

INTERNATION DEVELOPMENT ASSOCIATION
INTERNATIONAL MONETARY FUND

REPUBLIC OF YEMEN

Joint Bank-Fund Debt Sustainability Analysis

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

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The Joint Bank-Fund low-income country debt sustainability analysis (DSA) undertaken here reconfirms last year's assessment that Yemen is at a high risk of external debt distress. Even under a baseline scenario that assumes considerable adjustment, the present value (PV) of debt-to-exports ratio breaches the sustainability threshold. Additional thresholds are breached under sensitivity tests. It will be critical for Yemen to maintain sound policies consistent with a prudent borrowing strategy.

I. INTRODUCTION

1. **This joint Bank-Fund debt sustainability analysis (DSA) suggests that Yemen remains at a high risk of (external) debt distress.** Current debt ratios are relatively low compared with the indicative thresholds for sustainability, but dwindling oil production over the medium term presents significant challenges. With unchanged policies, debt would quickly become unsustainable. Even under a baseline scenario that assumes comprehensive fiscal and structural reforms, one of the debt thresholds (PV of debt-to-exports ratio) is breached and two other indicators (PV of debt-to-GDP ratio and debt service-to-exports ratio) approach their respective threshold levels. Standard DSA stress tests highlight that external debt sustainability could be further weakened by adverse shocks, notably depreciation of the exchange rate, lower export growth, and less favorable financing terms. Strong fiscal and structural reforms, supported by concessional external financing, will thus be essential to avoid debt distress.

2. **The Yemeni authorities largely agreed with the staff analysis, but expressed some reservations about the “high risk” assessment given that current debt ratios are low relative to the indicative thresholds.** The staff emphasized the recent decline in economic performance (as manifest in the fiscal and external current account deficits), the forward-looking nature of the DSA, and the many risks to the macroeconomic framework and debt indicators over the medium and long term. In addition to the high vulnerability to

adverse developments highlighted by the stress tests, the staff also underscored that the baseline macroeconomic framework assumed an ambitious reform and policy adjustment program, the achievement of which would require a serious and sustained level of commitment and continued external support.

II. METHODOLOGY

3. The DSA uses the debt sustainability framework for low-income countries (IDA SecM2007-0226, SM/07/131). Debt sustainability is assessed in relation to policy-dependent thresholds for external debt burden indicators. According to the average Country Policy and Institutional Assessment index for 2007, Yemen is classified as a weak performer in terms of policies and institutions.¹

4. The DSA is based on the macroeconomic framework discussed with the authorities during the 2008 IMF Article IV Consultations. It assumes a sustained, front-loaded fiscal adjustment based on expenditure and revenue reforms in response to dwindling oil production. Beyond the medium term, it is assumed that the reform process would continue and intensify before and after the exhaustion of oil reserves—projected to occur around 2021. The outcome under this scenario is subjected to stress tests to assess its vulnerability to less favorable developments in key economic variables, including the macroeconomic consequences of maintaining current policies (a “nonadjustment” scenario).

III. BACKGROUND

5. This DSA updates the 2007 DSA (SM/07/298 Supp. 2; 8/31/07); it incorporates more recent macroeconomic data including on the Liquefied Natural Gas (LNG) project, which is expected to begin production and export in 2009 and boost significantly overall hydrocarbon output. The outlook also incorporates the most recent information on and domestic oil reserves and production, actual 2007 debt data, and recent WEO projections of key economic variables, including international oil prices. The risk rating remains unchanged from the DSA prepared in 2007.

A. The Current Situation

6. **After three years of continuous decline, Yemen’s net public debt to GDP increased moderately in 2007.** This was mainly on account of an increase in the primary fiscal deficit by over 8 percent of GDP, and the impact of debt-to-GDP ratio would have been higher had it not been for relatively high nominal GDP growth. Net public debt (domestic and external) increased from 33 percent of GDP in 2006 to 35.2 percent in 2007. The 2007 fiscal deficit (5.8 percent of GDP; cash basis) was financed mainly by drawing

¹ For a weak performer, the indicative thresholds for external debt sustainability are an PV of debt-to-exports ratio of 100 percent, and PV of debt-to-GDP ratio of 30 percent, and 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.

down government deposits at the central bank (by 1.7 percent of GDP, to 5.2 percent of GDP), and by borrowing from the domestic bank and non-bank sectors (which increased the gross stock of domestic debt by 1.5 percentage points to 13.5 percent of GDP). Although the external current account deteriorated sharply in 2007, this mainly reflected capital good imports related to the LNG project—financed by FDI. Consequently, external debt declined by about 2 percent of GDP.

Republic of Yemen: Composition of Total Public Debt, End-2007

	Millions of Dollars	Percent of GDP
1. Net domestic debt	1,790	8.3
Banks (incl. CBY)	1,450	6.7
Securitized (T-bills)	1,076	5.0
Non-securitized	376	1.7
Non-banks (securitized)	1,454	6.7
Government deposits at banks	-1,117	-5.2
2. External debt	5,818	26.9
Multilateral creditors	3,046	14.1
Bilateral creditors	2,772	12.8
Total debt (=1+2)	7,608	35.2

Source: Yemeni authorities.

7. **All external debt is owed to official creditors, and is mostly on concessional terms.** At end-2007, external debt amounted to \$5.8 billion, equivalent to 26.9 percent of GDP. Just over half of this debt was owed to multilateral creditors (including \$2.1 billion owed to the World Bank, \$0.6 billion owed to the Arab Fund for Social and Economic Development (AFESD), and \$170 million outstanding to the IMF), and the other half was owed to bilateral creditors (of which \$1.2 billion to Russia, \$0.3 billion to Saudi Arabia and \$240 million to Japan). Yemen benefited from a series of rescheduling arrangements under the Paris Club in 1996, 1997 and 2001. Bilateral agreements under these arrangements have been reached with most of the concerned donors. In 2007, Japan forgave about \$8 million of debt owed by Yemen.

8. **Domestic debt consists mostly of Treasury bills, held by domestic bank and non-bank investors.** Non-securitized debt held by domestic banks has been declining and amounted to less than 13 percent of the total stock of domestic debt in 2007. Treasury bills are issued at 3, 6 and 12 months maturities; the weighted average yield was about 16 percent in 2007. Although the majority of T-bills are held by domestic non-bank investors, banks acquired two-thirds of net new issues in 2007, bringing their share of domestic debt from about one-third in 2006 to more than 40 percent in 2007.

9. **Yemen does not have access to international capital markets, but official donor support in the form of grants and concessional loans is expected to continue in the medium and long-term.** Donors pledged concessional loans of about \$2 billion (and grants of about \$3 billion) at the Consultative Group meeting in London in 2006. Despite some reported delays in translating these pledges into actual commitments,² active efforts by the

² Reportedly, about 65 percent of these pledges have translated into actual commitments following bilateral agreements with the donors, although actual disbursements have been slow. This partly reflects the normal lag in the implementation of projects, but the authorities also indicated some delays in coming to terms with individual donors.

authorities to undertake an adjustment and reform program should help mobilize the remaining assistance. New loan agreements for about \$350 million were signed in 2007, and for about \$160 million in the first part of 2008.

B. Macroeconomic Assumptions

10. **This DSA assumes that the authorities respond to dwindling oil production and lower oil prices through strong macroeconomic policies and structural reforms that facilitate economic diversification and help maintain macroeconomic stability.** The baseline macroeconomic framework (Box 1) assumes that real GDP grows by about 4½ percent over the long term. Underlying this assumption is strong fiscal adjustment—based on enhanced revenue mobilization and containing recurrent expenditure—accompanied by increased exchange rate flexibility, an ongoing commitment to containing inflation, as well as structural reforms to improve the business environment and encourage investment. Under these assumptions, the non-interest current account balance is projected to register moderate deficits that would be financed largely by FDI.³

IV. DEBT ANALYSIS

A. Public Debt Sustainability

11. **Even under an ambitious (baseline) adjustment scenario, public debt indicators raise serious concerns about long-term debt sustainability.** Net public debt currently stands at 35.2 percent of GDP, a potentially large ratio in view of the government's low revenue mobilization capacity (non-hydrocarbon revenue was only 10 percent of GDP in 2007, of which tax revenue was only 7 percent). Although fiscal adjustment would improve the debt-to-GDP ratio in the medium term, this ratio is projected to approach 50 percent in the long term with the expected decline in oil revenue. The PV of public debt stood at 25 percent of GDP and 75 percent of revenue in 2007. These indicators are expected to increase to almost 40 percent of GDP and over 170 percent of revenue by 2028.

12. **Standard stress tests highlight Yemen's vulnerability to adverse economic developments, such as a less favorable growth outturn or a weaker fiscal adjustment.**

- If real GDP grew by 3.2 percent in 2009–10 (below baseline projections but close to actual growth rate of in 2006 and 2007), the PV of debt-to-GDP ratio would rise to about 65 percent and the PV of debt-to-revenue ratio would approach 300 percent by 2028.

³ Net FDI are projected to turn into outflows in 2010 following the completion of a major LNG investment project, but are expected to become positive again in the medium-to-long term.

Box 1. Macroeconomic Assumptions for the Baseline (Adjustment) Scenario

Given Yemen's high dependency on oil,⁴ the adjustment scenario encompasses a range of policy and structural reforms to address the expected end of oil production by 2021. After crude oil production ceases, hydrocarbon revenues are projected to drop dramatically to about 16 percent of fiscal revenues (from LNG exports and domestic gas sales) and to 26 percent of total merchandise exports.

In the **medium term (2009–13)**, real GDP growth is projected to average 5.2 percent, boosted by the start of LNG production in 2009. Reforms center on fiscal adjustment, with an average annual reduction in the non-oil primary deficit of 1.6 percent of GDP (after a larger reduction in 2009 due to lower oil prices). Key spending reforms include eliminating fuel subsidies by 2012, containing the civil service wage bill, better expenditure management, and increased (but better targeted) social spending, to protect the poor from the adverse effects of removing domestic fuel subsidies. Tax revenue would be enhanced by over 3 percentage points by: implementing fully the General Sales Tax (doubling the rate from 5 percent to 10 percent in 2011); improving customs and tax administration; eliminating exemptions in the customs, income tax, and investment laws; and introducing a tax on petroleum products (2012). Even with declining oil exports, the current account deficit is expected to narrow from 7 percent of GDP in 2007 to 1.7 percent of GDP on average from 2009 to 2013.

The long term projections are based on the following policy assumptions:

- **Moderate real GDP growth, averaging 4.3 percent from 2014 to 2028**, with non-hydrocarbon growth close to 5 percent offsetting the decline in oil output. These assumptions are in line with the historical experience: the non-oil sector grew at an average rate of 5.2 percent during 1991–2007. Continued non-hydrocarbon growth will depend on sustained fiscal, financial sector, and structural reforms to improve the investment environment, and sizeable donor-funded public investment.
- **Continued revenue mobilization efforts**, notably through a further increase in the GST rate to 12 percent in 2014, and further strengthening of the tax and customs administration to improve the efficiency of both direct and indirect tax collection (GST, customs duties, excises on petroleum products, and income tax).
- **Additional expenditure restraint**—including a concerted effort to reduce the public wage bill to below 6 percent of GDP by 2028—would also provide the fiscal space for the social welfare expenditures required to smooth the transition to a predominantly non-oil economy.
- A more flexible exchange rate arrangement, would allow the accumulation of **external reserves** that would be later used to smooth the impact of the end of oil production in 2021.
- Official creditors are expected to provide external financing on concessional terms over the projection period, as the loss of oil production will require continued reliance on concessional external assistance. Domestic financing is assumed to come from the bank and non-bank sectors at positive real interest rates.

Under these assumptions, the **overall fiscal balance** moves sharply into deficit with the loss of oil revenues (nearly 6½ percent of GDP in 2021), but improves thereafter as reforms take hold. The **non-interest current account deficit**, largely financed by foreign direct investment, widens to about 8 percent of GDP with the depletion of oil in 2021, but narrows thereafter, with a pick-up in non-oil exports (from a low base), fiscal moderation, and sustained inward remittances and official transfers.

⁴ Hydrocarbon earnings account for about 75 percent of fiscal revenues and 90 percent of merchandise exports.

- Permanently lower growth over the entire projection period by $\frac{1}{4}$ of a percentage point of GDP would result in a debt-to-GDP and debt-to-revenue ratio in excess of 50 percent and 225 percent, respectively, in 2028.
- If the primary deficit remained unchanged from the estimated 2008 level, by 2028 the debt-GDP ratio would approach 70 percent and the debt-revenue ratio would exceed 300 percent.
- An oil price \$20 below baseline projections in 2009 and 2010 would have a relatively modest impact on the debt sustainability indicators, reflecting the decline in domestic oil production and the shift to being a net oil importer.

13. **To highlight the critical need for reform and adjustment, debt dynamics were also evaluated under unchanged policies (a non-adjustment scenario). Under such a scenario, public debt quickly becomes unsustainable.** In the absence of structural reform and fiscal adjustment efforts, by 2018 the PV of public debt would exceed 100 percent of GDP and debt service would absorb about one-third of fiscal revenues. Beyond this, public debt would increase to such unsustainable levels so as to render a sharp (and potentially destabilizing) adjustment unavoidable.

B. External Debt Sustainability

14. **Under the baseline (adjustment) scenario, Yemen's external debt situation entails a high risk of debt distress.** Although all indicators are currently below the policy-dependent thresholds, the PV of debt-to-exports ratio is projected to rise above the 100 percent threshold by 2018 and the PV of debt-to-GDP ratio is projected to approach the 30 percent threshold by 2028. While other indicators remain below their respective thresholds, the outlook is projected to worsen as debt accumulates and the resources available to service it decline as a result of the loss of oil exports around 2021.

15. **This outcome is highly vulnerable to adverse shocks.** Under stress tests, two of the indicators (PV of debt-to-GDP and PV of debt-to-exports) breach their respective thresholds while another two (PV of debt-to-revenues and debt service-to-exports) approach the threshold level. Debt indicators are most vulnerable to a depreciation in the exchange rate, lower export growth, and less favorable financing terms. A one-time 30 percent devaluation of the Yemeni rial in 2009 would bring the PV of debt above 40 percent of GDP and almost 200 percent of fiscal revenue by 2028. If export growth remained one standard deviation below its historical average in 2009 and 2010, the PV of debt would peak at 245 percent of exports by 2025 and exceed 130 percent of fiscal revenue by 2028, and external debt service would rise above 10 percent of exports. If interest rates on new external borrowing were 2 percent higher than in the baseline, the PV of debt would peak above 240 percent of exports in 2025.

16. **Under the non-adjustment scenario, external debt would also become rapidly unsustainable.** Even assuming that financing would continue to be available on

comparatively favorable (but not fully concessional) terms, all thresholds are breached fairly rapidly, and exceeded by a considerable margin in the medium term. Under these conditions, little room would be left to absorb the shocks associated with the end of oil production around 2021.

V. CONCLUSION

17. This DSA confirms the results of last year's DSA that Yemen remains at a high risk of debt distress. Despite relatively low debt ratios at present, the recent deterioration in macroeconomic performance and the medium-term challenges presented by declining oil production and volatility in oil prices present considerable risks. Even assuming an ambitious reform agenda, sound macroeconomic policies, and continued support from the donor community, Yemen will face a difficult path in coming years. This highlights the need for early action on key reforms to strengthen public finances, bolster debt management, and boost prospects for investment and growth.

Table 1. Republic of Yemen: Public Sector Debt Sustainability Framework, Baseline Scenario, 2005–28
(In percent of GDP, unless otherwise indicated)

	Actual			Estimate		Projections								
				Standard Deviation	Average	2008	2009	2010	2011	2012	2013	2008–13 Average	2014–28 Average	
	2005	2006	2007			2008	2009	2010	2011	2012	2013	2008–13 Average	2014–28 Average	
Public sector debt 1/	37.1	33.0	35.2			33.9	37.2	35.4	33.3	31.1	30.4		31.5	48.7
Of which: foreign-currency denominated	30.9	28.7	26.9			22.3	21.8	19.4	18.0	17.1	17.2		21.5	39.4
Change in public sector debt	-8.4	-4.1	2.2			-1.3	3.3	-1.8	-2.2	-2.1	-0.7		0.6	-0.6
Identified debt-creating flows	-6.7	-7.2	1.8			-1.7	2.8	-2.2	-2.5	-2.5	-1.0		0.5	-0.6
Primary deficit	-0.7	-3.6	4.9	4.3	-1.1	3.4	3.2	2.2	0.1	-0.4	0.1	1.4	1.3	0.5
Revenue and grants	34.9	38.6	33.2			37.4	24.9	24.6	26.0	25.1	24.7		24.1	22.4
Of which: grants	0.4	0.4	0.3			0.4	0.8	0.4	0.5	0.6	0.6		0.9	0.9
Primary (noninterest) expenditure	34.2	35.0	38.0			40.8	28.1	26.8	26.1	24.7	24.8		25.4	22.9
Automatic debt dynamics	-6.0	-3.6	-3.0			-5.1	-0.3	-4.3	-2.6	-2.0	-1.1		-0.9	-1.1
Contribution from interest rate/growth differential	-2.9	-1.4	-1.2			-1.5	-0.8	-1.9	-1.1	-0.9	-0.9		-1.1	-1.9
Of which: contribution from average real interest rate	-0.5	-0.3	-0.1			-0.2	1.7	-0.2	0.4	0.5	0.4		0.3	0.2
Of which: contribution from real GDP growth	-2.4	-1.1	-1.1			-1.3	-2.4	-1.8	-1.5	-1.4	-1.4		-1.3	-2.1
Contribution from real exchange rate depreciation	0.0	0.0	0.0			-3.6	0.4	-2.4	-1.5	-1.1	-0.2		0.0	0.0
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	-1.7	3.1	0.4			0.5	0.4	0.4	0.3	0.3	0.3		0.1	0.0
Other Sustainability Indicators:														
PV of public sector debt	...	...	24.8			25.4	29.0	28.3	26.8	25.1	24.4		24.7	37.9
Of which: foreign-currency denominated	...	...	16.5			13.8	13.7	12.2	11.5	11.0	11.1		14.8	28.6
Of which: external	...	...	16.5			13.8	13.7	12.2	11.5	11.0	11.1		14.8	28.6
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...
Gross financing need 2/	3.3	-0.3	8.1			6.4	6.4	5.4	3.3	2.4	2.6		3.0	2.8
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	74.6			68.0	116.5	115.0	103.1	99.6	98.7		102.8	169.0
PV of public sector debt-to-revenue ratio (in percent)	...	...	75.4			68.6	120.2	117.0	105.1	102.2	101.1		106.8	176.1
Of which: external 3/	...	...	50.2			37.2	56.5	50.6	45.0	44.9	46.2		63.7	133.0
Debt service-to-revenue and grants ratio (in percent) 4/	11.4	8.4	9.9			8.0	12.9	13.2	12.3	11.4	10.2		7.2	10.6
Debt service-to-revenue ratio (in percent) 4/	11.6	8.5	10.0			8.1	13.3	13.5	12.6	11.7	10.4		7.4	11.1
Primary deficit that stabilizes the debt-to-GDP ratio	7.7	0.5	2.6			4.7	-0.1	3.9	2.3	1.7	0.8		0.7	1.0
Key macroeconomic and fiscal assumptions:														
Real GDP growth (in percent)	5.6	3.2	3.3	4.4		3.9	7.7	5.0	4.4	4.5	4.5	5.0	4.5	4.5
Average nominal interest rate on forex debt (in percent)	2.0	1.3	1.2	1.2	0.4	1.4	1.3	1.4	1.5	1.5	1.6	1.4	1.7	1.9
Average real interest rate on domestic debt (in percent)	-0.9	5.0	7.7	1.1	10.0	-1.0	15.7	-0.2	3.1	4.1	3.8	4.2	3.6	2.9
Real exchange rate depreciation (in percent, + indicates depreciation)	-8.6	-7.5	-6.9	-6.3	5.8	-13.9	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	18.5	13.6	10.9	13.1	12.5	18.6	-0.4	15.5	11.0	9.2	8.4	10.4	6.1	6.9
Growth of real primary spending (deflated by GDP deflator, in percent)	0.1	0.1	0.1	0.1	0.1	0.1	-0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Grant element of new external borrowing (in percent)	...	...	...	...	0.1	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7

Sources: Yemeni authorities; and Fund staff estimates and projections.

1/ Public sector refers to the combined central and local government; public debt refers to net public 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.

Table 2. Republic of Yemen: Sensitivity Analysis for Key Indicators of Public Debt 2008–28
(in percent)

	Projections							
	2008	2009	2010	2011	2012	2013	2018	2028
PV of Debt-to-GDP Ratio								
Baseline	25	29	28	27	25	24	25	38
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	25	26	23	20	18	17	8	...
A2. Primary balance is unchanged from 2008	25	30	31	33	35	37	49	69
A3. Permanently lower GDP growth 1/	25	30	30	29	27	27	30	51
A4. Non-adjustment scenario	26	34	39	46	54	61	101	272
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009–10	25	32	34	34	34	34	41	65
B2. Primary balance is at historical average minus one standard deviations in 2009–10	25	30	30	29	28	27	27	40
B3. Combination of B1-B2 using one half standard deviation shocks	25	28	27	27	27	28	34	56
B4. One-time 30 percent real depreciation in 2009	25	35	34	32	30	29	30	46
B5. 10 percent of GDP increase in other debt-creating flows in 2009	25	40	39	38	36	35	35	46
B6. Oil price \$10 below baseline projection in 2009–11.	25	31	31	30	28	27	28	41
PV of Debt-to-Revenue Ratio 2/								
Baseline	68	117	115	103	100	99	103	169
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	68	105	93	...	...	...	...	...
A2. Primary balance is unchanged from 2008	68	120	125	126	139	152	204	307
A3. Permanently lower GDP growth 1/	68	119	120	110	109	110	124	226
A4. Non-adjustment scenario	69	141	167	207	261	251	410	1383
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009–10	68	128	136	130	133	139	171	288
B2. Primary balance is at historical average minus one standard deviations in 2009–10	68	119	123	112	109	109	113	177
B3. Combination of B1-B2 using one half standard deviation shocks	68	114	111	105	107	111	139	248
B4. One-time 30 percent real depreciation in 2009	68	141	138	123	119	119	123	206
B5. 10 percent of GDP increase in other debt-creating flows in 2009	68	159	159	145	143	142	145	207
B6. Oil price \$10 below baseline projection in 2009–11.	68	136	136	123	110	110	115	184
Debt Service-to-Revenue Ratio 2/								
Baseline	8	13	13	12	11	10	7	11
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	8	13	11	...	...	...	...	...
A2. Primary balance is unchanged from 2008	8	13	13	14	17	25	50	74
A3. Permanently lower GDP growth 1/	8	13	13	13	12	11	12	31
A4. Non-adjustment scenario	8	13	16	20	26	27	33	99
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2009–10	8	13	15	17	19	21	32	62
B2. Primary balance is at historical average minus one standard deviations in 2009–10	8	13	13	13	15	11	10	13
B3. Combination of B1-B2 using one half standard deviation shocks	8	13	12	5	6	8	17	43
B4. One-time 30 percent real depreciation in 2009	8	14	15	14	14	13	13	26
B5. 10 percent of GDP increase in other debt-creating flows in 2009	8	13	19	44	20	40	20	26
B6. Oil price \$10 below baseline projection in 2009–11.	8	15	15	14	13	11	8	12

Sources: Yemeni authorities; and Fund staff estimates and projections.

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

2/ Revenues are defined inclusive of grants.

Table 3. Republic of Yemen: External Debt Sustainability Framework, Baseline Scenario, 2005–28 1/
(In percent of GDP, unless otherwise indicated)

	Actual			Historical Average		Projections							2014–28 Average		
	2005	2006	2007	Average	Standard Deviation	2008	2009	2010	2011	2012	2013	2008–13 Average	2018	2028	Average
External debt (nominal) 1/	30.9	28.7	26.9			22.3	21.8	19.4	18.0	17.1	17.2		21.5	39.4	
<i>Of which: public and publicly guaranteed (PPG)</i>	30.9	28.7	26.9			22.3	21.8	19.4	18.0	17.1	17.2		21.5	39.4	
Change in external debt	-7.6	-2.2	-1.8			-0.6	-0.5	-2.5	-1.4	-0.9	0.1		1.0	-0.5	
Identified net debt-creating flows	-8.6	-10.7	-1.8			-4.6	0.4	1.2	1.7	1.9	1.5		2.5	-0.6	
Non-interest current account deficit	-4.4	-1.4	6.7	-4.2	5.7	1.7	2.2	0.9	1.2	1.7	1.2		0.5	3.7	4.5
Deficit in balance of goods and services	-5.0	-0.4	7.3			-0.5	1.7	-0.1	0.6	1.7	2.3		5.7	7.6	
Exports	40.9	41.3	35.9			35.6	24.7	23.9	21.7	19.4	18.2		19.2	22.7	
Imports	35.9	40.8	43.2			35.1	26.4	23.9	22.3	21.1	20.5		4.9	-4.6	-4.8
Net current transfers (negative = inflow)	-8.4	-7.1	-6.6	-12.4	4.9	-5.6	-4.6	-3.5	-3.4	-3.5	-4.0		-4.9	-4.6	
<i>Of which: official</i>	-0.9	-0.6	-0.7			-0.4	-0.8	-0.5	-0.5	-0.7	-0.6		-1.0	-1.0	
Other current account flows (negative = net inflow)	9.0	6.1	5.9			7.7	5.0	4.5	4.0	3.5	3.0		1.7	0.7	
Net FDI (negative = inflow)	1.8	-5.9	-5.3	-0.4	3.4	-1.7	-0.5	1.0	1.0	0.7	0.7		-1.4	-3.3	
Endogenous debt dynamics 2/	-5.9	-3.4	-3.1			-0.6	-1.3	-0.7	-0.5	-0.5	-0.5		-0.6	-1.0	-2.3
Contribution from nominal interest rate	0.6	0.4	0.3			0.3	0.3	0.3	0.2	0.2	0.2		0.3	0.7	
Contribution from real GDP growth	-1.8	-0.9	-0.8			-0.9	-1.6	-0.9	-0.7	-0.7	-0.7		-0.9	-1.7	
Contribution from price and exchange rate changes	-4.8	-2.9	-2.6			...	...	...	...	...	...		...	...
Residual (3-4) 3/	1.0	8.5	0.0			-4.0	-0.8	-3.7	-3.1	-2.8	-1.4		0.5	0.1	
<i>Of which: exceptional financing</i>	-1.1	-0.1	0.0			-0.1	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
PV of external debt 4/	...	...	...			13.8	13.7	12.2	11.5	11.0	11.1		14.8	28.6	
In percent of exports	...	...	...			38.7	55.3	51.1	52.8	56.7	61.2		108.7	189.3	
PV of PPG external debt	...	...	...			16.5	16.5	15.1	14.5	14.0	14.1		14.8	28.6	
In percent of exports	...	...	...			38.7	55.3	51.1	52.8	56.7	61.2		108.7	189.3	
In percent of government revenues	...	...	...			37.2	56.5	50.6	45.0	44.9	46.2		63.7	133.0	
Debt service-to-exports ratio (in percent)	5.2	2.9	3.5			3.1	3.9	3.5	3.6	3.5	3.8		4.8	9.9	
PPG debt service-to-exports ratio (in percent)	5.2	2.9	3.5			3.1	3.9	3.5	3.6	3.5	3.8		4.8	9.9	
PPG debt service-to-revenue ratio (in percent)	6.2	3.1	3.8			3.0	3.9	3.4	3.1	2.8	2.9		2.8	7.0	
Total gross financing need (in billions of U.S. dollars)	-0.1	-1.2	0.6			0.3	0.8	0.9	1.2	1.4	1.3		1.1	1.8	
Non-interest current account deficit that stabilizes debt ratio	3.2	0.8	8.4			6.3	2.6	3.4	2.6	2.6	1.2		1.5	4.2	
Key macroeconomic assumptions:															
Real GDP growth (in percent)	5.6	3.2	3.3	4.4	1.1	3.9	7.7	5.0	4.4	4.5	4.5	5.0	4.5	4.5	4.3
GDP deflator in US dollar terms (change in percent)	14.3	10.4	9.9	8.2	10.3	18.2	-0.6	15.5	11.0	9.2	3.3	9.4	1.1	-0.1	0.1
Effective interest rate (percent) 5/	2.0	1.3	1.2	1.2	0.4	1.4	1.3	1.4	1.5	1.5	1.6	1.4	1.7	1.9	1.8
Growth of imports of G&S (U.S. dollar terms, in percent)	35.6	14.9	-1.2	15.2	27.6	21.6	-25.7	17.7	5.2	2.0	1.2	3.7	-0.3	11.7	3.5
Growth of imports of G&S (U.S. dollar terms, in percent)	22.1	29.6	20.3	12.2	11.0	-0.3	-19.4	9.7	8.4	7.8	4.9	1.8	4.5	3.6	5.2
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7
Government revenues (excluding grants, in percent of GDP)	34.5	38.2	32.8	...	...	37.0	24.2	24.2	25.5	24.5	24.1	...	23.2	21.5	21.7
Aid flows (in billions of U.S. dollars) 7/	0.3	0.4	0.4	...	...	0.4	0.7	0.8	0.9	1.1	1.2	...	2.2	2.6	...
<i>Of which: Grants</i>	0.1	0.1	0.1	...	...	0.1	0.2	0.1	0.2	0.3	0.3	...	0.6	0.8	...
<i>Of which: Concessional loans</i>	0.3	0.3	0.4	...	...	0.3	0.5	0.7	0.7	0.8	0.9	...	1.6	1.8	...
Grant-equivalent financing (in percent of GDP) 8/	...	...	...	...	...	0.8	1.4	1.1	1.1	1.3	1.2	...	1.8	1.6	...
Grant-equivalent financing (in percent of external financing) 8/	...	...	...	...	...	50.6	55.4	47.4	49.1	52.5	51.5	...	53.1	56.3	...
Memorandum items:															
Nominal GDP (in billions of US dollars)	16.7	19.1	21.7			26.6	28.5	34.5	40.0	45.7	49.3		65.3	93.9	
Nominal dollar GDP growth	20.7	13.9	13.6			22.8	7.1	21.3	15.9	14.2	8.0		14.9	5.7	4.4
PV of PPG external debt (in billions of US dollars)	...	...	...			3.7	3.9	4.2	4.6	5.0	5.5		9.6	26.9	
(PV-PV-1)/GDP-1 (in percent)	...	...	...			0.4	0.8	1.2	1.1	1.1	1.0		1.6	1.1	2.0

Source: Staff simulations.

1/ Includes both public and private sector external debt.

2/ Derived as $[r - g - r(1+g)] / (1+g+r+gr)$ times previous period debt ratio, with r = nominal interest rate; g = real GDP growth rate, and r = growth rate of GDP deflator in U.S. dollar terms.

3/ Includes exceptional financing (i.e., changes in arrears and debt relief); changes in gross foreign assets; and valuation adjustments. For projections also includes contribution from price and exchange rate changes.

4/ Assumes that PV of private sector debt is equivalent to its face value.

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

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

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

8/ Grant-equivalent financing includes grants provided directly to the government and through new borrowing (difference between the face value and the PV of new debt).

Table 4. Republic of Yemen: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2008–28
(In percent)

	Projections							
	2008	2009	2010	2011	2012	2013	2018	2028
PV of debt-to-GDP ratio								
Baseline	14	14	12	11	11	11	15	29
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008–28 1/	14	9	6	2	...	...	...	...
A2. New public sector loans on less favorable terms in 2008–28 2/	14	14	13	12	12	12	16	32
A3. Nonadjustment scenario	14	15	14	13	13	22	64	223
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2009–10	14	14	13	12	12	12	16	30
B2. Export value growth at historical average minus one standard deviation in 2009–10 3/	14	11	12	11	11	11	14	28
B3. US dollar GDP deflator at historical average minus one standard deviation in 2009–10	14	14	15	14	13	13	18	34
B4. Net non-debt creating flows at historical average minus one standard deviation in 2009–10 4/	14	14	11	10	10	10	14	28
B5. Combination of B1–B4 using one-half standard deviation shocks	14	5	-1	0	0	1	6	27
B6. One-time 30 percent nominal depreciation relative to the baseline in 2009 5/	14	20	18	16	16	16	21	41
B7. Oil price \$10 below baseline projection in 2009–11	14	15	13	12	11	11	15	29
PV of debt-to-exports ratio								
Baseline	39	55	51	53	57	61	109	189
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008–28 1/	39	38	24	9	...	...	...	...
A2. New public sector loans on less favorable terms in 2008–28 2/	39	56	52	55	59	65	118	215
A3. Nonadjustment scenario	40	59	59	65	73	98	336	1486
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2009–10	39	55	51	53	57	61	109	189
B2. Export value growth at historical average minus one standard deviation in 2009–10 3/	39	37	56	58	62	67	121	215
B3. US dollar GDP deflator at historical average minus one standard deviation in 2009–10	39	55	51	53	57	61	109	189
B4. Net non-debt creating flows at historical average minus one standard deviation in 2009–10 4/	39	56	46	48	52	56	102	186
B5. Combination of B1–B4 using one-half standard deviation shocks	39	16	-3	-1	2	4	35	132
B6. One-time 30 percent nominal depreciation relative to the baseline in 2009 5/	39	55	51	53	57	61	109	189
B7. Oil price \$10 below baseline projection in 2009–11	39	64	58	59	58	63	111	191
PV of debt-to-revenue ratio								
Baseline	37	57	51	45	45	46	64	133
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008–28 1/	37	39	23	7	...	...	...	...
A2. New public sector loans on less favorable terms in 2008–28 2/	37	57	52	47	47	49	69	151
A3. Nonadjustment scenario	38	62	60	62	65	92	270	1190
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2009–10	37	59	54	48	48	49	68	141
B2. Export value growth at historical average minus one standard deviation in 2009–10 3/	37	45	48	43	43	44	62	132
B3. US dollar GDP deflator at historical average minus one standard deviation in 2009–10	37	57	61	54	54	55	76	159
B4. Net non-debt creating flows at historical average minus one standard deviation in 2009–10 4/	37	57	46	41	41	42	60	131
B5. Combination of B1–B4 using one-half standard deviation shocks	37	23	-4	-1	2	4	27	124
B6. One-time 30 percent nominal depreciation relative to the baseline in 2009 5/	37	81	72	64	64	66	91	190
B7. Oil price \$10 below baseline projection in 2009–11	37	66	58	51	46	48	65	135
Debt service-to-exports ratio								
Baseline	3	4	3	4	4	4	5	10
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008–28 1/	3	4	3	3	2	2	...	...
A2. New public sector loans on less favorable terms in 2008–28 2/	3	4	4	4	4	4	7	12
A3. Nonadjustment scenario	3	4	4	4	4	5	16	90
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2009–10	3	4	3	4	4	4	5	10
B2. Export value growth at historical average minus one standard deviation in 2009–10 3/	3	3	4	4	4	4	5	11
B3. US dollar GDP deflator at historical average minus one standard deviation in 2009–10	3	4	3	4	4	4	5	10
B4. Net non-debt creating flows at historical average minus one standard deviation in 2009–10 4/	3	4	3	3	3	4	5	10
B5. Combination of B1–B4 using one-half standard deviation shocks	3	3	2	2	2	2	1	5
B6. One-time 30 percent nominal depreciation relative to the baseline in 2009 5/	3	4	3	4	4	4	5	10
B7. Oil price \$10 below baseline projection in 2009–11	3	4	4	4	4	4	5	10
Debt service-to-revenue ratio								
Baseline	3	4	3	3	3	3	3	7
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2008–28 1/	3	4	3	2	2	1	...	...
A2. New public sector loans on less favorable terms in 2008–28 2/	3	4	3	3	3	3	4	8
A3. Nonadjustment scenario	3	4	4	4	4	5	13	72
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2009–10	3	4	4	3	3	3	3	7
B2. Export value growth at historical average minus one standard deviation in 2009–10 3/	3	4	3	3	3	3	2	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2009–10	3	4	4	4	3	3	3	8
B4. Net non-debt creating flows at historical average minus one standard deviation in 2009–10 4/	3	4	3	3	3	3	3	7
B5. Combination of B1–B4 using one-half standard deviation shocks	3	4	3	2	2	2	1	5
B6. One-time 30 percent nominal depreciation relative to the baseline in 2009 5/	3	6	5	4	4	4	4	10
B7. Oil price \$10 below baseline projection in 2009–11	3	4	4	3	3	3	3	7
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	36	36	36	36	36	36	36	36

Source: Staff projections and simulations.

1/ Variables include real GDP growth, growth of GDP deflator (in U.S. dollar terms), non-interest current account in percent of GDP, and non-debt creating flows.

2/ Assumes that the interest rate on new borrowing is by 2 percentage points higher than in the baseline; grace and maturity periods are the same as in the baseline.

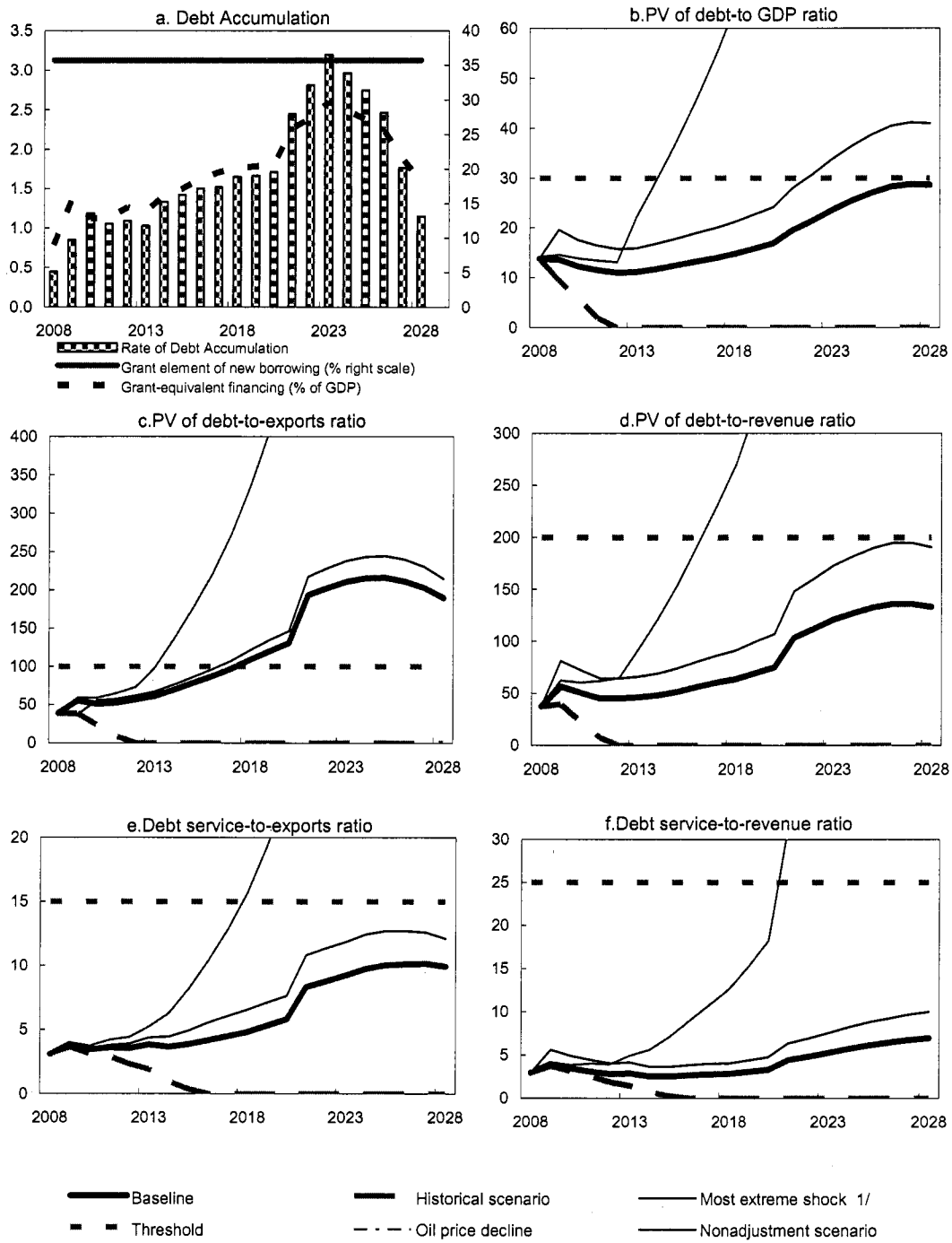
3/ Exports values are assumed to remain permanently at the lower level, but the current account as a share of GDP is assumed to return to its baseline level after the shock (implicitly assuming an offsetting adjustment in import levels).

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.

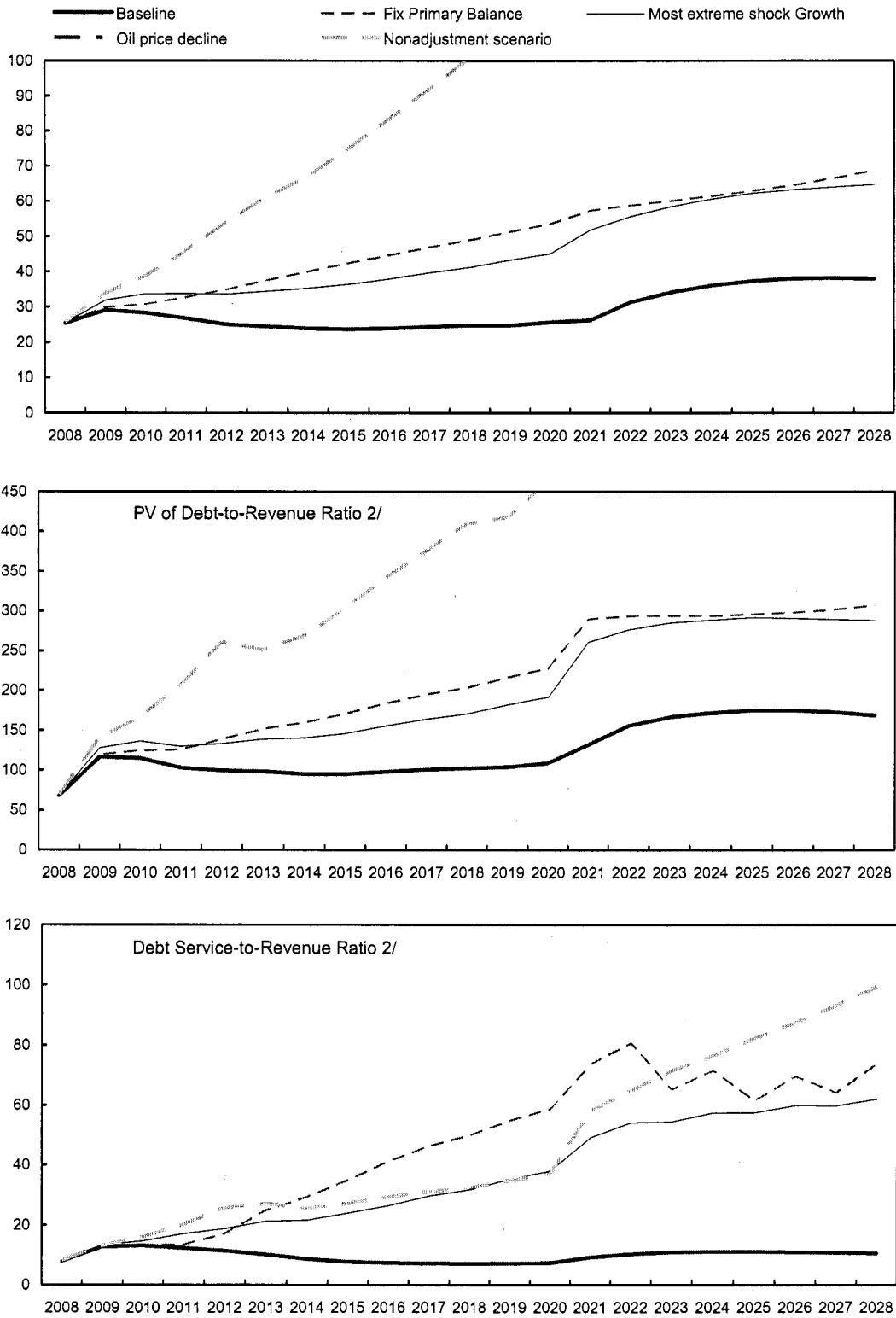
Figure 1. Republic of Yemen: Indicators of Public and Publicly Guaranteed External Debt Under Alternatives Scenarios, 2008–28 1/



Source: Staff projections and simulations.

1/ The most extreme stress test is the test that yields the highest ratio in 2018. In figure b. it corresponds to a one-time depreciation shock; in c. to a export shock; in d. to a one-time depreciation shock; in e. to a terms shock and in f. to a one-time depreciation shock

Figure 2. Republic of Yemen: Indicators of Public Debt Under Alternative Scenarios, 2008–28 1/



Sources: Yemeni authorities; and Fund staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2018.

2/ Revenues are defined inclusive of grants.