INTERNATIONAL MONETARY FUND

LIBERIA

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SEVENTH AND EIGHTH REVIEWS UNDER THE EXTENDED CREDIT FACILITY ARRANGEMENT, AND REQUEST FOR WAIVER OF NONOBSERVANCE OF PERFORMANCE CRITERIA —DEBT SUSTAINABILITY ANALYSIS

Risk of external debt distress:	moderate
Augmented by significant risks stemming from domestic public and/or private external debt?	No

Approved By
Dominique Desruelle (IMF) and Paloma Anos-Casero (IDA)

Prepared by the International Monetary Fund and the World Bank.

This Debt Sustainability Analysis (DSA)[1] updates the analysis presented to the Board in December 2016 as background for the Staff Report for the Fifth and Sixth Reviews of the Extended Credit Facility (ECF). Although Liberia's risk of debt distress remains moderate, debt has accumulated at a fast pace in recent years, in part due to multiple adverse shocks, and growth projections have deteriorated. Nonetheless, the debt-to-exports ratio—one of the key indicators for the debt distress rating—has improved compared to the previous DSA, reflecting a moderate upturn in gold production and opening of an iron ore mine site. The authorities need to be vigilant of growing debt vulnerabilities and enhance their efforts to mobilize domestic revenue and achieve fiscal consolidation, while protecting social spending.[2]

[1] The previous DSA may be found in Country Report No. 16/392 December 2016 Staff Report prepared for Board Meeting. The last full DSA may be found in IMF Country Report No. 16/8, published on January 8, 2016.

[2] Liberia's policies and institutions are classified as "weak" under the World Bank's Country Policy and Institutional Assessment (CPIA) Index (average score over 2013–15: 3.11). The relevant indicative thresholds for this category are: 30 percent for the PV of debt-to-GDP ratio, 100 percent for the PV of debt-to-exports ratio, 200 percent for the PV of debt-to-revenue ratio, 15 percent for the debt service-to-exports ratio, and 18 percent for the debt service-to-revenue ratio. These thresholds are applicable to public and publicly guaranteed external debt.

BACKGROUND

1. The external debt stock has been increasing at a fast pace, in part due to scaled-up infrastructure spending and multiple adverse shocks. Since September 2016 to June 2017, the total debt stock has increased from US$597 million to US$736 million. Currently, the external debt stock comprises mostly multilateral loans (Text Table 1). In FY2017, around US$218 million of external loans have been ratified, and the debt accumulation is expected to continue.

Text Table 1. Composition of External Debt Stock

	End of June 2017	
	Millions of $US	% of Total
Total debt stock	**736**	**100**
(as % of GDP)	**35**	
By creditors		
Multilateral including IMF	683	93
Of which:		
IMF	199	27
World Bank	291	40
AfDB	70	9
Bilateral	54	7

Sources: Liberian authorities; and IMF staff calculations

UNDERLYING ASSUMPTIONS

2. GDP projections have deteriorated while the outlook for export growth has improved both in the short- and medium-term. In the short run, GDP projections for FY2017 have been revised downward due to stronger-than-expected effects from the withdrawal of the United Nations Mission in Liberia (UNMIL) and lower commodity production in the second half of 2016. In FY2017, GDP growth is expected to contract by -2.2 percent, and exports are also expected to contract by -3.4 percent.[3] At the same time, export growth projections have improved, mainly due to improved gold production and opening of an iron ore mine site (Text Table 2). In the medium term, the GDP growth projection is also slightly lower than previously estimated, while export growth is more favorable than previously estimated.[4] Nonetheless, the baseline scenario remains subject to significant risks. On the downside, an unexpected deterioration in the security condition or a recurrence of Ebola could disrupt economic activity and investor sentiment and put additional

Text Table 2: Underlying DSA Assumptions

	FY2017		FY2017-FY2022	
	Dec 2016 DSA	Current DSA	Dec 2016 DSA	Current DSA
Real GDP growth (percent)	1.4	-2.2	5.2	4.2
Exports growth (percent)	-10.9	-3.4	1.5	4.5

Sources: Liberian authorities; and IMF staff projections

[3] All the variables including GDP and exports growth rates in DSA are in fiscal year (July to June) instead of calendar year for Liberia. Additional details on the external debt could also be found in MEFP ¶30.

[4] Dynamics of domestic interest rates changed since the last DSA update, partly because: (i) the yield of 2-year treasury bond issued in FY2017 (coupon bond) were relatively high (13 percent at issuance) and (ii) the implied interest rate was calculated using actual interest payments (which do not appear until FY2019).

pressure on fiscal balances. Conversely, a peaceful transition of power in January may release pent-up investment demand, lead to some repatriation of capital, and provide a boost to growth in 2018.

EXTERNAL DSA

3. **Liberia's risk of external debt distress remains moderate**. There are no breaches of indicative threshold under the baseline scenario for any debt indicator. The PV of debt-to-GDP ratio has deteriorated slightly since the 2016 December DSA. The PV of debt-to-GDP ratio under the baseline scenario is projected to increase from 23.1 percent in FY2017 to 27.5 percent in FY2019 and to decline gradually afterwards. The peak of 27.5 percent in the PV of debt-to-GDP ratio is higher than previously projected (23.4 percent in the December 2016 DSA). On the other hand, the PV of debt-to-exports ratio has improved mainly due to higher projected commodity prices and a moderate upturn in gold and iron ore mining, and is projected to increase from 76.5 percent in FY2017 and to a peak of 89.2 percent in FY2019, lower than previously projected (99 percent in the December 2016 DSA).

4. **However, debt vulnerabilities remain substantial, with some breaches of thresholds under extreme shock scenarios**. Under the most-extreme stress scenarios, either one-time depreciation shock or an export shock, both the PV of debt-to-GDP and the PV of debt-to-exports breach their thresholds even as early as FY2018 and remain breached at least until FY2030. Under the historical scenario case, the PV of debt-to-GDP and the PV of debt-to-exports breach after FY2030 or later. These breaches confirm the Liberian economy's vulnerability to external shocks such as the Ebola shocks, commodity price shock as a commodity exporter, and a sharp decline in the exchange rate and underscore the technical rating of moderate risk of external debt distress (Figure A1). Based on the probability approach, all the indicators under the baseline scenarios remain below the threshold. However, the PV of debt to GDP ratio is close to breach, reflecting Liberia's debt vulnerability (Figure A3).

PUBLIC DSA

5. **The public DSA has not significantly changed compared to the December update**. Under the baseline, most standard alternative scenarios, and the extreme stress test, the key debt indicator remains similar to the level in the December 2016 DSA. The PV of public debt-to-GDP ratio is expected to rise from 26.5 percent in FY2017 to around 28.9 percent in FY2019 and decline slowly thereafter (Figure A2). However, it should be noted that under a scenario in which the primary balance is fixed at its value in the first projection year, the ratio of total Public and Publicly Guaranteed (PPG) debt to GDP increases sharply and moves well above the benchmark in FY2026, and well above the benchmark for the remaining forecast period. The PV of debt-to-revenue and grants ratio is expected to rise from 90.3 percent in FY2017 to a peak of 105.6 percent in FY2019 and fall slowly afterwards; while the debt-service to-revenue and grants ratio is expected to reach a peak of 7.5 percent in FY2021 and decline thereafter. All these ratios have deteriorated since the December 2016 DSA, due to both a worse GDP projection and a faster pace of debt accumulation.

Over the medium term, while revenue is expected to increase due to on-going revenue mobilization efforts, grants are projected to decline sharply. Pro-growth and pro-poor spending needs also remain high. This highlights the critical importance of a prudent fiscal policy for debt sustainability in Liberia.

CONCLUSION

6. **Continued debt vulnerabilities call for a prudent debt management policy, a credible path of revenue mobilization and fiscal consolidation, and structural reforms to promote growth and economic diversification**. The DSA shows that Liberia's risk of debt distress remains moderate. The authorities agreed with staff's assessment and share staff's concerns about debt vulnerabilities. The authorities emphasize the importance of strengthening much-needed infrastructure while respecting the debt limits under the ECF. To keep the debt distress risk at moderate, they intend to continue prioritizing grants and concessional loans for pro-growth projects. Moreover, to enhance debt management capacity, (i) information flows between the legislature, the President's office, and the DMU of MFDP need to improve; and (ii) DMU needs to build capacity to do their own debt sustainability analysis and to update a medium-term debt strategy (MTDS) as needed. As Liberia remains vulnerable to external shocks (e.g., commodity price shocks) as a commodity exporter, the authorities need to be committed to a prudent borrowing strategy, the prioritization of pro-growth projects, and the diversification of the economy to make it more resilient to external shocks. Creating much needed fiscal space to meet social and development needs (one of the main pillars of the ECF-supported program) remains important and efforts on fiscal consolidation and revenue mobilization need to continue. While fiscal consolidation will be needed to keep a sustainable debt trajectory, the nature of the fiscal adjustment should not jeopardize critical spending for poverty reduction and productivity.

Table A1. Liberia: External Debt Sustainability Framework, Baseline Scenario, 2014–37[1/]

(Percent of GDP, unless otherwise indicated)

	Actual			Historical [6/]	Standard [6/]	Projections									
				Average	Deviation							2017-2022			2023-2037
	2014	2015	2016			2017	2018	2019	2020	2021	2022	Average	2027	2037	Average
External debt (nominal) 1/	**13.6**	**23.3**	**29.5**			**38.2**	**42.9**	**46.3**	**47.1**	**47.1**	**46.6**		**39.9**	**30.3**	
of which: public and publicly guaranteed (PPG)	13.6	23.3	29.5			38.2	42.9	46.3	47.1	47.1	46.6		39.9	30.3	
Change in external debt	2.7	9.7	6.3			8.7	4.6	3.5	0.8	0.0	-0.5		-1.0	-0.9	
Identified net debt-creating flows	7.7	11.8	9.2			10.8	6.0	5.2	3.7	2.0	0.5		0.2	-0.2	
Non-interest current account deficit	**28.1**	**31.4**	**29.6**	**26.7**	**7.1**	**25.3**	**27.2**	**27.5**	**24.6**	**23.5**	**22.3**		**16.0**	**13.0**	15.6
Deficit in balance of goods and services	71.8	86.3	79.5			68.5	60.3	53.8	47.2	42.7	38.4		29.4	21.2	
Exports	42.6	37.2	31.4			30.2	29.6	30.8	30.8	30.9	30.8		31.7	21.9	
Imports	114.4	123.5	110.9			98.7	89.9	84.6	78.0	73.5	69.1		61.1	43.1	
Net current transfers (negative = inflow)	-61.6	-70.5	-62.5	-82.5	27.5	-55.3	-46.0	-40.6	-37.3	-34.1	-30.8		-23.2	-13.3	-20.2
of which: official	-32.2	-35.0	-29.5			-31.7	-30.6	-28.8	-26.8	-24.0	-21.1		-15.6	-8.8	
Other current account flows (negative = net inflow)	17.9	15.7	12.7			12.2	12.8	14.3	14.8	15.0	14.7		9.8	5.0	
Net FDI (negative = inflow)	**-19.7**	**-19.9**	**-19.7**	**-20.8**	**7.3**	**-15.5**	**-19.3**	**-21.4**	**-18.9**	**-19.1**	**-19.2**		**-13.8**	**-11.5**	-13.6
Endogenous debt dynamics 2/	**-0.8**	**0.3**	**-0.7**			**0.9**	**-1.9**	**-0.9**	**-2.0**	**-2.4**	**-2.5**		**-1.9**	**-1.6**	
Contribution from nominal interest rate	0.1	0.2	0.2			0.3	0.5	0.3	0.3	0.4	0.4		0.3	0.2	
Contribution from real GDP growth	-0.6	0.4	-0.5			0.6	-2.4	-1.2	-2.4	-2.7	-2.9		-2.3	-1.9	
Contribution from price and exchange rate changes	-0.3	-0.3	-0.3			...	...	...	...	...	...		...	...	
Residual (3-4) 3/	**-5.0**	**-2.2**	**-3.0**			**-2.1**	**-1.4**	**-1.8**	**-2.9**	**-2.0**	**-1.0**		**-1.3**	**-0.6**	
of which: exceptional financing	0.0	-0.9	-0.9			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
PV of external debt 4/	...	...	17.9			23.1	25.5	27.5	27.4	26.8	26.0		22.0	17.1	
In percent of exports	...	...	57.1			76.5	86.4	89.2	88.9	86.9	84.5		69.4	78.0	
PV of PPG external debt	**...**	**...**	**17.9**			**23.1**	**25.5**	**27.5**	**27.4**	**26.8**	**26.0**		**22.0**	**17.1**	
In percent of exports	**...**	**...**	**57.1**			**76.5**	**86.4**	**89.2**	**88.9**	**86.9**	**84.5**		**69.4**	**78.0**	
In percent of government revenues	**...**	**...**	**82.0**			**103.4**	**112.2**	**113.1**	**108.5**	**105.0**	**100.5**		**90.5**	**63.1**	
Debt service-to-exports ratio (in percent)	**0.8**	**1.2**	**0.8**			**1.7**	**3.4**	**3.1**	**4.7**	**6.0**	**5.9**		**3.2**	**4.5**	
PPG debt service-to-exports ratio (in percent)	**0.8**	**1.2**	**0.8**			**1.7**	**3.4**	**3.1**	**4.7**	**6.0**	**5.9**		**3.2**	**4.5**	
PPG debt service-to-revenue ratio (in percent)	**1.4**	**2.0**	**1.2**			**2.2**	**4.5**	**3.9**	**5.8**	**7.3**	**7.0**		**4.2**	**3.6**	
Total gross financing need (Millions of U.S. dollars)	175.6	239.2	210.9			215.8	191.4	153.5	168.3	157.3	133.4		136.7	243.1	
Non-interest current account deficit that stabilizes debt ratio	25.4	21.8	23.4			16.6	22.5	24.0	23.9	23.5	22.8		17.0	13.8	
Key macroeconomic assumptions															
Real GDP growth (in percent)	5.7	-2.8	2.4	5.9	3.8	-2.2	6.5	2.8	5.5	6.2	6.6	4.2	6.1	6.5	6.2
GDP deflator in US dollar terms (change in percent)	2.4	2.3	1.5	5.1	2.9	2.8	-2.9	-1.3	1.6	1.3	2.1	0.6	2.8	2.3	2.7
Effective interest rate (percent) 5/	0.7	1.6	0.9	0.7	0.6	1.0	1.4	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8
Growth of exports of G&S (US dollar terms, in percent)	-3.0	-13.2	-12.3	5.6	16.1	-3.4	1.2	5.7	7.3	7.7	8.4	4.5	7.2	4.7	6.7
Growth of imports of G&S (US dollar terms, in percent)	8.9	7.3	-6.6	5.2	9.6	-10.5	-5.8	-4.5	-1.2	1.4	2.3	-3.1	6.5	4.9	5.7
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	47.0	49.9	54.2	58.8	58.6	58.9	54.6	52.9	54.0	53.6
Government revenues (excluding grants, in percent of GDP)	23.5	22.4	21.8			22.3	22.8	24.3	25.3	25.6	25.8		24.3	27.1	26.2
Aid flows (in Millions of US dollars) 7/	77.6	199.1	198.6			252.1	245.7	168.5	170.9	160.7	164.3		170.9	347.5	
of which: Grants	77.6	199.1	198.6			145.3	144.3	67.1	48.3	37.6	33.6		42.7	101.7	
of which: Concessional loans	0.0	0.0	0.0			106.8	101.5	101.5	122.6	123.1	130.7		128.1	245.8	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			10.6	10.0	6.0	5.1	4.4	4.0		2.6	2.3	2.6
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			72.2	75.3	70.6	70.5	68.3	67.3		64.6	67.4	65.4
Memorandum items:															
Nominal GDP (Millions of US dollars)	2005.9	1994.1	2073.0			2084.0	2154.4	2185.7	2342.4	2518.5	2741.1		4271.6	10168.6	
Nominal dollar GDP growth	8.2	-0.6	4.0			0.5	3.4	1.5	7.2	7.5	8.8	4.8	9.0	8.9	9.1
PV of PPG external debt (in Millions of US dollars)			352.0			444.7	515.3	575.6	620.8	655.9	692.6		925.3	1710.4	
(PVt-PVt-1)/GDPt-1 (in percent)						4.5	3.4	2.8	2.1	1.5	1.5	2.6	1.5	1.0	1.3
Gross workers' remittances (Millions of US dollars)	473.0	615.3	549.7			597.8	608.2	617.1	620.7	629.6	639.6		854.3	1016.9	
PV of PPG external debt (in percent of GDP + remittances)	...	...	14.2			18.0	19.9	21.4	21.7	21.5	21.1		18.3	15.5	
PV of PPG external debt (in percent of exports + remittances)	...	...	30.9			39.2	44.2	46.5	47.8	48.0	48.0		42.5	53.5	
Debt service of PPG external debt (in percent of exports + remittanc	...	...	0.4			0.9	1.8	1.6	2.5	3.3	3.4		2.0	3.1	

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private 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/ Assumes that PV of private sector debt is equivalent to its face value.

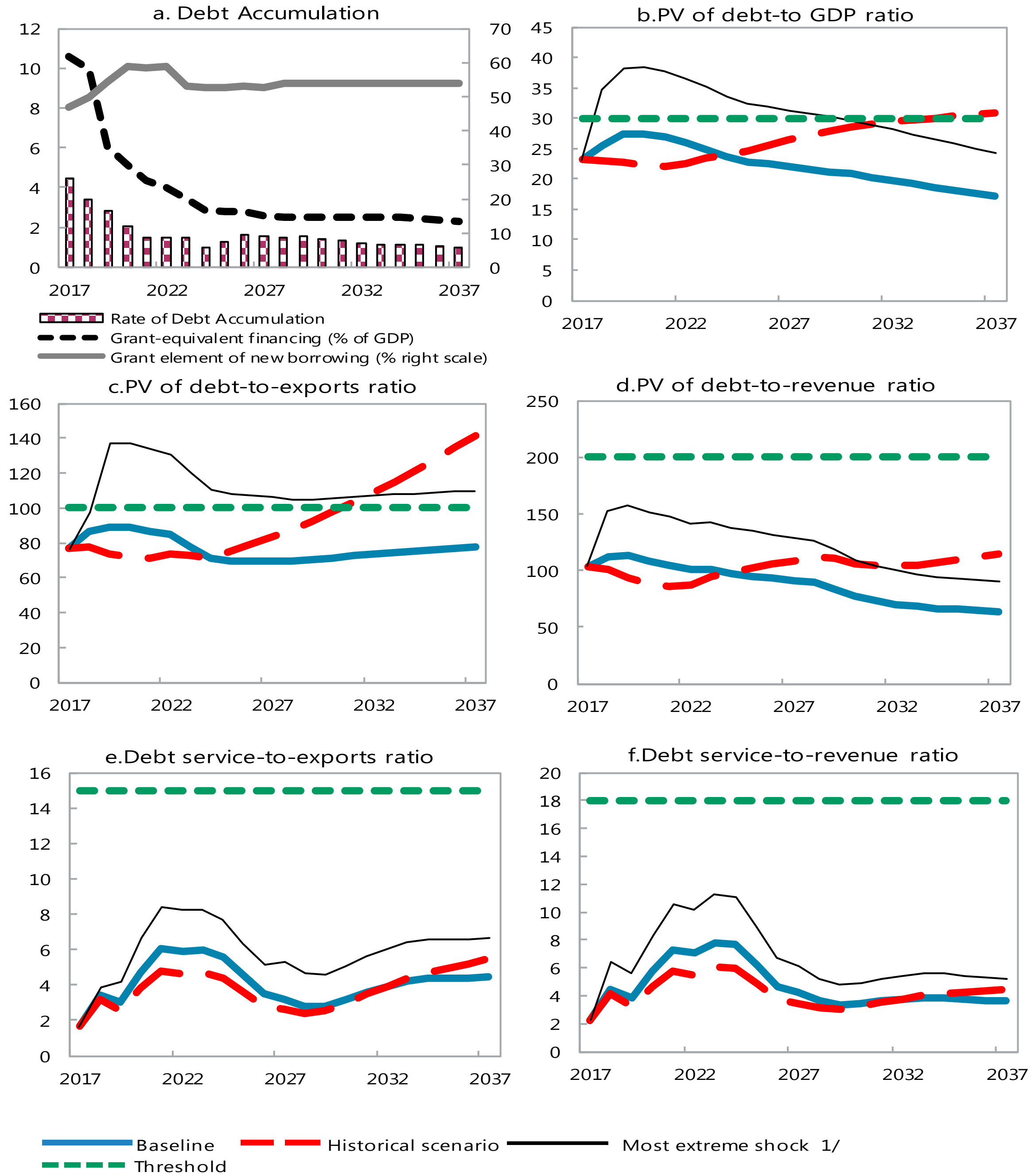
5/ Current-year interest payments divided by previous period debt stock.

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 A1. Indicators of Public and Publicly Guaranteed External Debt Under Alternative Scenarios, 2017–37[1/]



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio on or before 2027. In figure b. it corresponds to a One-time depreciation shock; in c. to a Exports shock; in d. to a One-time depreciation shock; in e. to a Exports shock and in figure f. to a One-time depreciation shock

Table A2. Liberia: Public Sector Debt Sustainability Framework, Baseline Scenario, 2014–37

(Percent of GDP; unless otherwise indicated)

	Actual					Estimate					Projections				
	2014	2015	2016	Average 5/	Standard Deviation 5/	2017	2018	2019	2020	2021	2022	2017-22 Average	2027	2037	2023-37 Average
Public sector debt 1/	16.7	25.4	30.1			41.6	46.7	47.8	48.1	48.0	47.6		40.1	30.5	
of which: foreign-currency denominated	16.2	24.1	30.0			38.7	43.7	47.1	47.9	47.9	47.4		39.9	30.3	
Change in public sector debt	4.3	8.7	4.7			11.5	5.2	1.0	0.4	-0.1	-0.4		-1.0	-0.9	
Identified debt-creating flows	1.0	9.7	4.0			8.1	3.7	3.1	0.3	-0.3	-1.2		-1.5	-2.1	
Primary deficit	1.8	9.5	3.9	1.7	3.4	7.1	5.4	3.9	3.2	2.7	2.3	4.1	1.5	0.2	0.7
Revenue and grants	27.4	32.4	31.4			29.3	29.5	27.4	27.3	27.0	27.1		25.3	28.1	
of which: grants	3.9	10.0	9.6			7.0	6.7	3.1	2.1	1.5	1.2		1.0	1.0	
Primary (noninterest) expenditure	29.2	41.9	35.3			36.4	34.8	31.3	30.6	29.7	29.4		26.8	28.3	
Automatic debt dynamics	-0.8	0.2	0.1			1.0	-1.7	-0.8	-3.0	-3.0	-3.5		-3.0	-2.3	
Contribution from interest rate/growth differential	-0.7	0.5	-0.7			0.5	-2.9	-1.2	-2.8	-3.2	-3.4		-2.8	-2.2	
of which: contribution from average real interest rate	0.0	0.0	-0.1			-0.1	-0.4	0.1	-0.3	-0.4	-0.4		-0.4	-0.3	
of which: contribution from real GDP growth	-0.7	0.5	-0.6			0.7	-2.5	-1.3	-2.5	-2.8	-3.0		-2.3	-1.9	
Contribution from real exchange rate depreciation	-0.1	-0.4	0.8			0.4	1.2	0.4	-0.2	0.2	-0.1		...	...	
Other identified debt-creating flows	0.0	0.0	0.0			0.0	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	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Residual, including asset changes	3.3	-1.0	0.7			3.4	1.5	-2.1	0.1	0.2	0.8		0.5	1.2	
Other Sustainability Indicators															
PV of public sector debt	...	...	18.5			26.5	29.4	28.9	28.4	27.7	27.0		22.2	17.3	
of which: foreign-currency denominated	...	...	18.4			23.6	26.3	28.3	28.2	27.6	26.8		22.0	17.1	
of which: external	...	...	17.9			23.1	25.5	27.5	27.4	26.8	26.0		22.0	17.1	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	2.2	10.8	5.7			7.7	9.0	8.7	5.5	4.9	4.3		2.8	1.5	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	58.9			90.3	99.9	105.6	104.1	102.5	99.6		87.7	61.5	
PV of public sector debt-to-revenue ratio (in percent)	...	...	84.7			118.4	129.2	119.0	112.5	108.5	104.3		91.3	63.8	
of which: external 3/	...	...	82.0			103.4	112.2	113.1	108.5	105.0	100.5		90.5	63.1	
Debt service-to-revenue and grants ratio (in percent) 4/	1.6	2.6	2.2			1.8	4.3	7.4	6.4	7.5	7.1		4.4	3.8	
Debt service-to-revenue ratio (in percent) 4/	1.9	3.8	3.1			2.4	5.5	8.3	7.0	7.9	7.4		4.6	4.0	
Primary deficit that stabilizes the debt-to-GDP ratio	-2.5	0.8	-0.8			-4.3	0.2	2.9	2.9	2.8	2.8		2.5	1.1	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	5.7	-2.8	2.4	5.9	3.8	-2.2	6.5	2.8	5.5	6.2	6.6	4.2	6.1	6.5	6.2
Average nominal interest rate on forex debt (in percent)	1.3	1.9	1.2	0.9	0.7	1.1	1.4	1.2	1.2	1.1	1.0	1.2	0.9	0.8	0.9
Average real interest rate on domestic debt (in percent)	...	-5.6	-6.8	-5.2	3.4	-10.7	-10.1	12.7	14.0	9.8	4.9	3.4	3.4	1.7	1.8
Real exchange rate depreciation (in percent, + indicates depreciation)	-0.9	-2.2	3.4	-2.6	4.2	1.4	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	9.2	7.4	9.3	9.4	3.5	18.3	12.8	10.1	9.6	7.9	8.2	11.1	5.9	5.4	6.1
Growth of real primary spending (deflated by GDP deflator, in percent)	-1.8	39.6	-13.6	2.6	13.7	0.8	1.8	-7.8	3.1	3.3	5.4	1.1	6.3	5.7	6.0
Grant element of new external borrowing (in percent)	...	...	...	...	...	47.0	49.9	54.2	58.8	58.6	58.9	54.6	52.9	54.0	...

Sources: Country authorities; and staff estimates and projections.

1/ The public sector debt in DSA covers the central budgetary government's gross debt.

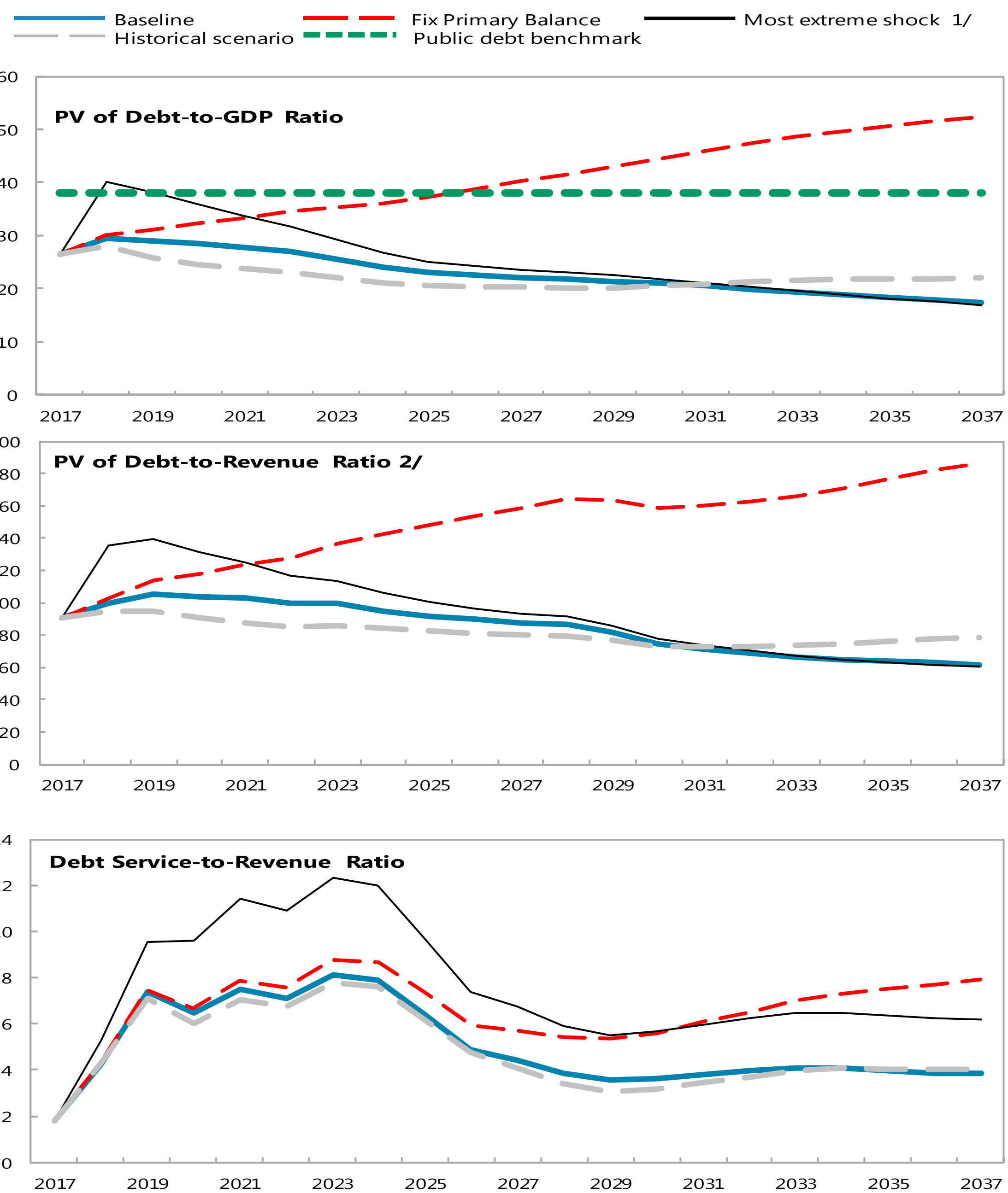
2/ Gross financing need is defined as the primary deficit plus debt service plus the stock of short-term debt at the end of the last period.

3/ Revenues excluding grants.

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

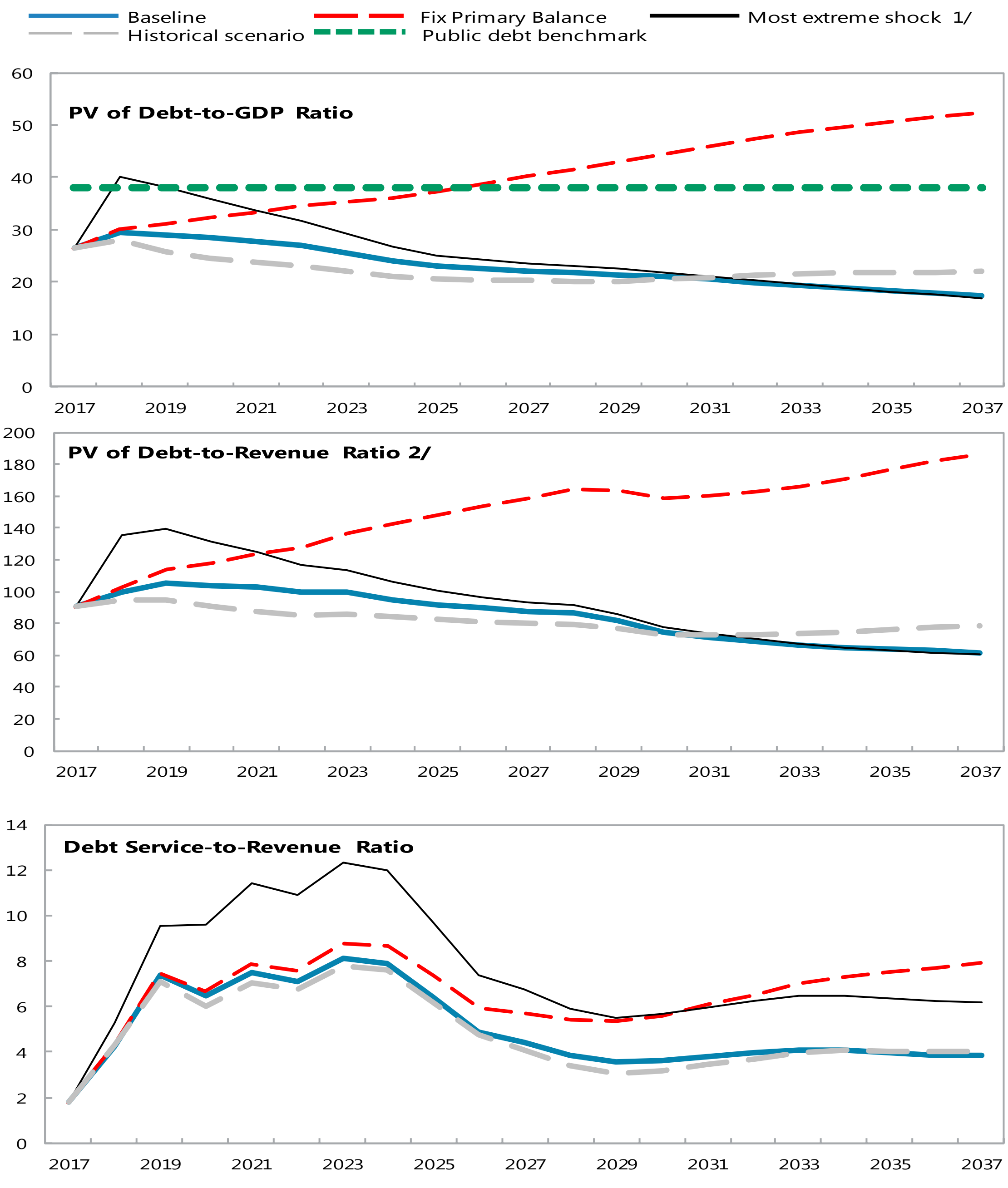
5/ Historical averages and standard deviations are generally derived over the past 10 years, subject to data availability.

Figure A2. Liberia: Indicators of Public Debt Under Alternative Scenarios, 2017–37[1/]



Sources: Country authorities; and staff estimates and projections.
1/ The most extreme stress test is the test that yields the highest ratio on or before 2027.
2/ Revenues are defined inclusive of grants.

Figure A2. Liberia: Indicators of Public Debt Under Alternative Scenarios, 2017–37[1/]



Sources: Country authorities; and staff estimates and projections.
1/ The most extreme stress test is the test that yields the highest ratio on or before 2027.
2/ Revenues are defined inclusive of grants.

Table A3. Liberia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2017–37

(Percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
PV of debt-to GDP ratio								
Baseline	23	26	27	27	27	26	**22**	17
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	23	23	23	22	22	23	**26**	31
A2. New public sector loans on less favorable terms in 2017-2037 2/	23	26	30	31	32	32	**32**	28
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	23	25	28	28	27	26	**23**	18
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	23	26	32	32	31	30	**25**	18
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	23	23	24	24	24	23	**20**	15
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	23	22	22	22	22	21	**19**	16
B5. Combination of B1-B4 using one-half standard deviation shocks	23	12	1	2	2	2	**5**	10
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	23	35	38	38	38	37	**31**	24
PV of debt-to-exports ratio								
Baseline	77	86	89	89	87	84	**69**	78
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	77	78	74	72	71	73	**83**	141
A2. New public sector loans on less favorable terms in 2017-2037 2/	77	86	96	101	104	105	**100**	129
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	77	81	85	86	84	82	**68**	77
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	77	98	137	137	134	130	**106**	110
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	77	81	85	86	84	82	**68**	77
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	77	76	70	71	70	69	**59**	72
B5. Combination of B1-B4 using one-half standard deviation shocks	77	46	4	7	8	9	**18**	57
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	77	81	85	86	84	82	**68**	77
PV of debt-to-revenue ratio								
Baseline	103	112	113	108	105	101	**91**	63
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	103	101	93	88	86	87	**109**	114
A2. New public sector loans on less favorable terms in 2017-2037 2/	103	112	122	124	126	126	**130**	104
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	103	109	114	110	107	103	**93**	65
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	103	112	130	125	121	116	**103**	66
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	103	100	99	96	93	90	**82**	57
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	103	98	89	87	85	82	**76**	58
B5. Combination of B1-B4 using one-half standard deviation shocks	103	55	4	7	8	9	**19**	37
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	103	152	157	152	147	141	**129**	90

Table A3. Liberia: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2017–37 (concluded)

(Percent)

Debt service-to-exports ratio								
Baseline	2	3	3	5	6	6	**3**	4
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	2	3	3	4	5	5	**3**	5
A2. New public sector loans on less favorable terms in 2017-2037 2/	2	3	3	5	7	7	**4**	7
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	2	3	3	5	6	6	**3**	4
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	2	4	4	7	8	8	**5**	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	2	3	3	5	6	6	**3**	4
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	2	3	3	4	6	6	**3**	4
B5. Combination of B1-B4 using one-half standard deviation shocks	2	4	3	4	5	5	**0**	3
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	2	3	3	5	6	6	**3**	4
Debt service-to-revenue ratio								
Baseline	2	4	4	6	7	7	**4**	4
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	2	4	3	5	6	5	**3**	4
A2. New public sector loans on less favorable terms in 2017-2037 2/	2	4	4	6	8	8	**5**	6
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	2	5	4	6	8	7	**4**	4
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	2	4	4	6	8	7	**5**	4
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	2	4	4	5	7	6	**4**	3
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	2	4	4	5	7	7	**3**	3
B5. Combination of B1-B4 using one-half standard deviation shocks	2	4	3	4	5	5	**-1**	2
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	2	6	6	8	11	10	**6**	5
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	53	53	53	53	53	53	**53**	53

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 A4. Liberia: Sensitivity Analysis for Key Indicators of Public Debt 2017–37

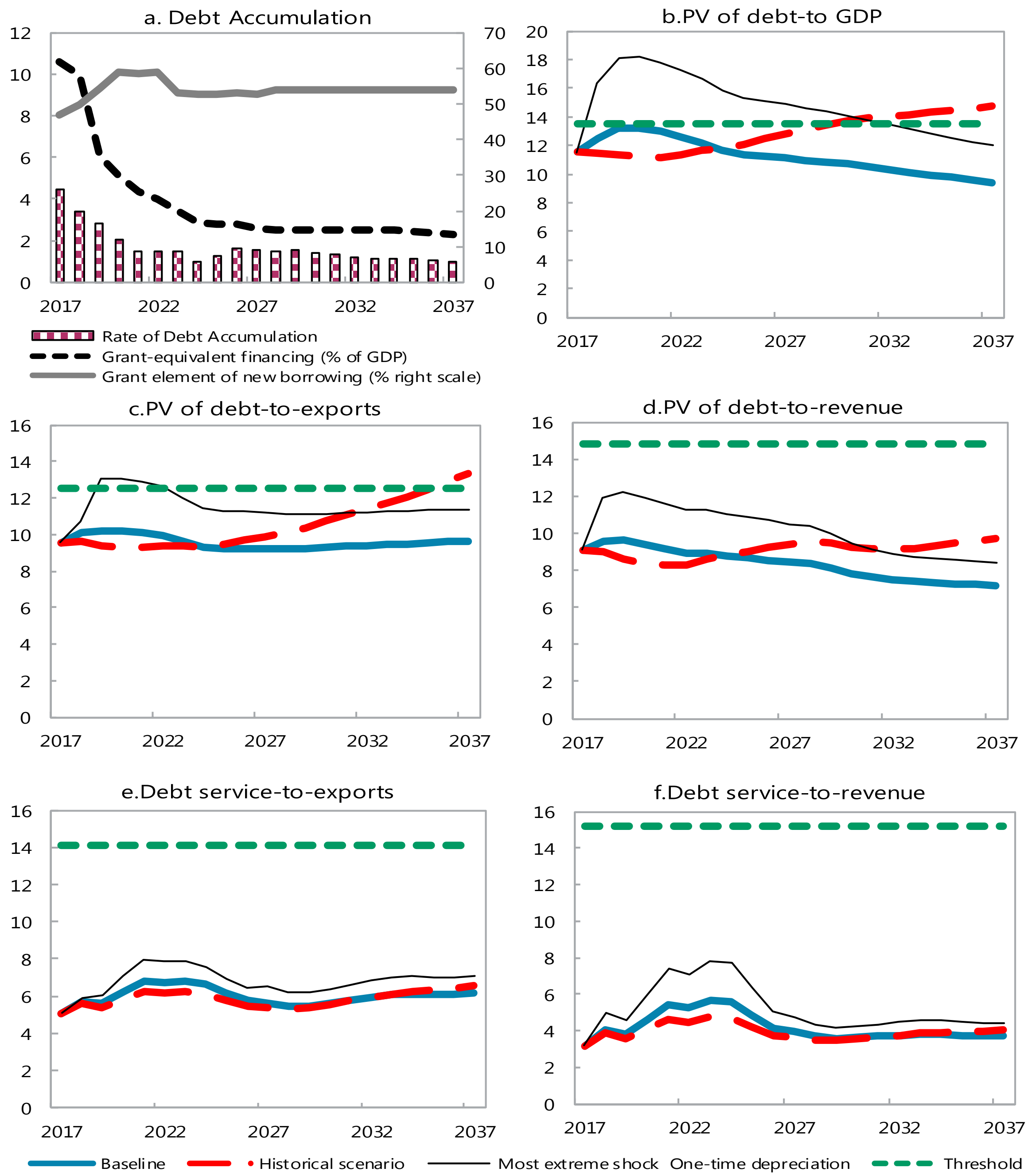
	Projections							
	2017	2018	2019	2020	2021	2022	2027	2037
PV of Debt-to-GDP Ratio								
Baseline	26	29	29	28	28	27	22	17
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	26	28	26	25	24	23	20	22
A2. Primary balance is unchanged from 2017	26	30	31	32	33	35	40	52
A3. Permanently lower GDP growth 1/	26	30	30	30	29	29	28	37
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	26	31	31	31	31	31	28	26
B2. Primary balance is at historical average minus one standard deviations in 2018-201	26	29	29	29	28	27	22	17
B3. Combination of B1-B2 using one half standard deviation shocks	26	29	28	28	27	27	23	19
B4. One-time 30 percent real depreciation in 2018	26	40	38	36	34	32	24	17
B5. 10 percent of GDP increase in other debt-creating flows in 2018	26	34	33	33	32	31	25	19
PV of Debt-to-Revenue Ratio 2/								
Baseline	90	100	106	104	103	100	88	62
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	90	95	94	90	88	85	80	79
A2. Primary balance is unchanged from 2017	90	102	114	118	123	128	159	187
A3. Permanently lower GDP growth 1/	90	101	108	108	109	108	112	130
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	90	105	114	114	115	114	110	91
B2. Primary balance is at historical average minus one standard deviations in 2018-201	90	99	107	106	104	101	89	62
B3. Combination of B1-B2 using one half standard deviation shocks	90	99	103	102	101	98	89	67
B4. One-time 30 percent real depreciation in 2018	90	136	139	132	125	117	93	60
B5. 10 percent of GDP increase in other debt-creating flows in 2018	90	114	121	119	118	114	100	67
Debt Service-to-Revenue Ratio 2/								
Baseline	2	4	7	6	8	7	4	4
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	2	4	7	6	7	7	4	4
A2. Primary balance is unchanged from 2017	2	4	7	7	8	8	6	8
A3. Permanently lower GDP growth 1/	2	4	7	7	8	7	5	6
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	2	4	8	7	8	8	5	5
B2. Primary balance is at historical average minus one standard deviations in 2018-201	2	4	7	6	8	7	4	4
B3. Combination of B1-B2 using one half standard deviation shocks	2	4	7	6	8	7	4	4
B4. One-time 30 percent real depreciation in 2018	2	5	10	10	11	11	7	6
B5. 10 percent of GDP increase in other debt-creating flows in 2018	2	4	8	7	8	7	5	4

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.

Figure A3. Liberia: Probability of Debt Distress of Public and Publicly Guaranteed External Debt under Alternatives Scenarios, 2017–37[1/]



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio on or before 2027. In figure b. it corresponds to a One-time depreciation shock; in c. to a Exports shock; in d. to a One-time depreciation shock; in e. to a Exports shock and in figure f. to a One-time depreciation shock