assumption in light of new discoveries.

Debt financing: Concessional financing from official bilateral creditors is expected to decline, and to be gradually replaced by commercial borrowing over the medium to long term. The shift is consistent with Ghana's recent transition to lower middle-income status. The projected volume of commercial borrowing is higher than in the previous DSA, consistent with Ghana's plans to scale up infrastructure investment. The DSA assumes that the ECF program limits on contracting of nonconcessional external debt will be fully utilized during 2011–12, with annual disbursements of close to 3 percent of GDP during 2012–15 (Text Table 2). Net foreign financing is projected to remain above 2 percent of GDP annually through the end of the projection period, with net domestic financing as a residual averaging 1¼ percent of GDP during 2012–31. Ghana's $750 million sovereign bond is expected to be rolled over in 2017 and 2027.

Text Table 2. Official Public External Borrowing (in US$ millions)

	2011	2012	2013	2014	2015	2016	Average 2017-31
November 2011 DSA							
Total disbursements	1,297	2,223	1,920	2,021	1,993	2,005	5,542
Concessional loans	1,128	980	657	707	623	623	674
Nonconcessional loans	168	1,243	1,263	1,314	1,370	1,383	4,869
(percent of GDP)	*0.4*	*2.9*	*2.7*	*2.6*	*2.5*	*2.3*	*4.1*
May 2011 DSA							
Total disbursements	2,166	1,759	1,392	1,415	1,541	1,708	3,836
Nonconcessional loans	648	500	600	700	826	943	3,071

Sources: Ghanaian authorities and IMF staff estimates and projections.

II. External DSA

Baseline scenario

2. **Under the baseline scenario, Ghana's debt indicators are below the relevant indicative debt distress thresholds**.[3] The projected level and composition of external debt is associated with a small deterioration in the various debt burden indicators, but all remain below their respective thresholds (Text Table 3, Tables 1 and Figure 1). The baseline external debt burden trajectories are less favorable than in the May 2011 DSA, however, reflecting mainly assumptions on increased external borrowing on non-concessional terms.

Standard stress tests

3. **Standard stress tests confirm a moderate risk of debt distress (Table 2).** On the positive side, all three stock indicators remain below their threshold levels under the stress scenarios. However, in the worst stress-test scenario (a one-time 30 percent exchange rate depreciation), the external debt-to-GDP ratio fails to stabilize and approaches its indicative threshold by the end of the projection period. Moreover, the external debt service-to-revenue ratio breaches its threshold under the same stress test, rising to 40 percent by 2031. A permanently higher nominal interest rate on new external borrowing also moves debt burden indicators closer to the thresholds and raises the external debt-service ratio significantly

[3] As in the previous DSA, public debt is determined net of government deposits at the banking system, including the Oil Fund held at the Bank of Ghana. The difference between gross and net debt is about 2½ percent of non-oil GDP. Reflecting a lack of reliable data, nonguaranteed debt of state-owned enterprises is excluded, and private sector external debt data are weak.

above the threshold to almost 50 percent of revenues by the end of the projection period.[4] Keeping key variables at their historical levels, on the other hand, would imply lower debt indicators in the long run, reflecting the baseline assumption of a considerably lower nominal GDP growth rate (in U.S. dollar terms) than the average observed over the past 10 years.[5]

Text Table 3. Indicators of External Debt Vulnerabilities (Baseline, in percent)

	2016	2021	2031
PV of debt-to -GDP ratio			
May 2011 DSA	19.4	21.2	22.9
November 2011 DSA	25.4	28.9	32.6
Threshold	*50*	*50*	*50*
PV of debt-to-exports ratio			
May 2011 DSA	56.0	67.2	72.8
November 2011 DSA	66.3	76.4	83.0
Threshold	*200*	*200*	*200*
PV of debt-to-revenue ratio			
May 2011 DSA	96.6	116.5	132.4
November 2011 DSA	124.4	154.8	182.0
Threshold	*300*	*300*	*300*
Debt service-to-exports ratio			
May 2011 DSA	3.5	6.4	8.5
November 2011 DSA	4.3	9.4	13.1
Threshold	*25*	*25*	*25*
Debt service-to-revenue ratio			
May 2011 DSA	6.0	11.1	15.5
November 2011 DSA	8.1	19.0	28.8
Threshold	*35*	*35*	*35*

Sources: IMF staff projections.
1/ All indicatators refer to public and publicly guaranteed external debt.

III. PUBLIC SECTOR DSA

4. **The public debt dynamics, covering both external and domestic liabilities, indicate additional risks (Text Table 4).** Although public debt, as a share of GDP, is projected to remain broadly stable in the baseline, a ratio of 40 percent is already sizeable

[4] The standard stress test assumes that the interest rate on new borrowing is two percentage points higher than in the baseline scenario.

[5] In the historical scenario, the variables that are kept at their 2001–10 levels are output growth, inflation (measured by dollar GDP deflator), and the non-interest current account balance and FDI in percent of GDP.

and could rise significantly in the event of shocks or failure to achieve the anticipated consolidation (Table 3 and Figure 2). Indeed, keeping the primary deficit at its projected 2011 level of 1½ percent of GDP, rather than reducing it to ½ percent of GDP from 2013 onward (as assumed in the baseline), would imply a steady rise in the public debt ratio to about 65 percent of GDP by 2031 (Table 4). The debt ratio would rise to almost 80 percent, if the primary balance and real GDP growth were at their historical averages. Moreover, a high and rising debt service-to-revenue ratio, even in the baseline, suggests the need for further reforms to boost revenues over the medium to long term, building on recent successes and new initiatives planned for 2012.

Text Table 4. Indicators of Public Debt Vulnerabilities (Baseline, in percent)

	2016	2021	2031
PV of debt-to -GDP ratio			
May 2011 DSA	30.5	37.9	42.1
November 2011 DSA	34.7	36.7	41.7
PV of debt-to-revenue ratio 2/			
May 2011 DSA	143.9	201.8	240.3
November 2011 DSA	162.6	191.4	230.9
Debt service-to-revenue ratio 2/			
May 2011 DSA	27.3	41.8	52.8
November 2011 DSA	27.3	41.1	53.1

Sources: IMF staff projections.
1/ All indicatators refer to total public and publicly guaranteed debt.
2/ Revenues are defined inclusive of grants.

IV. Conclusions

5. **The baseline DSA is overall less favorable than in May, but the risks remain moderate**. The deterioration in debt burden trajectories mainly reflects higher external borrowing assumptions. Nevertheless, the trajectories of all external debt burden indicators remain within their respective thresholds, even under stress. The most pronounced risks arise from a high debt service-to-revenue ratio and a total public debt ratio that provides limited buffers against shocks.

6. **As emphasized in the previous analysis, successful fiscal consolidation and continued robust growth will be essential for achieving the projected debt outcomes**. The baseline scenario assumes that the program objectives are achieved, with a small primary deficit of about ½ percent of GDP in 2013 and beyond, and ongoing robust export performance and economic growth. While the growth projections remain conservative based on historical trends, and there is considerable upside potential, unproductive spending could

easily derail the debt dynamics onto an unsustainable path. Thus, careful expenditure prioritization toward growth-enhancing investment and ongoing efforts to boost revenues will remain important to keep debt sustainable and create buffers against shocks.

7. **Further improvements in debt management capacity will also be essential, especially in light of Ghana's increasing access to market financing.** While the DSA suggests that Ghana can manage a gradual shift toward nonconcessional borrowing, new debts—and the associated projects—need to be selected and managed carefully, with emphasis on favorable terms and sufficiently long maturity to contain rollover risks.

8. **The authorities agree with the broad thrust of the analysis, but consider the projections to be on the conservative side.** In their view, the projections understate the potential growth dividends from the planned infrastructure investments, particularly in the gas sector. Incorporating such dividends would imply stronger debt indicators.

Table 1: External Debt Sustainability Framework, Baseline Scenario, 2008-31 1/
(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average	Standard Deviation	Projections									
												2011-2016			2017-2031
	2008	2009	2010			2011	2012	2013	2014	2015	2016	Average	2021	2031	Average
External debt (nominal) 1/	24.0	27.6	27.5	48.1	28.9	26.1	27.7	30.0	32.0	33.2	34.6	30.6	37.9	40.8	38.7
o/w public and publicly guaranteed (PPG)	16.2	19.5	19.9	38.5	26.8	19.7	22.2	24.1	25.6	26.4	27.3	24.2	28.7	29.5	28.9
Change in external debt	0.2	3.7	-0.1	-9.5	12.6	-1.4	1.5	2.4	2.0	1.2	1.3	1.2	0.4	0.2	0.4
Identified net debt-creating flows	3.4	0.1	-5.2	-5.6	8.4	-3.1	-3.3	-1.7	-0.7	-0.7	-0.5	-1.7	-0.7	0.4	-0.4
Non-interest current account deficit	10.2	3.4	7.6	4.3	3.5	7.9	5.6	3.2	3.9	4.0	3.6	4.7	3.6	3.6	3.6
Deficit in balance of goods and services	19.3	13.1	13.8	13.8	3.3	12.1	9.8	6.9	7.8	8.1	7.9	8.8	7.9	7.4	7.9
Exports	24.8	29.5	29.3	26.7	3.1	38.6	38.3	39.1	38.4	38.1	38.4	38.4	37.9	39.2	38.0
Imports	44.0	42.6	43.1	40.4	3.6	50.7	48.0	46.0	46.2	46.1	46.3	47.2	45.8	46.6	45.9
Net current transfers (negative = inflow)	-9.4	-10.2	-7.2	-10.0	1.4	-6.3	-6.9	-6.3	-6.3	-6.3	-6.3	-6.4	-5.4	-3.9	-5.0
o/w official	-2.5	-3.3	-0.6	-2.4	0.9	-1.3	-1.3	-0.9	-0.9	-0.8	-0.6	-0.9	-0.3	-0.1	-0.2
Other current account flows (negative = net inflow)	0.3	0.6	1.1	0.5	0.3	2.1	2.8	2.6	2.4	2.2	2.0	2.3	1.1	0.1	0.7
Net FDI (negative = inflow)	-4.2	-6.5	-7.8	-2.9	2.7	-8.2	-7.3	-3.6	-3.6	-3.6	-3.7	-5.0	-3.8	-2.9	-3.6
Endogenous debt dynamics 2/	-2.5	3.2	-5.0	-7.0	7.5	-2.7	-1.5	-1.3	-0.9	-1.0	-0.5	-1.3	-0.5	-0.3	-0.4
Contribution from nominal interest rate	0.6	0.6	0.6	0.8	0.4	0.5	0.4	0.6	0.7	0.8	0.9	0.6	1.3	1.9	1.5
Contribution from real GDP growth	-1.7	-1.1	-1.7	-2.6	1.4	-3.2	-1.9	-1.9	-1.7	-1.8	-1.4	-2.0	-1.8	-2.2	-1.9
Contribution from price and exchange rate changes	-1.4	3.6	-3.9	-5.2	7.2	…	…	…	…	…	…	…	…	…	…
Residual (3-4) 3/	-3.3	3.6	5.1	-3.9	12.1	1.7	4.8	4.0	2.7	1.9	1.9	2.8	1.1	-0.2	0.9
o/w exceptional financing	-0.2	-3.9	0.0	-3.6	5.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0
PV of external debt 4/	...	...	23.2	23.2	…	21.9	24.1	27.0	29.4	31.0	32.7	27.7	38.1	43.9	39.9
In percent of exports	...	...	79.0	79.0	…	56.8	62.9	69.0	76.6	81.5	85.4	72.0	100.7	112.0	104.8
PV of PPG external debt	...	...	15.6	15.6	…	15.5	18.6	21.0	23.0	24.2	25.4	21.3	28.9	32.6	30.0
In percent of exports	...	...	53.2	53.2	…	40.2	48.5	53.7	59.8	63.5	66.3	55.3	76.4	83.0	78.9
In percent of government revenues	...	...	108.3	108.3	…	85.6	99.8	112.3	115.5	119.0	124.4	109.4	154.8	182.0	162.8
Debt service-to-exports ratio (in percent)	12.2	11.1	8.8	29.5	20.1	6.1	5.5	5.5	6.4	7.1	7.7	6.4	13.8	18.4	15.3
PPG debt service-to-exports ratio (in percent)	6.0	5.3	4.4	22.6	19.9	2.7	2.6	2.9	3.5	4.0	4.3	3.3	9.4	13.1	10.6
PPG debt service-to-revenue ratio (in percent)	11.2	11.6	8.9	44.8	37.7	5.8	5.3	6.0	6.7	7.5	8.1	6.6	19.0	28.8	22.0
Total gross financing need (Millions of U.S. dollars)	2561	48	774	1883	1453	754	177	832	1363	1671	1718	1086	4205	14410	6981
Non-interest current account deficit that stabilizes debt ratio	10.1	-0.3	7.7	13.8	11.5	9.3	4.1	0.9	1.9	2.7	2.3	3.5	3.1	3.4	3.2
Key macroeconomic assumptions															
Real GDP growth (in percent)	8.4	4.0	7.7	5.8	1.4	13.6	8.5	7.4	6.0	6.2	4.6	7.7	5.3	5.8	5.4
GDP deflator in US dollar terms (change in percent)	6.3	-13.0	16.3	10.1	11.1	3.2	5.6	0.8	2.3	2.5	2.5	2.8	2.5	2.0	2.2
Effective interest rate (percent) 5/	2.9	2.4	2.6	1.9	0.6	2.0	1.7	2.2	2.6	2.8	3.0	2.4	3.9	5.0	4.2
Growth of exports of G&S (US dollar terms, in percent)	17.8	7.6	24.6	14.9	9.1	54.1	13.7	10.6	6.4	7.9	8.0	16.8	8.1	8.9	7.9
Growth of imports of G&S (US dollar terms, in percent)	24.9	-12.6	26.7	16.2	14.7	37.9	8.6	3.8	8.7	8.7	7.5	12.5	7.4	8.6	7.8
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	20.8	0.1	-3.3	-3.4	-4.5	-8.0	0.3	-15.9	-19.0	-16.2
Government revenues (excluding grants, in percent of GDP)	13.3	13.5	14.4	13.4	0.8	18.1	18.6	18.7	19.9	20.3	20.5	19.3	18.7	17.9	18.5
Aid flows (in Millions of US dollars) 7/	776	776	755	590	243	1042	867	707	739	727	655	789	411	319	409
o/w Grants	776	776	755	590	243	655	721	561	593	582	509	603	411	319	370
o/w Concessional loans	0.3	0.2	0.2	0.2	0.1	387	146	146	146	146	146	186	0	0	39
Grant-equivalent financing (in percent of GDP) 8/	...	...	...	…	…	2.5	1.7	1.1	1.0	0.9	0.6	1.3	-0.2	-0.9	-0.4
Grant-equivalent financing (in percent of external financing) 8/	...	...	...	…	…	47.0	24.6	20.1	20.1	19.1	13.8	24.1	-4.4	-15.3	-7.3
Memorandum items:															
Nominal GDP (Millions of US dollars)	28,528	25,799	32,321	19,188	8,544	37,879	43,396	46,994	50,922	55,384	59,359	48,989	84,882	181,462	112,629
Nominal dollar GDP growth	15.2	-9.6	25.3	16.6	12.2	17.2	14.6	8.3	8.4	8.8	7.2	10.7	7.9	7.9	7.7
PV of PPG external debt (in Millions of US dollars)	...	...	4,894	…	…	5,771	7,791	9,563	11,353	13,046	14,749	10,379	24,127	58,083	33,860

Sources: Ghanaian authorities; and staff estimates and projections.

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 PV of private sector debt is equivalent to its face value.

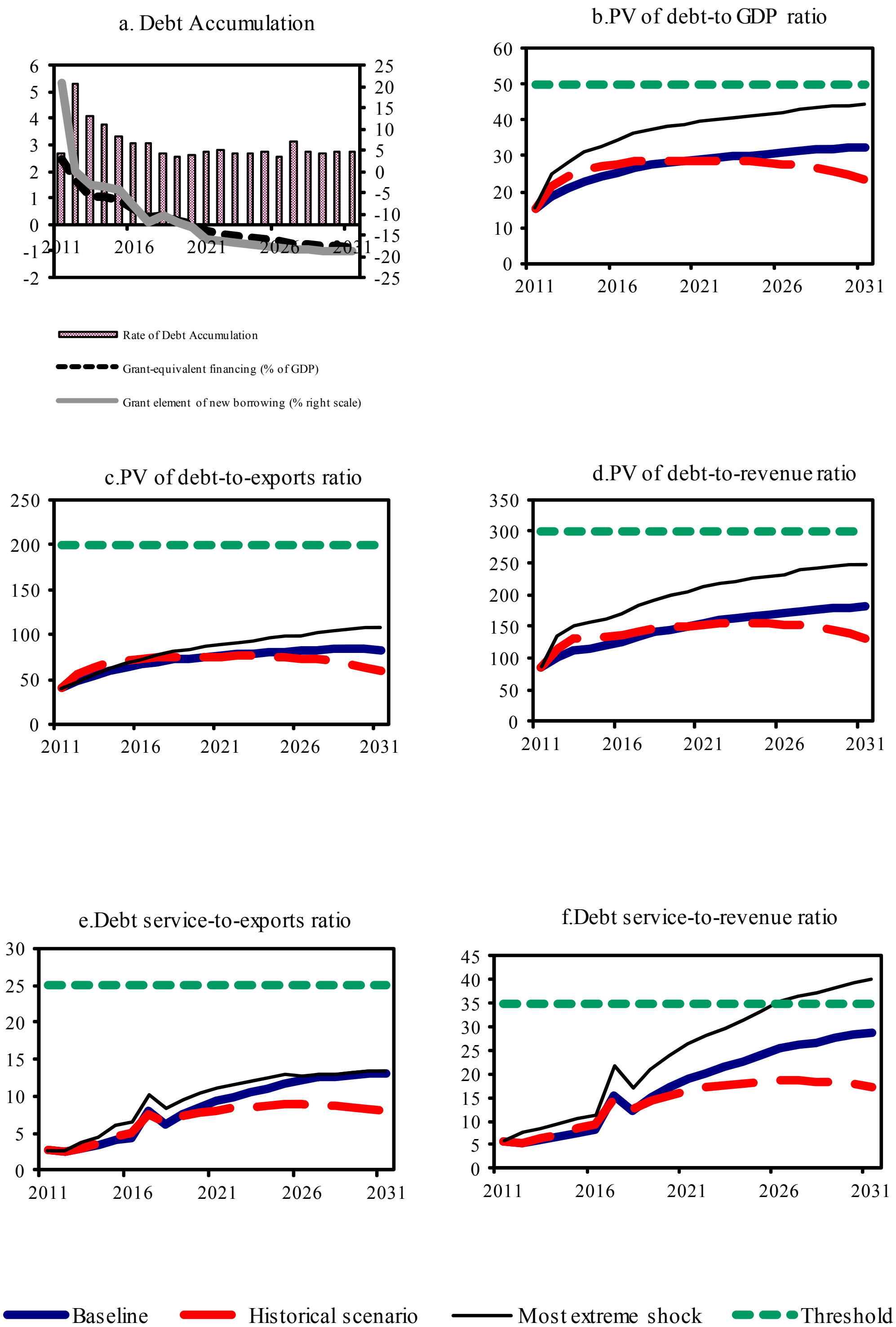
5/ Current-year interest payments divided by previous period debt stock.

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).

Figure 1: Indicators of Public and Publicly Guaranteed External Debt under Alternative Scenarios, 2011-31 1/



Sources: Ghanaian authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2021.

Table 2. Ghana: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2011-2031
(In percent)

	Projections							
	2011	2012	2013	2014	2015	2016	**2021**	2031
PV of debt-to GDP ratio								
Baseline	15.5	18.6	21.0	23.0	24.2	25.4	**28.9**	32.6
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2011-2031 1/	15.5	21.4	24.4	26.1	26.9	27.8	**28.5**	23.4
A2. New public sector loans on less favorable terms in 2011-2031 2	15.5	18.2	21.2	23.9	25.7	27.5	**33.5**	42.6
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2012-2013	15.5	17.9	20.9	23.2	24.5	25.9	**29.5**	33.2
B2. Export value growth at historical average minus one standard deviation in 2012-2013 3/	15.5	17.9	22.3	24.2	25.4	26.5	**29.2**	31.9
B3. US dollar GDP deflator at historical average minus one standard deviation in 2012-2013	15.5	19.1	22.1	24.2	25.5	26.9	**30.7**	34.5
B4. Net non-debt creating flows at historical average minus one standard deviation in 2012-2013 4/	15.5	24.5	28.0	29.7	30.3	30.9	**31.6**	32.3
B5. Combination of B1-B4 using one-half standard deviation shocks	15.5	22.4	23.3	25.4	26.2	27.3	**29.6**	32.1
B6. One-time 30 percent nominal depreciation relative to the baseline in 2012 5/	15.5	25.1	28.4	31.1	32.8	34.6	**39.5**	44.4
PV of debt-to-exports ratio								
Baseline	40.2	48.5	53.7	59.8	63.5	66.3	**76.4**	83.0
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2011-2031 1/	40.2	55.8	62.4	68.1	70.8	72.4	**75.2**	59.7
A2. New public sector loans on less favorable terms in 2011-2031 2	40.2	47.7	54.3	62.3	67.6	71.6	**88.5**	108.7
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2012-2013	40.2	46.9	52.0	58.0	61.7	64.6	**74.7**	81.1
B2. Export value growth at historical average minus one standard deviation in 2012-2013 3/	40.2	46.9	59.8	66.4	70.1	72.6	**81.3**	85.7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2012-2013	40.2	46.9	52.0	58.0	61.7	64.6	**74.7**	81.1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2012-2013 4/	40.2	63.9	71.6	77.4	79.5	80.6	**83.4**	82.3
B5. Combination of B1-B4 using one-half standard deviation shocks	40.2	58.0	60.2	63.7	66.5	68.5	**75.4**	78.9
B6. One-time 30 percent nominal depreciation relative to the baseline in 2012 5/	40.2	46.9	52.0	58.0	61.7	64.6	**74.7**	81.1
PV of debt-to-revenue ratio								
Baseline	85.6	99.8	112.3	115.5	119.0	124.4	**154.8**	182.0
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2011-2031 1/	85.6	114.9	130.4	131.4	132.6	135.8	**152.5**	130.8
A2. New public sector loans on less favorable terms in 2011-2031 2	85.6	98.1	113.5	120.2	126.5	134.3	**179.4**	238.2
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2012-2013	85.6	96.5	111.9	116.9	120.7	126.4	**158.1**	185.6
B2. Export value growth at historical average minus one standard deviation in 2012-2013 3/	85.6	96.5	119.5	121.7	124.8	129.5	**156.6**	178.5
B3. US dollar GDP deflator at historical average minus one standard deviation in 2012-2013	85.6	102.9	118.2	121.6	125.6	131.5	**164.5**	193.1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2012-2013 4/	85.6	131.5	149.8	149.3	148.9	151.2	**169.0**	180.4
B5. Combination of B1-B4 using one-half standard deviation shocks	85.6	120.4	124.9	127.6	129.1	133.3	**158.6**	179.3
B6. One-time 30 percent nominal depreciation relative to the baseline in 2012 5/	85.6	134.8	151.9	156.4	161.4	169.1	**211.6**	248.3

Table 2. Ghana: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2011-2031 (continued)
(In percent)

	Projections							
	2011	2012	2013	2014	2015	2016	**2021**	2031
Debt service-to-exports ratio								
Baseline	2.7	2.6	2.9	3.5	4.0	4.3	**9.4**	13.1
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2011-2031 1/	2.7	2.6	3.1	3.7	4.6	5.0	**8.1**	7.9
A2. New public sector loans on less favorable terms in 2011-2031 2	2.7	2.6	2.6	3.1	3.5	3.8	**10.0**	21.8
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2012-2013	2.7	2.6	2.9	3.5	4.0	4.3	**9.3**	13.1
B2. Export value growth at historical average minus one standard deviation in 2012-2013 3/	2.7	2.6	3.0	4.0	4.5	5.2	**10.3**	13.8
B3. US dollar GDP deflator at historical average minus one standard deviation in 2012-2013	2.7	2.6	2.9	3.5	4.0	4.3	**9.3**	13.1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2012-2013 4/	2.7	2.6	3.7	4.5	6.1	6.5	**11.1**	13.4
B5. Combination of B1-B4 using one-half standard deviation shocks	2.7	2.6	3.4	3.8	4.9	5.0	**9.7**	12.7
B6. One-time 30 percent nominal depreciation relative to the baseline in 2012 5/	2.7	2.6	2.9	3.5	4.0	4.3	**9.3**	13.1
Debt service-to-revenue ratio								
Baseline	5.8	5.3	6.0	6.7	7.5	8.1	**19.0**	28.8
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2011-2031 1/	5.8	5.3	6.4	7.1	8.6	9.3	**16.5**	17.4
A2. New public sector loans on less favorable terms in 2011-2031 2	5.8	5.3	5.4	5.9	6.6	7.1	**20.4**	47.7
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2012-2013	5.8	5.3	6.1	7.0	7.8	8.4	**19.8**	29.9
B2. Export value growth at historical average minus one standard deviation in 2012-2013 3/	5.8	5.3	6.0	7.2	8.0	9.2	**19.9**	28.8
B3. US dollar GDP deflator at historical average minus one standard deviation in 2012-2013	5.8	5.7	6.5	7.3	8.1	8.8	**20.6**	31.1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2012-2013 4/	5.8	5.3	7.8	8.8	11.4	12.2	**22.5**	29.3
B5. Combination of B1-B4 using one-half standard deviation shocks	5.8	5.4	7.1	7.6	9.6	9.8	**20.4**	29.0
B6. One-time 30 percent nominal depreciation relative to the baseline in 2012 5/	5.8	7.5	8.3	9.4	10.5	11.3	**26.5**	40.0
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	-16.8	-16.8	-16.8	-16.8	-16.8	-16.8	**-16.8**	-16.8

Sources: Ghanaian 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 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: Public Sector Debt Sustainability Framework, Baseline Scenario, 2008-31
(In percent of GDP, unless otherwise indicated)

	Actual			Average	Standard Deviation	Estimate	Projections								
	2008	2009	2010			2011	2012	2013	2014	2015	2016	2011-16 Average	2021	2031	2017-31 Average
Public sector debt 1/	33.6	36.2	46.3	55.1	26.5	42.6	43.5	42.3	38.6	37.2	36.6	40.1	36.6	38.7	37.3
o/w foreign-currency denominated	16.2	19.5	19.9	38.5	26.8	19.7	22.2	24.1	25.6	26.4	27.3	24.2	28.7	29.5	28.9
Change in public sector debt	2.5	2.6	10.1	-7.9	12.9	-3.7	0.9	-1.2	-3.8	-1.3	-0.6	-1.6	0.2	0.1	0.1
Identified debt-creating flows	1.6	2.0	0.9	-7.5	9.0	-2.8	-1.9	-1.3	-1.3	-1.4	-0.8	-1.6	-0.4	0.0	-0.3
Primary deficit	6.2	3.0	4.3	2.2	2.1	1.8	2.1	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5
Revenue and grants	16.0	16.5	16.7	16.6	1.5	19.8	20.3	19.9	21.0	21.4	21.3	20.6	19.2	18.1	18.9
of which: grants	2.7	3.0	2.3	3.2	1.0	1.7	1.7	1.2	1.2	1.1	0.9	1.3	0.5	0.2	0.4
Primary (noninterest) expenditure	22.3	19.5	21.0	18.8	2.5	21.6	22.4	20.4	21.5	21.9	21.8	21.6	19.7	18.5	19.4
Automatic debt dynamics	-2.1	-0.8	-4.0	-9.1	7.5	-5.4	-3.9	-1.7	-1.7	-1.8	-1.2	-2.6	-0.9	-0.5	-0.8
Contribution from interest rate/growth differential	-3.0	-1.1	-2.0	-3.7	1.7	-5.0	-3.4	-1.7	-1.3	-1.4	-0.8	-2.3	-0.7	-0.3	-0.5
of which: contribution from average real interest rate	-0.6	0.2	0.6	-0.4	0.8	0.6	0.0	1.3	1.1	0.8	0.8	0.8	1.2	1.8	1.4
of which: contribution from real GDP growth	-2.4	-1.3	-2.6	-3.2	1.3	-5.6	-3.3	-3.0	-2.4	-2.2	-1.6	-3.0	-1.8	-2.1	-1.9
Contribution from real exchange rate depreciation	0.9	0.3	-2.0	-5.4	6.0	-0.4	-0.5	0.0	-0.3	-0.4	-0.3	-0.3	...	...	-0.3
Other identified debt-creating flows	-2.6	-0.2	0.7	-0.6	0.9	0.8	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
Privatization receipts (negative)	-2.3	0.0	1.0	-0.3	0.8	1.0	0.0	0.0	0.0	0.0	0.0	0.2	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	0.0	0.0	0.0	0.0
Debt relief (HIPC and other)	-0.3	-0.2	-0.3	-0.3	0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	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	0.0	0.0	0.0	0.0
Residual, including asset changes	1.0	0.6	9.2	-0.4	8.3	-1.0	2.8	0.1	-2.5	0.1	0.1	-0.1	0.6	0.1	0.4
Other Sustainability Indicators															
PV of public sector debt	17.4	16.7	42.0	18.1	9.3	38.4	39.9	39.3	35.9	35.0	34.8	37.2	36.8	41.8	38.5
o/w foreign-currency denominated	0.0	0.0	15.6	1.7	5.2	15.5	18.6	21.0	23.0	24.2	25.4	21.3	28.9	32.6	30.0
o/w external	...	...	15.6	…	…	15.5	18.6	21.0	23.0	24.2	25.4	21.3	28.9	32.6	30.0
PV of contingent liabilities (not included in public sector debt)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gross financing need 2/	11.5	9.3	10.4	12.4	4.4	13.1	12.4	11.2	10.2	10.1	10.1	11.2	12.3	13.5	12.7
PV of public sector debt-to-revenue and grants ratio (in percent)	108.3	100.9	251.0	100.0	64.0	193.6	196.8	197.5	170.7	163.6	163.1	180.9	192.0	231.5	204.7
PV of public sector debt-to-revenue ratio (in percent)	130.4	123.4	291.7	120.5	73.0	212.1	214.4	210.1	180.7	172.1	170.0	193.2	197.0	233.8	208.7
o/w external 3/	…	…	108.3	108.3		85.6	99.8	112.3	115.5	119.0	124.4	109.4	154.8	182.0	162.8
Debt service-to-revenue and grants ratio (in percent) 4/	13.9	16.4	16.9	43.4	30.6	30.2	27.6	30.7	27.4	27.2	27.5	28.4	41.3	53.3	45.0
Debt service-to-revenue ratio (in percent) 4/	16.8	20.1	19.6	53.9	38.2	33.1	30.0	32.6	29.0	28.6	28.6	30.3	42.3	53.9	45.9
Primary deficit that stabilizes the debt-to-GDP ratio	3.7	0.4	-5.9	-0.6	4.8	5.6	1.2	1.7	4.3	1.8	1.1	2.6	0.4	0.4	0.4
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	8.4	4.0	7.7	5.8	1.4	13.6	8.5	7.4	6.0	6.2	4.6	7.7	5.3	5.8	5.4
Average nominal interest rate on forex debt (in percent)	4.6	3.8	3.7	2.5	1.3	2.7	2.3	2.8	3.2	3.5	3.8	3.0	5.1	6.9	5.6
Average real interest rate on domestic debt (in percent)	-6.0	-1.6	1.0	-1.4	5.0	2.1	-1.2	4.8	3.2	2.1	2.1	2.2	2.7	3.6	3.1
Real exchange rate depreciation (in percent, + indicates depreciation)	6.4	2.0	-11.0	-8.5	7.7	-2.2	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	20.2	16.6	17.3	20.9	7.3	9.0	11.9	7.6	8.7	8.4	7.8	8.9	6.0	5.5	5.9
Growth of real primary spending (deflated by GDP deflator, in percent)	0.1	-0.1	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0
Grant element of new external borrowing (in percent)	...	...	...	…	…	20.8	0.1	-3.3	-3.4	-4.5	-8.0	0.3	-15.9	-19.0	...

Sources: Ghanaian authorities; and staff estimates and projections.

1/ Public sector comprise central government. The concept of net debt is used.

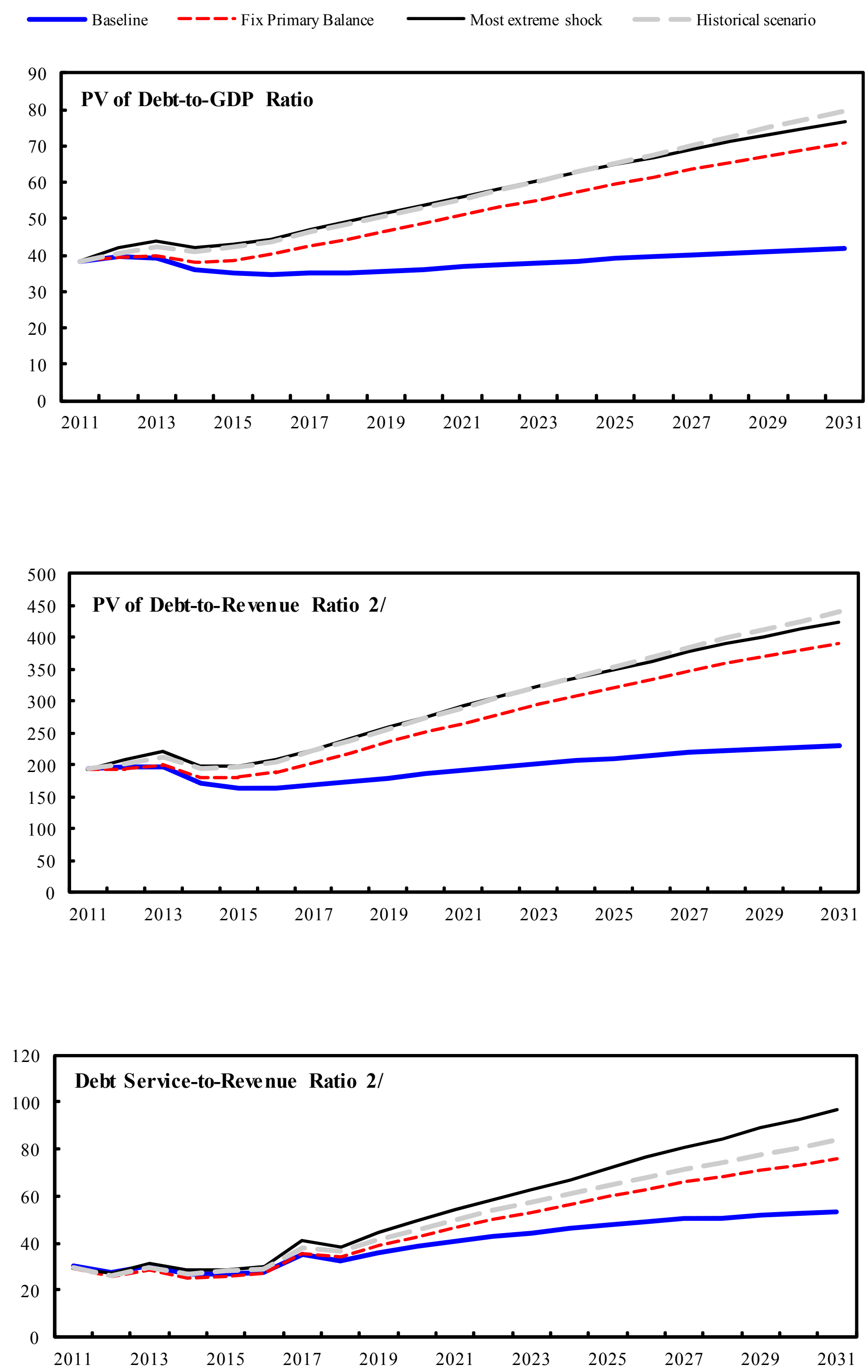
2/ Gross financing need is defined as the primary deficit plus debt service plus the stock of short-term debt at the end of the last period.

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.

Figure 2: Indicators of Public Debt Under Alternative Scenarios, 2011-2031 1/



Sources: Ghanaian authorities; and staff estimates and projections.
1/ The most extreme stress test is the test that yields the highest ratio in 2021.
2/ Revenues are defined inclusive of grants.