APPENDIX II: DEBT SUSTAINABILITY ANALYSIS (LIC DSF METHODOLOGY)[5]

The debt sustainability analysis (DSA) was prepared jointly by Bank and Fund staffs in accordance with the standardized Debt Sustainability Framework (DSF) methodology for Low-Income Countries (LICs). After HIPC and MDRI debt relief, Liberia's risk of debt distress is low, though this result is sensitive to FDI flows and export shocks, as well as to borrowing conditions. With the assumption of average annual concessional borrowing of 3 percent of GDP for the period, the assessment of the country's risk of debt distress remains unchanged and the present value of the external debt remains well below 30 percent.

I. BACKGROUND

1. **This joint DSA was prepared using the Fund-World Bank standardized Debt Sustainability Framework (DSF) methodology for Low-Income countries** approved by the respective Boards.[6] It updates the LIC DSA presented to the Bank and Fund Boards in early 2009, presents the projected path of Liberia's external and public debt indicators, and draws conclusions on forward-looking sustainability of debt under baseline and alternate scenarios. It uses the reconciled debt database prepared for the completion point HIPC DSA and, in the baseline, incorporates the impact of HIPC, additional bilateral assistance beyond HIPC, and MDRI debt relief.

2. **The initial conditions and assumptions underlying the results of the LIC DSA include the following:**

- **Liberia's public debt as of end-June 2009 is estimated at about 190 percent of GDP.** The debt is mostly owed to external creditors (185 percent), mainly the African Development Bank, the IMF, and the World Bank (64 percent of total external debt)

[5] The LIC-DSA differs from the HIPC DSA discussed in the main body of the completion point document in the following assumptions: (i) the LIC-DSA discount rate is fixed at 4 percent while the HIPC-DSA uses the currency-specific 6-month averages of commercial interest reference rates (CIRR); (ii) the export denominator in the LIC-DSA is based on the current year data for exports of goods and services, while in the HIPC DSA it is based on the three-year backward-looking average; (iii) the LIC-DSA incorporates WEO assumptions on the exchange rate, while the HIPC-DSA uses the actual exchange rate at end-2009; and (iv) the LIC DSA assesses the risk of debt distress based on country-specific policy-dependent thresholds, while the HIPC DSA employs a single thresholds applicable to all countries.

[6] Liberia is not classified yet in the World Bank's Country Policy and Institutional Assessment index (CPIA). The staff assumes that Liberia is a weak performer, for which the DSF indicative thresholds for external debt sustainability are a PV of debt-to-GDP ratio of 30 percent, a PV of debt-to-exports ratio of 100, a PV of debt-to-revenue ratio of 200 percent, a debt service-to-exports ratio of 15 percent, and a debt service-to-revenue ratio of 25 percent.

and bilateral and commercial creditors (36 percent). The domestic debt stock amounts to about 5 percent of GDP. The DSA includes the domestic debt of the public sector, including borrowing from the banking sector. But, as with the 2009 DSA, borrowing from the central bank is excluded to ensure that the public sector DSA is in line with the public sector definition.

- **The completion point is assumed to take place at end-June 2010, at which time Liberia will benefit from irrevocable debt relief.** The external debt stock will be reduced to US$166 million, of which 69 percent will be owed to bilateral creditors and the remainder to multilaterals and other creditors. The nominal reduction in debt stock is estimated to be US$1,509.4 million, with annual debt service savings of about US$145 million in the first 10 years following the completion point.

- **The baseline macroeconomic assumptions are consistent with those underpinning the ECF-supported program and the HIPC DSA.**[7] GDP growth is assumed to accelerate until the large mining investments reach full capacity. After this, output growth slows to 5 percent for the remainder of the projection period. Inflation moderates quickly and stabilizes at 4 percent. Exports grow at a fast rate during 2011/12-2012/13 when the mining projects commence, with the growth rate then stabilizing at 10 percent. Imports are assumed to mirror, to some extent, the export dynamics—annual growth averages 25-30 percent for the construction phase of the mining projects (2010/11–2012/13), and then slows to about 4 percent. The fiscal revenues associated with these projects are lagged somewhat, becoming significant only in the latter part of the projection period.

II. Baseline Scenario

3. **The baseline scenario in the DSA assumes full delivery of HIPC and MDRI debt relief and that Liberia reaches the completion point by end-June 2010**[8]. While this

[7] More detail is provided in Box 2 of the HIPC Completion Point Document. The macroeconomic assumptions are more conservative than those used to underpin the 2009 DSA. This change reflects the impact of the global crisis on external demand and commodity prices—and also a more cautious estimation of the size and speed of investment in the iron ore sector and the resulting volume of production and exports. In light of the significant increase in foreign direct investment commitments since 2009, and the large pipeline of projects now under discussion, the assumed path of FDI is higher overall, but with less optimistic assumptions applied to its effect on output. Consequently, both export growth and the current account balance are somewhat lower, and the absolute increase in real GDP is more subdued and less frontloaded than in the 2009 baseline. Projected real growth over the next five years has therefore been revised downwards from 9 to 7 percent. However, with the increase in iron ore production now spread over a longer period, and the effects of higher FDI gradually being felt, growth averages about 5 percent for the remainder of the period, slightly higher that previously assumed.

[8] In contrast, the 2009 DSA showed the impact of the full delivery of HIPC and MDRI in an alternative scenario.

reduces post-completion point debt to low levels, debt service on the majority of the remaining obligations—mostly owed to bilateral creditors—is scheduled to begin in 2011/12 and be fully amortized in 5 years, creating a significant debt service hump in 2011/12–2015/16.

4. **A moderate borrowing policy is assumed over the long term, but somewhat higher than the 2009 DSA baseline and with some front loading in the first 5 years.** Reflecting Liberia's limited access to loan finance, and its low income per capita, grant financing is expected to remain the main source of external financing over the period. However, new external borrowing is assumed to begin in FY 2010/11 at 2 percent of GDP, rise to 5 percent of GDP in FY2013/14–2014/15 and gradually decline to 2 percent of GDP. All new external borrowing is assumed to be on concessional (IDA) terms. Domestic borrowing, to be supplied through a planned treasury bill market, is constant in the scenario at 1 percent of GDP per year. In contrast, the 2009 DSA assumed 2 percent of total borrowing throughout the period.

III. External Debt Sustainability

5. **In the period following the completion point, debt dynamics are dominated by the rapid repayment of remaining obligations owed to official bilateral creditors** (Figure A1). In this period, the PV of external debt declines from 15 percent in 2010/11 to 12 percent of GDP in 2015/16, at which time this debt is fully repaid (Table A1). For the same reason, the ratios of debt service to exports and debt service to revenues both undergo a steep increase during the peak of debt service in 2011/12–2015/16. Meeting these estimated obligations, which may be subject to further review by Paris Club creditors, would require a mix of fiscal measures and refinancing options. The increase in debt service in this period relative to the decision point estimates is treated by staff as a financing gap pending discussion of measures or refinancing options.

6. **Following repayment of these near-term obligations, the debt and debt service profiles are relatively benign**. Most of the remaining obligations carry favorable terms. Moreover, all new obligations are contracted at IDA terms, and the annual amount contracted by this time is declining as a share of GDP. Consequently, the PV of debt to GDP increases only moderately after 2015/16, and eventually stabilizes at about 17 percent by the end of the period, well below its 30 percent threshold value.

7. **Similarly, the concessional nature of debt and its low volume ensures very low ratios of debt service to exports and to revenues in the period following the 2011/12–2015/16 debt service bulge**. These ratios are also mitigated by rising exports and revenues due to the coming on stream of large mining projects. For the debt service to exports ratio, this happens by the end of the debt service bulge, as the projects have already begun exporting by this time. However, mitigation of the ratio of debt service to revenue does not become significant until towards the second half of the projection period.

8. **These results remain broadly unchanged under alternative scenarios in the DSF framework, except for the historical scenario,** (Figure A1 and Table A2).

- The PV of external debt to GDP ratio is sensitive to the degree of concessionality of borrowing, reaching 27 percent in FY2021/22 and 29 percent by 2029/30 under the alternate scenario of less favorable borrowing terms. The PV of external debt to exports ratio confirms a moderate sensitivity to lower exports—under this shock, the ratio will remain at about 40 percent, but with a marginal decline by the end of projection period. Similar results—showing only limited debt vulnerability—are obtained for all indicators when lower GDP growth is assumed. Threshold levels are never exceeded.

- Projected debt ratios increase sharply based on historical data for the current account deficit and the growth of GDP and exports (2004/05-2009/10). The PV of the debt to GDP ratio, debt to exports and debt to revenue ratios all breach the policy-dependent thresholds. However, the staffs do not consider the historical trend a reliable indicator for assessing debt vulnerability, as the unreliability of historical data and its availability for only a short period—during which foreign direct investment was very low and a poor indicator of future trends—combine to create implausible borrowing assumptions and an unrealistic indication of debt distress.

IV. Public Sector Debt Sustainability

9. **Following debt relief, all public debt indicators will also decline markedly in the baseline scenario.** (Figure A2, Table A3). This is due mainly to debt relief on external debt. For the entire period, the PV of public debt rises by 8.2 percentage points of GDP, compared to only 1.6 percentage points for external debt, reflecting the commercial terms assumed for domestic debt and its steady rate of accumulation. The PV of debt-to-revenue ratio rises over the period until 2023/24, when it begins to fall back under the influence of rising mining project revenues. The debt service-to-revenue ratio jumps sharply during FY2011/12–2015/16, before falling back to below 5 percent for the period FY2017/18 to 2029/30.

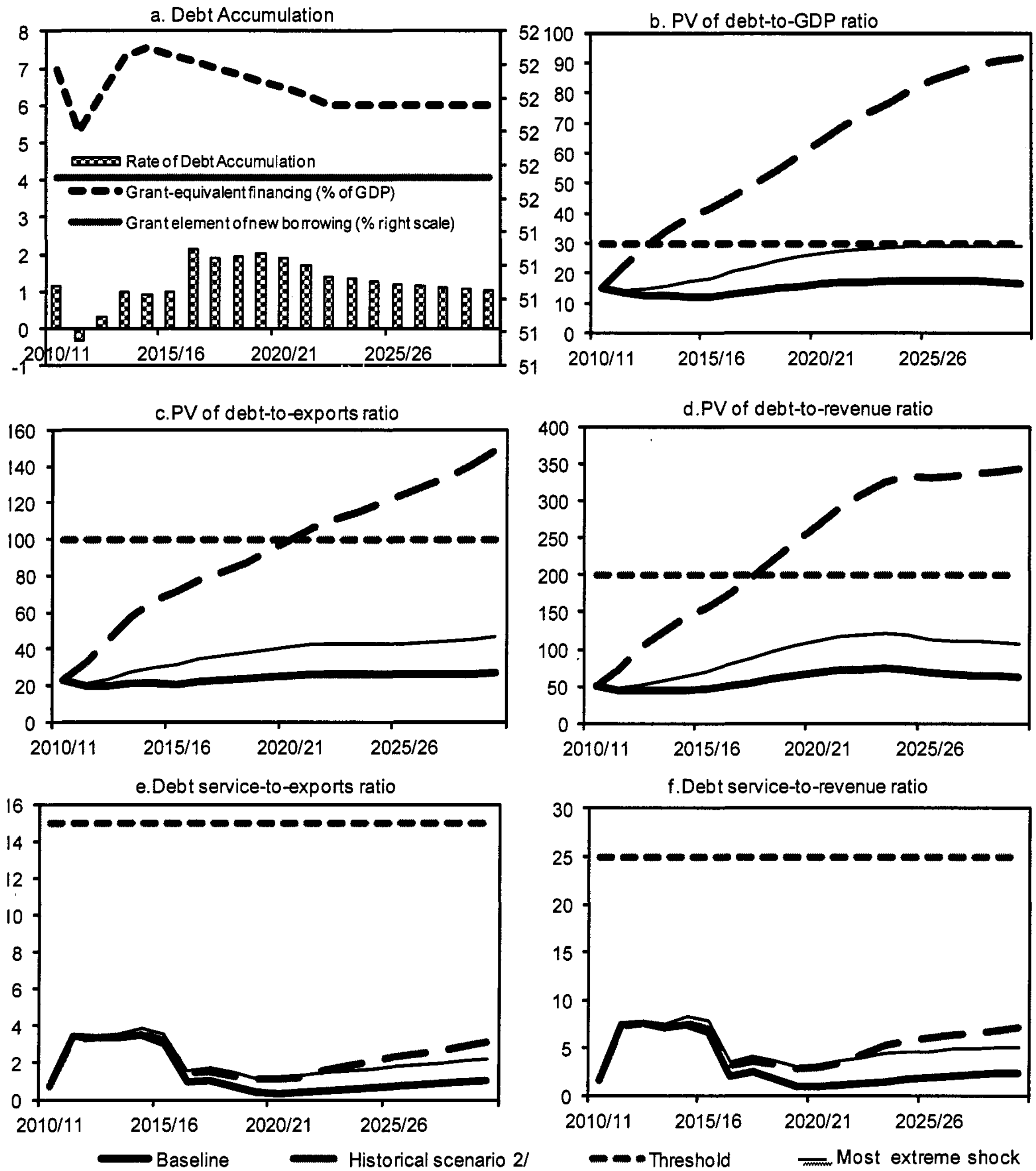
10. **Alternative and shock scenarios show a similar gradual rising trend of debt indicators, but all remain within acceptable limits** (Table A4). Under the alternative scenario of lower GDP, the PV of debt-to-GDP ratio will increase moderately from 18 percent in FY2010/11 to about 39 percent by the end of the projection period. The PV of the public debt-to-revenue ratio will also deteriorate substantially under a low growth scenario, reaching about 95 percent in FY2020/21 and 121 percent in FY2029/30. However, the debt service-to-revenue ratio will remain below 10 percent under the pessimistic scenario of lower GDP growth.

V. Conclusion

11. **Liberia's risk of debt distress remains low following the debt relief under the HIPC initiative and the MDRI, although delays in implementing structural reforms aimed at raising growth, investment and exports could be a source of external**

vulnerability. In the baseline scenario, which includes annual average new borrowing of 3 percent of GDP on concessional terms, Liberia's debt indicators remain well below the relevant indicative thresholds. Nonetheless, Liberia's debt outlook does appear sensitive to export shocks, while the alternative scenario based on concessional borrowing on less favorable terms shows some vulnerability, although all indicators remain below their threshold values. The historical data scenario is not viewed as a reliable basis for assessing debt vulnerabilities, due to the paucity of data and large structural changes in the immediate post-conflict period.

Liberia: Figure A1 - Indicators of Public and Publicly Guaranteed External Debt under Alternatives Scenarios, 2010/11-2030/31 1/

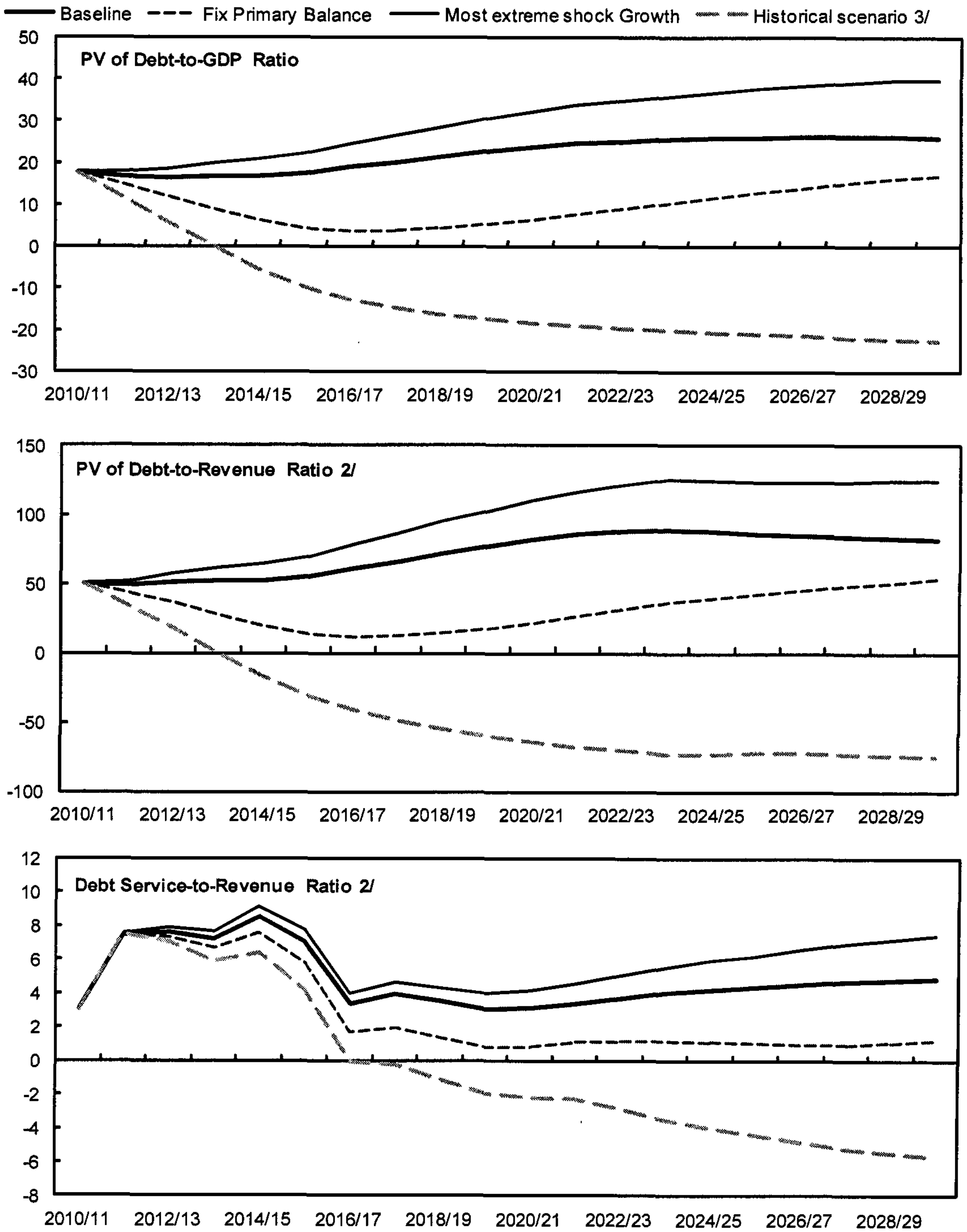


Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2019/20. In figures b, d, e, and f it corresponds to loans on less favorable terms; in c. to export values growing at historical average minus one standard deviation.

2/ Given the lack of reliability of historical data, the DSA uses only FY 2004/05 to FY2009/10. The historical scenario breaches the PV debt to GDP threshold, but staff does not consider this a reliable indicator of potential debt distress, as it results mainly from the high current account deficits and low level of foreign direct investment in the period following the return of political stability.

Liberia: Figure A2 - Indicators of Public Debt Under Alternative Scenarios, 2010/11-2030/31 1/



1/ The most extreme stress test is the test that yields the highest ratio in 2020/21.
2/ Revenues are defined inclusive of grants.
3/ Given the lack of reliability of historical data, the DSA uses only FY 2004/05 to FY2009/10 . The historical scenario breaches the PV debt to GDP threshold, but staff does not consider this a reliable indicator of potential debt distress, as it results mainly from the high current account deficits and low level of foreign direct investment in the period following the return of political stability.

Sources: Country authorities; and staff estimates and projections.

Table A1. Liberia : External Debt Sustainability Framework, Baseline Scenario, FY2008-FY2030 1/
(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average 7/	Standard Deviation	Projections												
	2007/08	2008/09	2009/10			2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2010/11-2015/16 Average	2020/21	2021/22	2027/28	2028/29	2029/30	2016/17-2029/30 Average
External debt (nominal) 1/	**547.9**	**360.8**	**191.2**			**17.3**	**16.9**	**17.7**	**19.5**	**21.1**	**22.5**		**30.2**	**30.8**	**29.6**	**29.3**	**28.5**	
o/w public and publicly guaranteed (PPG)	547.9	360.8	191.2			17.3	16.9	17.7	19.5	21.1	22.5		30.2	30.8	29.6	29.3	28.5	
Change in external debt	547.9	-187.1	-169.6			-173.9	-0.3	0.8	1.9	1.6	1.4		1.0	0.5	-0.3	-0.3	-0.8	
Identified net debt-creating flows	...	-20.4	-8.7			-8.7	1.4	3.6	5.1	6.9	8.5		2.3	1.1	0.0	0.9	2.0	
Non-interest current account deficit	**45.2**	**45.2**	**38.9**	**35.6**	**9.6**	**49.8**	**54.4**	**43.5**	**34.3**	**33.2**	**31.9**		**22.9**	**22.6**	**16.9**	**17.3**	**17.5**	20.4
Deficit in balance of goods and services	166.4	154.5	140.5			143.4	136.3	109.7	86.3	72.2	60.4		32.7	31.5	19.3	19.7	20.5	
Exports	74.6	65.4	60.5			66.7	67.6	63.5	59.0	58.0	58.1		64.8	65.3	66.5	64.5	61.6	
Imports	241.1	219.9	201.0			210.1	203.8	173.2	145.3	130.2	118.5		97.5	96.8	85.8	84.2	82.1	
Net current transfers (negative = inflow)	-142.2	-126.9	-119 7	-115.0	61.2	-109.9	-92.7	-77.2	-64.1	-50.8	-41.4		-29.7	-28.6	-23.3	-22.5	-21.3	-26.5
o/w official	-52.0	-49.0	-47.7			-44.5	-38.6	-36.0	-33.7	-31.5	-29.8		-23.8	-22.9	-18.2	-17.5	-16.6	
Other current account flows (negative = net inflow)	20.9	17.6	18.2			16.3	10.9	10.9	12.1	11.8	12.9		19.9	19.8	20.9	20.0	18.4	
Net FDI (negative = inflow)	**-25.0**	**-24.7**	**-27.9**	**-9.9**	**12.4**	**-45.5**	**-52.1**	**-39.1**	**-28.4**	**-25.4**	**-22.5**		**-19.6**	**-20.4**	**-15.7**	**-15.1**	**-14.3**	-17.3
Endogenous debt dynamics 2/	**...**	**-40.9**	**-19.8**			**-12.9**	**-0.9**	**-0.8**	**-0.7**	**-0.8**	**-0.9**		**-1.1**	**-1.1**	**-1.2**	**-1.2**	**-1.2**	
Contribution from nominal interest rate	...	0.0	0.0			0.2	0.5	0.4	0.3	0.2	0.2		0.2	0.2	0.2	0.2	0.2	
Contribution from real GDP growth	0.0	-29.6	-18.7			-13.1	-1.3	-1.1	-1.0	-1.1	-1.1		-1.3	-1.3	-1.4	-1.4	-1.4	
Contribution from price and exchange rate changes	0.0	-11.2	-1.1			...	...	...	...	...	...		...	...	...	...	...	
Residual (3-4) 3/	**...**	**-166.7**	**-160.9**			**-165.3**	**-1.8**	**-2.8**	**-3.3**	**-5.3**	**-7.1**		**-1.3**	**-0.6**	**-0.3**	**-1.3**	**-2.8**	
o/w exceptional financing	...	-12.7	-5 9			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
PV of external debt	...	...	...			15.1	13.4	12 5	12.4	12.2	12.1		16.5	17.0	17.3	17.1	16.7	
In percent of exports	...	...	...			22.6	19.9	19.8	21.0	21.0	20.9		25.4	26.0	26.0	26.5	27.1	
PV of PPG external debt	...	...	...			**15.07**	**13.4**	**12.5**	**12.4**	**12.2**	**12.1**		**16.5**	**17.0**	**17.3**	**17.1**	**16.7**	
In percent of exports	...	...	...			**22.60**	**19.9**	**19.8**	**21.0**	**21.0**	**20.9**		**25.4**	**26.0**	**26.0**	**26.5**	**27.1**	
In percent of government revenues	...	...	...			**51.18**	**43.9**	**44.5**	**44.4**	**44.7**	**45.8**		**68.2**	**71.5**	**65.2**	**63.8**	**62.4**	
Debt service-to-exports ratio (in percent)	...	...	...			**0.70**	**3.4**	**3.3**	**3.3**	**3.5**	**3.1**		**0.3**	**0.4**	**0.9**	**1.0**	**1.0**	
PPG debt service-to-exports ratio (in percent)	...	...	...			**0.70**	**3.4**	**3.3**	**3.3**	**3.5**	**3.1**		**0.3**	**0.4**	**0.9**	**1.0**	**1.0**	
PPG debt service-to-revenue ratio (in percent)	...	...	...			**1.59**	**7.5**	**7.5**	**7.1**	**7.5**	**6.7**		**0.9**	**1.1**	**2.2**	**2.3**	**2.4**	
Total gross financing need (Millions of U.S. dollars)	160.9	176.7	101.1			46.9	50.0	76.8	102.3	139.0	173.1		80.0	60.5	64.2	106.2	160.0	
Non-interest current account deficit that stabilizes debt ratio	-502.7	232.3	208.5			223.7	54.8	42.7	32.4	31.6	30.5		21.9	22.1	17.2	17.6	18.3	
Key macroeconomic assumptions																		
Real GDP growth (in percent)	8 2	5.8	5.5	3.0	9.2	7.5	8.4	7.3	6.3	6.0	5.4	6.8	4.7	4.7	5.1	5.2	5.3	5.1
GDP deflator in US dollar terms (change in percent)	8.6	2.1	0.3	7.0	4.0	1.1	1.1	2.4	2.7	3.2	3.1	2.3	2.3	2.2	1.9	1.9	3.5	2.4
Effective interest rate (percent) 4/	...	0.0	0.0	0.0	0 0	0.1	2.9	2.4	1.8	1.3	1.0	1.6	0.8	0.8	0.8	0.8	0.8	0.8
Growth of exports of G&S (US dollar terms, in percent)	13.1	-5.3	-2.1	15.3	16.3	19.8	11.0	3.2	1.6	7.4	8.9	8.7	8.4	8.0	6.2	4.0	4.1	4.1
Growth of imports of G&S (US dollar terms, in percent)	11.0	-1.4	-3.3	11.2	14.1	13.6	6.3	-6.7	-8.4	-2.0	-1.1	0.3	6.4	6.4	5.2	5.2	6.2	1.1
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51 6
Government revenues (excluding grants, in percent of GDP)	21.9	24.5	30.5			29.4	30.7	28.2	27.9	27.2	26.5		24.1	23.7	26.5	26.8	26.8	25.2
Aid flows (in Millions of US dollars) 5/	1.5	23 6	13.0			78.6	73.3	98.4	127.0	142.2	149.2		177.0	181.1	252.5	270.5	294.7	
o/w Grants	1.5	23.6	13.0			59 1	40.7	50.7	61.9	71.0	77.2		111.9	119.8	179.9	192.7	209.9	
o/w Concessional loans	0.0	0 0	0.0			19.5	32.6	47.7	65.1	71.2	72.0		65.1	61.3	72.7	77.8	84.8	
Grant-equivalent financing (in percent of GDP) 6/	...	...	...			7.0	5.3	6.3	7.3	7.6	7.4		6.5	6.3	6.0	6.0	6.0	6.3
Grant-equivalent financing (in percent of external financing) 6/	...	...	...			88.0	78.5	76.5	75.2	75.7	76.6		82.2	83.6	86.1	86.1	86.1	83.8
Memorandum items:																		
Nominal GDP (Millions of US dollars)	797 6	861.9	912.0			991 0	1085.6	1192.5	1302.7	1424.5	1548.7		2245.0	2403.5	3607.6	3864.9	4210.2	
Nominal dollar GDP growth	17.5	8.1	5.8			8.7	9.5	9.8	9.2	9.3	8.7	9.2	7.1	7.1	7.1	7.1	8.9	7.6
PV of PPG external debt (in Millions of US dollars)			136.8			147.2	143.9	147.5	159.2	171.0	185.2		364.5	402.6	614.3	652.7	693.2	
(PVt-PVt-1)/GDPt-1 (in percent)						1.1	-0.3	0.3	1.0	0.9	1.0	0.7	1.9	1.7	1.1	1.1	1.0	1.5

Sources: Country authorities; and staff estimates and projections.

1/ Public sector external debt.

2/ Derived as [r - g - ρ(1+g)]/(1+g+ρ+gρ) 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/ Current-year interest payments divided by previous period debt stock.

5/ Defined as grants, concessional loans, and debt relief.

6/ 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).

7/ Historical averages and standard deviations are derived over FY2004/05-FY2009/10.

Table A2. Liberia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, FY2011-FY2030
(In percent)

										Projections										
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	**2020/21**	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
										PV of debt-to GDP ratio										
Baseline	15.1	13.4	12.5	12.4	12.2	12.1	13.2	14.0	14.8	15.7	**16.5**	17.0	17.2	17.3	17.4	17.4	17.4	17.3	17.1	16.7
A. Alternative Scenarios																				
A1. Key variables at their historical averages in 2010/11-2030/31 1/	15	22	29	34	38	42	46	50	54	59	**64**	69	73	77	81	84	87	89	91	92
A2. New public sector loans on less favorable terms in 2010/11-2030/31 2	15	14	15	16	17	18	21	22	24	25	**27**	28	28	29	29	29	29	29	29	29
B. Bound Tests																				
B1 Real GDP growth at historical average minus one standard deviation in 2011/12-2012/13	15	14	13	13	13	13	14	15	16	16	**17**	18	18	18	18	18	18	18	18	17
B2 Export value growth at historical average minus one standard deviation in 2011/12-2012/13 3/	15	17	20	20	19	19	20	20	21	21	**22**	22	22	22	21	21	21	20	20	19
B3 US dollar GDP deflator at historical average minus one standard deviation in 2011/12-2012/13	15	13	12	12	12	12	13	14	14	15	**16**	17	17	17	17	17	17	17	17	16
B4 Net non-debt creating flows at historical average minus one standard deviation in 2011/12-2012/13 4/	15	19	9	9	9	9	11	12	12	13	**14**	15	15	15	15	16	16	16	16	15
B5. Combination of B1-B4 using one-half standard deviation shocks	15	13	-4	-3	-2	-2	0	1	3	4	**5**	6	7	8	8	9	10	10	11	11
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011/12 5/	15	19	18	17	17	17	19	20	21	22	**23**	24	24	24	24	24	24	24	24	23
										PV of debt-to-exports ratio										
Baseline	23	20	20	21	21	21	22	23	24	25	**25**	26	26	26	26	26	26	26	27	27
A. Alternative Scenarios																				
A1. Key variables at their historical averages in 2010/11-2030/31 1/	23	33	45	58	66	71	78	82	87	93	**99**	106	111	115	120	125	130	134	141	149
A2. New public sector loans on less favorable terms in 2010/11-2030/31 2	23	21	23	27	30	32	35	37	38	40	**41**	42	43	43	43	43	44	44	45	47
B. Bound Tests																				
B1 Real GDP growth at historical average minus one standard deviation in 2011/12-2012/13	23	20	19	21	21	21	22	23	23	24	**25**	26	26	26	25	25	26	26	26	27
B2 Export value growth at historical average minus one standard deviation in 2011/12-2012/13 3/	23	28	38	39	39	38	39	39	38	39	**39**	40	39	38	37	37	36	36	36	36
B3 US dollar GDP deflator at historical average minus one standard deviation in 2011/12-2012/13	23	20	19	21	21	21	22	23	23	24	**25**	26	26	26	25	25	26	26	26	27
B4 Net non-debt creating flows at historical average minus one standard deviation in 2011/12-2012/13 4/	23	28	15	16	16	16	18	19	20	21	**22**	23	23	23	23	23	23	24	24	25
B5. Combination of B1-B4 using one-half standard deviation shocks	23	20	-6	-5	-4	-3	0	2	4	6	**8**	9	10	11	12	13	14	15	16	17
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011/12 5/	23	20	19	21	21	21	22	23	23	24	**25**	26	26	26	25	25	26	26	26	27
										PV of debt-to-revenue ratio										
Baseline	51	44	45	44	45	46	51	55	60	64	**68**	72	73	74	72	68	67	65	64	62
A. Alternative Scenarios																				
A1 Key variables at their historical averages in 2010/11-2030/31 1/	51	72	101	123	141	157	175	196	220	243	**267**	291	309	326	332	330	333	337	339	343
A2. New public sector loans on less favorable terms in 2010/11-2030/31 2	51	46	52	57	63	69	79	88	97	104	**111**	117	119	121	118	114	112	111	109	108
B. Bound Tests																				
B1 Real GDP growth at historical average minus one standard deviation in 2011/12-2012/13	51	45	47	46	47	48	53	58	63	67	**71**	75	76	77	75	71	70	68	67	65
B2 Export value growth at historical average minus one standard deviation in 2011/12-2012/13 3/	51	55	73	71	71	71	75	79	83	87	**90**	93	93	93	88	83	80	77	74	72
B3 US dollar GDP deflator at historical average minus one standard deviation in 2011/12-2012/13	51	43	43	43	44	45	49	54	58	63	**66**	70	71	72	70	67	65	64	62	61
B4 Net non-debt creating flows at historical average minus one standard deviation in 2011/12-2012/13 4/	51	62	34	34	35	36	41	45	50	55	**59**	62	63	65	63	61	60	59	58	57
B5. Combination of B1-B4 using one-half standard deviation shocks	51	43	-13	-10	-8	-6	0	6	11	17	**21**	26	28	32	34	35	37	38	39	40
B6 One-time 30 percent nominal depreciation relative to the baseline in 2011/12 5/	51	61	62	62	63	64	71	77	84	90	**96**	100	102	103	100	96	93	91	89	87

Table A2 Liberia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, FY2010-FY2030 (Concluded)
(In percent)

	Projections																			
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	**2020/21**	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Debt service-to-exports ratio																				
Baseline	1	3	3	3	4	3	1	1	1	0	**0**	0	0	1	1	1	1	1	1	1
A. Alternative Scenarios																				
A1. Key variables at their historical averages in 2010/11-2030/31 1/	1	3	3	3	4	3	1	2	1	1	**1**	1	2	2	2	2	2	3	3	3
A2. New public sector loans on less favorable terms in 2010/11-2030/31 2	1	3	3	4	4	4	2	2	1	1	**1**	1	1	2	2	2	2	2	2	2
B. Bound Tests																				
B1 Real GDP growth at historical average minus one standard deviation in 2011/12-2012/13	1	3	3	3	4	3	1	1	1	0	**0**	0	0	1	1	1	1	1	1	1
B2 Export value growth at historical average minus one standard deviation in 2011/12-2012/13 3/	1	4	4	4	4	4	1	1	1	1	**1**	1	1	1	1	1	1	1	1	2
B3 US dollar GDP deflator at historical average minus one standard deviation in 2011/12-2012/13	1	3	3	3	4	3	1	1	1	0	**0**	0	0	1	1	1	1	1	1	1
B4 Net non-debt creating flows at historical average minus one standard deviation in 2011/12-2012/13 4/	1	3	3	3	3	3	1	1	1	0	**0**	0	1	0	0	1	1	1	1	1
B5. Combination of B1-B4 using one-half standard deviation shocks	1	4	3	3	3	3	1	1	0	0	**0**	0	0	0	0	0	0	0	0	0
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011/12 5/	1	3	3	3	4	3	1	1	1	0	**0**	0	0	1	1	1	1	1	1	1
Debt service-to-revenue ratio																				
Baseline	2	7	8	7	7	7	2	2	2	1	**1**	1	1	2	2	2	2	2	2	2
A. Alternative Scenarios																				
A1. Key variables at their historical averages in 2010/11-2030/31 1/	2	7	8	7	8	7	3	4	3	3	**3**	3	4	5	6	6	6	7	7	7
A2. New public sector loans on less favorable terms in 2010/11-2030/31 2	2	7	8	7	8	8	3	4	4	3	**3**	4	4	4	5	5	5	5	5	5
B. Bound Tests																				
B1 Real GDP growth at historical average minus one standard deviation in 2011/12-2012/13	2	8	8	8	8	7	2	3	2	1	**1**	1	1	2	2	2	2	2	2	3
B2 Export value growth at historical average minus one standard deviation in 2011/12-2012/13 3/	2	7	8	7	8	7	2	3	2	1	**1**	1	2	3	3	3	3	3	3	3
B3 US dollar GDP deflator at historical average minus one standard deviation in 2011/12-2012/13	2	7	7	7	7	7	2	2	2	1	**1**	1	1	1	2	2	2	2	2	2
B4 Net non-debt creating flows at historical average minus one standard deviation in 2011/12-2012/13 4/	2	7	8	7	7	7	2	2	2	1	**1**	1	2	1	1	2	2	2	2	2
B5. Combination of B1-B4 using one-half standard deviation shocks	2	7	7	6	7	6	1	2	1	0	**0**	1	1	-1	0	0	0	1	1	1
B6 One-time 30 percent nominal depreciation relative to the baseline in 2011/12 5/	2	11	11	10	11	10	3	4	3	1	**1**	2	2	2	2	3	3	3	3	3
Memorandum item:																				
Grant element assumed on residual financing (i e , financing required above baseline) 6/	50	50	50	50	50	50	50	50	50	50	**50**	50	50	50	50	50	50	50	50	50

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 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 A3. Liberia: Public Sector Debt Sustainability Framework, Baseline Scenario, FY2008-FY2030
(In percent of GDP, unless otherwise indicated)

	Actual			Average	Standard Deviation	Estimate	Projections						
	2007/08	2008/09	2009/10			2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2020/21	2029/30
Public sector debt 1/	547.9	360.9	191.3			19.9	20.3	21.6	24.0	25.8	27.7	37.5	37.7
o/w foreign-currency denominated	547.9	360.8	191.2			18.9	18.4	18.9	20.6	21.8	23.2	30.7	28.7
Change in public sector debt	547.9	-187.0	-169.6			-171.3	0.3	1.3	2.4	1.8	1.9	1.4	-0.8
Identified debt-creating flows	...	-54.9	-212.6			-169.4	2.7	3.5	3.9	3.6	3.3	0.7	-1.1
Primary deficit	-3.6	1.6	-0.6	-0.8	2.3	1.9	3.8	4.7	5.2	5.1	4.8	2.4	1.2
Revenue and grants	22.1	27.3	31.9			35.4	34.4	32.4	32.6	32.2	31.5	29.1	31.7
of which: grants	0.2	2.7	1.4			6.0	3.8	4.3	4.8	5.0	5.0	5.0	5.0
Primary (noninterest) expenditure	18.5	28.9	31.3			37.3	38.2	37.1	37.8	37.3	36.3	31.5	32.9
Automatic debt dynamics	...	-56.5	2.8			-17.0	-1.1	-1.2	-1.3	-1.5	-1.5	-1.7	-2.3
Contribution from interest rate/growth differential	...	-42.8	-24.3			-14.7	-1.1	-1.1	-1.1	-1.3	-1.3	-1.6	-1.9
of which: contribution from average real interest rate	...	-12.6	-5.5			-1.4	0.4	0.3	0.2	0.1	0.0	0.0	0.1
of which: contribution from real GDP growth	0.0	-30.3	-18.8			-13.3	-1.5	-1.4	-1.3	-1.4	-1.3	-1.6	-1.9
Contribution from real exchange rate depreciation	...	-13.7	27.2			-2.3	0.0	-0.1	-0.1	-0.2	-0.2	...	...
Other identified debt-creating flows	0.0	0.0	-214.9			-154.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Privatization receipts (negative)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recognition of implicit or contingent liabilities	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt relief (HIPC and other)	0.0	0.0	-214.9			-154.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual, including asset changes	...	-132.1	43.0			-1.9	-2.4	-2.1	-1.6	-1.8	-1.4	0.6	0.3
Other Sustainability Indicators													
PV of public sector debt	...	...	...			17.8	16.8	16.5	16.8	16.9	17.3	23.7	25.9
o/w foreign-currency denominated	...	...	...			16.8	14.9	13.8	13.5	12.9	12.8	16.9	16.9
o/w external	...	...	...			15.1	13.4	12.5	12.4	12.2	12.1	16.5	16.7
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...	...	...
Gross financing need 2/	...	...	...			3.0	6.4	7.2	7.6	7.8	7.1	3.3	2.7
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	...			50.2	48.8	50.8	51.6	52.4	55.0	81.5	81.7
PV of public sector debt-to-revenue ratio (in percent)	...	...	...			60.3	54.8	58.5	60.4	61.9	65.4	98.3	96.9
o/w external 3/	...	...	...			51.2	43.9	44.5	44.4	44.7	45.8	68.2	62.4
Debt service-to-revenue and grants ratio (in percent) 4/	...	...	...			3.1	7.5	7.6	7.2	8.5	7.1	3.1	4.8
Debt service-to-revenue ratio (in percent) 4/	...	...	...			3.7	8.4	8.7	8.5	10.1	8.4	3.7	5.7
Primary deficit that stabilizes the debt-to-GDP ratio	...	...	...			173.2	3.5	3.4	2.8	3.3	2.9	1.0	2.0
Key macroeconomic and fiscal assumptions													
Real GDP growth (in percent)	8.2	5.8	5.5	3.0	9.2	7.5	8.4	7.3	6.3	6.0	5.4	4.7	5.3
Average nominal interest rate on forex debt (in percent)	...	0.0	0.0	0.0	0.0	0.1	2.7	2.2	1.7	1.3	0.9	0.8	0.8
Average real interest rate on domestic debt (in percent)	...	...	4.3	4.3	0.0	227.5	15.5	10.0	8.1	6.8	6.4	6.2	4.6
Real exchange rate depreciation (in percent, + indicates depreciation)	-4.5	-2.7	8.1	-3.2	5.4	-1.3	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	10.3	13.4	-0.8	9.5	4.8	5.3	4.0	5.3	5.7	6.1	6.0	5.2	6.4
Growth of real primary spending (deflated by GDP deflator, in percent)	0.7	0.7	0.1	0.2	0.4	0.3	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Grant element of new external borrowing (in percent)	...	...	...	...	...	51.6	51.6	51.6	51.6	51.6	51.6	51.6	51.6

Sources: Country authorities; and staff estimates and projections.

1/ The public sector comprises the central government, the Central Bank of Liberia (CBL), public enterprises , and other official sector entities.

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 derived over FY2004/05-FY2009/10.

Table A4. Liberia: Sensitivity Analysis for Key Indicators of Public Debt FY2011-FY2030

	Projections												
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2020/21	2021/22	2022/23	2027/28	2028/29	2029/30
	PV of Debt-to-GDP Ratio												
Baseline	18	17	16	17	17	17	19	24	25	25	26	26	26
A. Alternative scenarios													
A1. Real GDP growth and primary balance are at historical averages	18	12	6	0	-5	-10	-13	-18	-19	-20	-22	-22	-23
A2. Primary balance is unchanged from 2010/11	18	15	12	9	6	4	4	6	7	9	15	16	17
A3. Permanently lower GDP growth 1/	18	17	17	17	18	19	21	28	30	31	37	38	39
B. Bound tests													
B1. Real GDP growth is at historical average minus one standard deviations in 2011/12-2012/13	18	18	19	20	21	22	25	32	34	35	39	40	40
B2. Primary balance is at historical average minus one standard deviations in 2011/12-2012/13	18	14	10	11	11	12	14	19	20	21	23	23	23
B3. Combination of B1-B2 using one half standard deviation shocks	18	13	8	10	11	12	14	22	24	25	29	29	29
B4. One-time 30 percent real depreciation in 2011/12	18	23	22	21	20	19	20	24	25	26	28	28	28
B5. 10 percent of GDP increase in other debt-creating flows in 2011/12	18	27	26	26	25	26	27	31	31	32	32	32	31
	PV of Debt-to-Revenue Ratio 2/												
Baseline	50	49	51	52	52	55	61	82	86	88	84	83	82
A. Alternative scenarios													
A1. Real GDP growth and primary balance are at historical averages	50	34	18	0	-17	-31	-41	-64	-68	-70	-73	-74	-75
A2. Primary balance is unchanged from 2010/11	50	43	36	28	19	13	11	22	26	31	48	51	53
A3. Permanently lower GDP growth 1/	50	49	52	53	55	59	66	95	102	107	117	119	121
B. Bound tests													
B1. Real GDP growth is at historical average minus one standard deviations in 2011/12-2012/13	50	52	57	61	64	70	78	110	117	121	124	125	125
B2. Primary balance is at historical average minus one standard deviations in 2011/12-2012/13	50	41	32	34	35	38	44	66	70	73	72	72	71
B3. Combination of B1-B2 using one half standard deviation shocks	50	38	25	29	33	38	46	76	82	86	91	92	92
B4. One-time 30 percent real depreciation in 2011/12	50	68	67	64	61	62	65	83	88	91	89	89	88
B5. 10 percent of GDP increase in other debt-creating flows in 2011/12	50	78	80	79	79	81	86	105	109	111	102	100	98
	Debt Service-to-Revenue Ratio 2/												
Baseline	3	7	8	7	9	7	3	3	3	4	5	5	5
A. Alternative scenarios													
A1. Real GDP growth and primary balance are at historical averages	3	8	7	6	6	4	0	-2	-2	-3	-5	-5	-6
A2. Primary balance is unchanged from 2010/11	3	7	7	7	8	6	2	1	1	1	1	1	1
A3. Permanently lower GDP growth 1/	3	7	8	7	9	7	4	4	4	4	6	6	7
B. Bound tests													
B1. Real GDP growth is at historical average minus one standard deviations in 2011/12-2012/13	3	8	8	8	9	8	4	4	5	5	7	7	7
B2. Primary balance is at historical average minus one standard deviations in 2011/12-2012/13	3	7	7	6	8	6	3	3	3	3	3	4	4
B3. Combination of B1-B2 using one half standard deviation shocks	3	8	7	6	8	6	3	3	3	3	4	4	5
B4. One-time 30 percent real depreciation in 2011/12	3	9	11	10	12	10	5	4	4	5	7	7	7
B5. 10 percent of GDP increase in other debt-creating flows in 2011/12	3	7	9	9	10	8	4	4	4	6	7	7	7

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.