

BHUTAN: JOINT BANK-FUND DEBT SUSTAINABILITY ANALYSIS

External and public debt dynamics are assessed using the Low-Income Country Debt Sustainability Analysis (LIC-DSA) framework. Debt ratios remain elevated in the coming years due to additional hydropower projects. Notwithstanding the breach of some LIC-DSA indicative thresholds, staffs' assessment is that external debt dynamics are subject to a moderate risk of distress. This assessment is made on the basis of the near absence of commercial risk from Bhutan's major energy projects and the high level of its foreign exchange reserves in relation to external indebtedness.

I. BACKGROUND

1. **At end 2005/06, total public and publicly guaranteed (PPG) debt was about 82 percent of GDP, half of which was related to the Tala hydropower project financed by India.** Public debt increased by about 20 percentage points of GDP since 2001/02, with Tala debt accounting for most of the increase.¹ Domestic debt, all denominated in local currency and held by domestic financial institutions, remains moderate.² As for external debt, Indian rupee debt for the power sector amounted to 46¾ percent of GDP, and convertible currency debt was about 30 percent of GDP.³

II. UNDERLYING DEBT SUSTAINABILITY ANALYSIS ASSUMPTIONS

2. **The baseline incorporates the impact of two additional hydropower projects relative to the analysis in the 2005 Article IV consultation report.**⁴ The DSA in 2005 Article IV staff report incorporated only the ongoing Tala project (1020 MW, financed 60 percent in grants, and 40 percent in loans) with a 12-year maturity at 9 percent interest in Indian rupees). The following analysis incorporates the Punatsangchu I and Dagachu projects. The agreement for Puna I was signed in July 2007 with the Government of India (GOI). The Government of Austria and the Asian Development Bank are to finance Dagachu, with equity

¹ Fiscal year starting July 1.

² Domestic debt data compiled by the Royal Government of Bhutan include fixed rate debt relating to the purchase of one airplane for state-owned Druk Air in 2004/05, amounting to about half of total domestic debt. Debt related to the second airplane purchase and other state owned enterprises are not included in the data.

³ Convertible currency debt includes US\$9½ million commercial debt extended by the IFC, making all external debt public or publicly guaranteed.

⁴ Punatsangchu II and Mangdechhu are at early stages of conception and are not included in the projections.

participation by the Royal Government of Bhutan (RGB).⁵ In addition, relative to the previous analysis, the debt ratios have turned out to be more favorable due to better-than-expected fiscal balances and upward revisions in the GDP series.

3. **Underlining baseline macroeconomic assumptions are as follows.**

- **Real sector:** Real GDP spikes as Tala comes on stream in 2006/07, and Punatsangchu I is commissioned in 2016. The hydropower construction activities and the commissioning of Dagachu are projected to support growth in the interim. Inflation is projected to remain in line with price developments in India, with the ngultrum pegged to the Indian rupee.

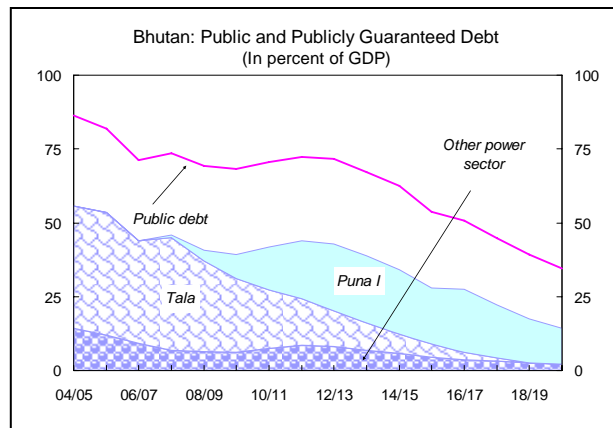
Bhutan: Structure of Public Sector Debt
(In percent of GDP)

	2001/02	2002/03	2003/04	2004/05	2005/06
Total debt	59.6	77.5	84.7	86.3	81.9
Domestic debt	2.3	7.5	6.5	7.6	4.5
External debt	57.3	70.0	78.2	78.7	77.5
Of which: hydropower projects	36.1	45.5	53.8	55.7	53.6
Tala	21.5	29.8	37.9	41.5	41.6

Source: Royal Monetary Authority of Bhutan; and staff estimates.

- **Fiscal sector:** Higher revenues from hydropower corporations and a broadening of the tax base will help raise the domestic revenue-to-GDP ratio. However, budgetary grants are expected to moderate in absolute terms as national income rises.

- **External sector:** Electricity exports when new power come on stream. import growth for hydropower construction and increased debt associated with projected. The account



jump projects Strong

service Tala are current

⁵ Puna I’s project capacity will be 1095 MW. The financing terms are: 40 percent grant, 60 percent loan, 10 percent interest rate. The entire financing will be in Indian rupees. Dagachu will be 114 MW. The external financing will be 75 percent in loans, at 7 percent. There is to be a 25 percent equity participation by the RGB.

deteriorates over the medium term. In the long run, the power sector contributes to balance of payment surpluses. New non-hydropower financing is assumed to have similar concessional terms as past loans.

4. **The net present value (NPV) calculation assumes a standard five percent discount rate for all loans.** Debt service for Tala includes repayment of interest during construction (IDC, which was deferred) but not interest on IDC.

III. EXTERNAL DEBT SUSTAINABILITY ANALYSIS

A. Baseline

5. **Power sector debt in Indian rupees shapes external PPG debt and debt service dynamics.** In NPV terms, the total and external public debt-to-GDP ratios are projected to dip in 2006/07 and 2007/08, when Tala comes on stream and boosts GDP.⁶ Over the medium term, disbursements for new projects are projected to offset repayments for Tala. When Puna I comes on stream in 2016/17, the NPV-to-GDP dips and remains below the LIC-DSA indicative thresholds for strong policy performance countries. Even though the debt service ratios rise when repayments for large power projects begin, they moderate in the long run and remain below the thresholds over most of the projection period. A further mitigating factor is the level of reserves, at about 50 percent of GDP and ten months of import cover and projected to rise further, which implies that repayment difficulties are in fact unlikely over the period when indicative debt burden thresholds are breached.

B. Sensitivity Analysis

6. **The debt ratios decline over time under most alternative scenarios, and eventually fall below the thresholds.** For Bhutan, the two most extreme stress tests involve (i) new borrowing on less favorable terms; and (ii) applying a one standard deviation shock to export growth.⁷ The indicators deteriorate over the medium term if the current account excluding interest payments is set at its historical average. This is because Tala-related imports in the past 10 years and the purchase of two airplanes in 2004/05 strongly bias the historical average upward. The recently observed pickup in electricity exports from Tala renders this scenario highly unlikely.

⁶ The addition of accumulated IDC (12 percent of GDP) in 2007/08 to the nominal debt stocks does not affect the public debt-to-GDP ratios in NPV terms (as it is already included), but does explain why the nominal debt-to-GDP ratio remains roughly unchanged in 2007/08, despite rapid GDP growth.

⁷ Since hydropower cycles have shaped Bhutanese exports over the past 10 years, the variation of export growth is very high. Applying a one standard deviation shock to export growth actually leads to a reduction in exports.

IV. PUBLIC DEBT SUSTAINABILITY ANALYSIS

A. Baseline

7. **The baseline public debt dynamics is driven by the external debt of the power sector.** Over the medium term, grant inflows of about 8–9 percent of GDP are expected to limit the overall fiscal deficit to 3–6 percent of GDP. With foreign financing of about 3½ percent of GDP, domestic financing should be limited to 1–2 percent of GDP, keeping domestic debt to below 11 percent of GDP over the medium term. In the long run, moderate broadening of the tax base and improvements in tax administration, combined with revenues from additional hydropower projects, will sustain the domestic revenue ratio at about 18 percent of GDP. This will help achieve a small overall fiscal surplus and enable a reduction in domestic debt.

B. Sensitivity Analysis

8. **The public debt ratios remain on a declining path over the long term under various stress tests.** However, the debt ratios would not improve drastically under the no-reform scenario which assumes a primary deficit of 3.6 percent of GDP. The difference from the baseline scenario stems from the projected path of the primary balance which averages to a small surplus over the next 20 years. Containing capital expenditure as well as broadening domestic tax base will be the key to ensure public debt sustainability.

V. STAFF ASSESSMENT

9. **Staffs view Bhutan's debt dynamics as sustainable but subject to a moderate risk of distress.**

- The analysis based on the LIC-DSA indicators and stress tests—showing the breaching of some LIC-DSA thresholds—suggests that external debt dynamics should be characterized as subject to a high risk of distress.
- However, there are strong mitigating factors:
 - Bhutan's own experience with construction, commissioning and management of large hydropower projects (which constitute the bulk of external debt) suggests that the projects are subject to low implementation risk. Hydropower projects have yielded expected growth dividends in the past. When Chukha, the first major hydropower project came on stream in 1986, the electricity sector grew by 800 percent in 1985/86, 370 percent in 1986/87, and 60 percent in 1987/88, boosting overall GDP growth rate to 10 percent, 23 percent, and 17 percent, respectively. While the Tala commissioning was delayed by a year to mid-2006, in 2006/07 it increased total electricity sales by 80 percent and exports by over 90 percent compared to a year earlier, and was the main source of the 17 percent

increase in real GDP over the same period. The loan repayments for the Chukha hydropower project are expected to be completed in 2007/08, twenty years after the commissioning of the project in the mid-1980s.

- Puna I is currently expected to have smaller real costs of construction than Tala for a larger generation capacity. As a result, Puna I's internal rate of return is estimated to be about 2 percentage points higher than Tala.
- The relationship with India suggests that commercial risk is essentially absent from these projects. A key factor in the successful implementation of Chukha, and in the case of other projects going forward, is Bhutan's relationship with India, which is both provider of financing for these large projects and the main consumer of their output. The two countries therefore maintain a close dialogue on the financial and technical aspects of the projects, besides the wider dialogue on support for annual budgets and the five-year plans. For instance, in the case of Tala cost overruns were financed by India on the same concessional terms as the original loan agreement.
- In light of these factors, characterization of debt dynamics as subject to moderate risk of distress is appropriate.

Table 1. Bhutan: Public Sector Debt Sustainability Framework, Baseline Scenario, 2004/05–2027/28

(In percent of GDP, unless otherwise indicated)

	Actual		Est. 06/07	Historical Average 5/	Standard Deviation 5/	Projection									
	04/05	05/06				07/08	08/09	09/10	10/11	11/12	07/08–12/13 average		17/18	27/28	13/14–27/28 average
Public sector debt 1/	86.3	81.9	71.3			73.5	69.2	68.2	70.6	72.2	71.7			44.8	11.7
Of which: external debt	78.7	77.5	64.8			64.0	59.0	57.1	60.1	62.4	61.2			38.1	11.7
Of which: convertible-currency denominated	30.5	30.7	26.2			22.3	22.7	22.5	24.6	26.2	25.7			19.1	11.7
Of which: domestic	7.6	4.5	6.5			9.5	10.2	11.0	10.5	9.8	10.5			6.7	0.0
Change in public sector debt	1.5	-4.3	-10.7			2.2	-4.3	-1.1	2.5	1.6	-0.5			-5.9	-1.3
Identified debt-creating flows	1.7	-3.4	-13.2			-8.5	-3.3	-0.5	4.6	3.5	-0.1			-6.0	-1.9
Primary deficit	5.9	0.2	2.1	3.6	4.9	2.4	1.6	1.1	2.3	1.7	1.4	1.7	-1.7	-0.5	-1.2
Revenue and grants	30.3	33.9	35.1			30.7	28.9	27.9	26.9	26.2	25.3			21.6	17.4
Of which: grants	12.7	16.3	14.0			11.1	9.5	9.0	8.6	8.1	7.7			2.8	0.1
Primary (noninterest) expenditure	36.2	34.1	37.2			33.1	30.6	28.9	29.1	27.9	26.7			19.8	16.8
Automatic debt dynamics	-9.1	-8.3	-15.4			-8.1	-4.8	-4.1	-4.1	-4.3	-4.6			-1.2	-0.6
Contribution from interest rate/growth differential	-7.1	-8.8	-12.9			-7.6	-4.4	-3.7	-3.8	-4.1	-4.4			-1.1	-0.5
Of which: contribution from average real interest rate	-1.9	-2.0	-1.5			0.9	0.3	0.2	0.0	-0.1	-0.2			0.8	0.0
Of which: contribution from real GDP growth	-5.2	-6.8	-11.4			-8.5	-4.7	-3.9	-3.8	-3.9	-4.2			-1.9	-0.5
Contribution from real exchange rate depreciation	-2.0	0.5	-2.5			-0.5	-0.4	-0.3	-0.3	-0.2	-0.2			...	...
Other identified debt-creating flows	4.9	4.8	0.0			-2.8	-0.1	2.5	6.4	6.1	3.1			-3.0	-0.8
Other (power sector debt)	4.9	4.8	0.0			-2.8	-0.1	2.5	6.4	6.1	3.1			-3.0	-0.8
Residual, including asset changes	-0.2	-1.0	2.6			10.7	-1.0	-0.6	-2.1	-2.0	-0.4			0.1	0.6
NPV of public sector debt	...	...	82.7			67.0	62.4	62.1	65.7	69.0	70.3			41.2	9.1
Of which: external	...	...	76.2			57.5	52.2	51.1	55.2	59.3	59.8			34.5	9.1
Of which: convertible-currency denominated	...	...	17.2			14.9	15.7	16.1	18.8	20.8	20.7			15.3	9.1
Of which: domestic	...	...	6.5			9.5	10.2	11.0	10.5	9.8	10.5			6.7	0.0
NPV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...			...	...
Gross financing need 2/	8.3	11.0	4.8			12.5	12.9	9.5	10.1	7.7	6.7			4.5	1.4
NPV of public sector debt-to-revenue and grants ratio (in percent)	...	...	235.7			218.2	215.5	222.9	244.6	263.8	278.3			191.3	52.3
NPV of public sector debt-to-revenue ratio (in percent)	...	...	392.1			341.2	321.2	329.9	359.0	382.9	400.5			220.2	52.6
Of which: external 3/	...	...	361.3			292.7	268.8	271.2	301.6	328.7	340.7			184.4	52.6
Debt service-to-revenue and grants ratio (in percent) 4/	7.7	5.9	7.7			27.1	25.3	23.8	22.1	20.4	19.2			28.7	11.1
Debt service-to-revenue ratio (in percent) 4/	13.2	11.3	12.8			42.3	37.7	35.2	32.4	29.6	27.6			33.1	11.1
Primary deficit that stabilizes the debt-to-GDP ratio	4.4	4.5	12.8			0.2	5.9	2.1	-0.2	0.1	1.9			4.1	0.8
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	6.9	9.1	17.0	8.6	3.1	14.4	7.2	6.3	6.2	6.1	6.4	7.8	4.0	4.2	5.2
Average nominal interest rate on forex debt (in percent)	1.4	1.7	1.4	1.4	0.2	1.3	1.4	1.6	1.7	2.2	2.5	1.8	2.2	1.5	2.0
Average real interest rate on domestic currency debt (in percent) 6/	-3.1	-3.4	-2.8	-4.3	1.7	3.0	0.8	0.6	0.1	-0.4	-0.9	0.5	2.7	5.9	2.2
Real exchange rate depreciation (in percent, + indicates depreciation)	-7.2	2.0	-10.0	-1.9	5.5	-2.2	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	5.0	4.6	4.3	5.8	2.1	5.2	5.0	4.7	4.5	4.2	3.9	4.6	3.9	3.9	3.9
Growth of real primary spending (deflated by GDP deflator, in percent)	23.4	2.5	27.9	9.4	18.7	1.7	-0.9	0.5	7.0	1.5	1.7	1.9	2.3	2.9	2.0

Sources: Data provided by the Bhutanese authorities; and Fund staff estimates and projections.

1/ Gross public and publicly guaranteed debt. In 2007/08, cumulative interest during construction for Tala (12 percent of GDP) is added to debt stock.

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/ Revenue excluding grants. The decline over the medium term mostly owes to declining receipts for Tala interest payments.

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.

6/ Including rupee debt.

Table 2. Bhutan: Sensitivity Analysis for Key Indicators of Public Debt 2007/08–2027/28 1/

	Staff projection							
	07/08	08/09	09/10	10/11	11/12	12/13	17/18	27/28
NPV of debt-to-GDP ratio								
Baseline	67	62	62	66	69	70	41	9
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	67	63	64	66	69	71	55	39
A2. Primary balance is unchanged from 2007/08	67	63	64	67	71	73	56	42
A3. Permanently lower GDP growth 2/	67	63	63	67	72	74	51	40
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008/09–2009/10	67	64	65	69	73	75	48	19
B2. Primary balance is at historical average minus one standard deviations in 2008/09–2009/10	67	72	82	86	89	89	55	17
B3. Combination of B1-B2 using one half standard deviation shocks	67	69	75	79	82	83	50	14
B4. One-time 30 percent real depreciation in 2008/09	67	78	77	81	85	86	54	18
B5. 10 percent of GDP increase in other debt-creating flows in 2008/09	67	76	77	80	83	83	50	14
NPV of debt-to-revenue ratio								
Baseline	218	215	223	245	264	278	191	52
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	218	219	231	252	272	288	260	224
A2. Primary balance is unchanged from 2007/08	218	218	229	250	272	289	258	242
A3. Permanently lower GDP growth 2/	218	217	225	249	272	290	233	228
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008/09–2009/10	218	219	230	255	277	295	220	107
B2. Primary balance is at historical average minus one standard deviations in 2008/09–2009/10	218	248	296	321	339	352	253	97
B3. Combination of B1-B2 using one half standard deviation shocks	218	237	270	294	313	327	232	83
B4. One-time 30 percent real depreciation in 2008/09	218	269	276	302	325	341	249	101
B5. 10 percent of GDP increase in other debt-creating flows in 2008/09	218	264	276	298	316	329	233	83
Debt service-to-revenue ratio								
Baseline	27	25	24	22	20	19	29	11
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	27	25	24	22	20	19	28	17
A2. Primary balance is unchanged from 2007/08	27	25	24	22	21	19	31	23
A3. Permanently lower GDP growth 2/	27	25	24	22	21	20	31	17
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2008/09–2009/10	27	26	24	23	21	20	30	13
B2. Primary balance is at historical average minus one standard deviations in 2008/09–2009/10	27	25	25	24	22	20	31	14
B3. Combination of B1-B2 using one half standard deviation shocks	27	25	24	23	21	20	30	13
B4. One-time 30 percent real depreciation in 2008/09	27	26	24	23	21	20	30	12
B5. 10 percent of GDP increase in other debt-creating flows in 2008/09	27	25	25	23	21	20	31	13

Sources: Data provided by the Bhutanese authorities; and Fund staff estimates and projections.

1/ Share of Indian rupee loans for additional borrowing is assumed to be 0.

2/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of 20 (i.e., the length of the projection period).

Table 3. Bhutan: External Debt Sustainability Framework, Baseline Scenario, 2004/05–2027/28 1/
(In percent of GDP, unless otherwise indicated)

	Actual		Est. 06/07	Historical Average 5/ 06/07	Standard Deviation 5/ 06/07	Staff Projection					2007/08–12/13	Staff Projection		2013/14–27/28	
	04/05	05/06				07/08	08/09	09/10	10/11	11/12	12/13	Average	17/18	27/28	Average
External debt (nominal) 1/	78.7	77.5	64.8			64.0	59.0	57.1	60.1	62.4	61.2		38.1	11.7	
Convertible currency debt	30.5	30.7	26.2			22.3	22.7	22.5	24.6	26.2	25.7		19.1	11.7	
Rupee debt	48.2	46.8	38.6			41.7	36.3	34.6	35.5	36.2	35.5		19.1	0.0	
Power sector debt	55.7	53.6	44.0			45.8	40.7	39.1	41.7	43.9	42.9		22.2	0.0	
Change in external debt	0.5	-1.2	-12.7			-0.8	-4.9	-1.9	3.0	2.3	-1.3		-5.6	-1.3	
Identified net debt-creating flows	17.4	-6.8	-26.4			-18.2	-7.4	-1.0	5.9	6.0	1.9		0.6	-7.3	
Non-interest current account deficit	27.8	2.3	-11.4	7.9	11.1	-13.3	-5.1	0.9	8.0	8.4	4.7		0.8	-6.7	-1.3
Deficit in balance of goods and services	33.6	14.1	-0.6			-6.1	0.0	5.2	11.2	11.2	7.4		-2.9	-14.6	
Exports	33.5	42.4	54.3			55.4	54.0	52.3	51.4	50.6	49.8		50.9	60.3	
Imports	67.1	56.5	53.7			49.3	54.0	57.5	62.6	61.8	57.2		47.9	45.6	
Net current transfers (negative = inflow)	-7.6	-12.0	-9.9	-10.4	3.2	-6.7	-4.7	-4.0	-3.4	-2.8	-2.3		4.2	7.9	5.0
Of which: official	-15.5	-20.0	-14.5			-13.5	-11.6	-11.0	-10.5	-9.9	-9.4		-3.5	-0.1	
Other current account flows (negative = net inflow)	1.8	0.2	-0.9			-0.5	-0.4	-0.3	0.3	0.1	-0.5		-0.5	0.1	
Net FDI (negative = inflow)	-1.2	-0.7	-1.0	-0.5	0.4	-0.9	-0.9	-0.8	-0.8	-0.7	-0.7		-0.5	-0.3	-0.5
Endogenous debt dynamics 2/	-9.2	-8.4	-13.9			-3.9	-1.4	-1.1	-1.3	-1.7	-2.1		0.3	-0.3	
Contribution from nominal interest rate	0.5	1.2	0.9			3.3	2.7	2.3	1.9	1.7	1.6		2.0	0.2	
Contribution from real GDP growth	-4.7	-6.3	-10.7			-7.2	-4.1	-3.4	-3.2	-3.4	-3.7		-1.7	-0.5	
Contribution from price and exchange rate changes	-5.0	-3.3	-4.1			...	...	...	...	...	...		...	...
Residual (3–4) 3/	-16.9	5.6	13.7			17.4	2.5	-0.9	-2.9	-3.7	-3.2		-6.2	6.0	
Of which: exceptional financing	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
NPV of external debt	...	...	76.2			57.5	52.2	51.1	55.2	59.3	59.8		34.5	9.1	
Convertible currency debt	...	...	17.2			14.9	15.7	16.1	18.8	20.8	20.7		15.3	9.1	
Rupee debt	...	...	59.0			42.5	36.4	34.9	36.5	38.4	39.1		19.3	0.0	
Power sector debt	...	...	63.1			45.8	40.1	39.1	42.8	46.4	46.9		22.5	0.0	
In percent of exports	...	...	140.3			103.8	96.6	97.6	107.5	117.2	120.2		67.9	15.1	
In percent of government revenues	...	...	361.3			292.7	268.8	271.2	301.6	328.7	340.7		184.4	52.6	
Debt service-to-exports ratio (in percent)	7.2	5.8	4.0			14.2	12.5	11.6	10.5	9.6	8.9		11.5	3.2	
Debt service-to-revenue ratio (in percent)	13.8	13.9	10.3			39.9	34.8	32.3	29.5	26.9	25.1		31.3	11.0	
Total gross financing need (billions of U.S. dollars)	213.4	35.4	-111.9			-89.0	12.4	105.7	235.7	253.7	183.6		207.4	-317.6	
Non-interest current account deficit that stabilizes debt ratio	27.3	3.5	1.3			-12.5	-0.2	2.8	5.0	6.1	5.9		6.4	-5.4	
Key macroeconomic assumptions															
Real GDP growth (in percent)	6.9	9.1	17.0	8.6	3.1	14.4	7.2	6.3	6.2	6.1	6.4	7.8	4.0	4.2	5.2
GDP deflator in U.S. dollar terms (change in percent)	6.8	4.3	5.6	3.6	3.4	12.2	4.8	2.8	2.5	2.2	2.0	4.4	1.9	1.9	1.9
Effective interest rate (percent) 4/	0.8	1.7	1.4	1.6	1.2	6.6	4.7	4.2	3.7	3.1	2.8	4.2	4.8	1.9	3.4
Growth of exports of goods and services (U.S. dollar terms, in percent)	36.8	44.3	58.2	19.5	22.3	30.8	9.7	5.8	6.9	6.8	6.8	11.1	7.2	8.5	8.6
Growth of imports of goods and services (U.S. dollar terms, in percent)	71.6	-4.1	17.5	16.5	20.9	17.6	23.3	16.3	18.4	7.1	0.5	13.9	6.0	6.2	5.6
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	3.6	-9.1	-27.8	-27.1	-28.6	-29.4	-19.7	33.3	33.3	27.5
Government revenues (excluding grants, in percent of GDP)	17.6	17.6	21.1			19.6	19.4	18.8	18.3	18.0	17.6		18.7	17.3	18.1
Aid flows (in billions of U.S. dollars) 6/	297.7	323.9	203.6			264.0	320.4	392.7	524.6	529.7	431.0		157.2	76.4	
Of which: grants	213.2	235.9	171.0			210.8	222.5	264.3	306.9	314.5	278.2		116.7	8.2	
Of which: concessional loans	84.5	88.1	32.7			53.1	97.8	128.4	217.8	215.2	152.8		40.5	68.1	
Grant-equivalent financing (in percent of GDP) 7/	...	...	...			15.3	13.7	13.4	13.3	12.5	10.6		3.9	0.5	3.2
Grant-equivalent financing (in percent of external financing) 7/	...	...	...			81.2	67.2	58.7	47.5	47.7	54.1		82.8	40.4	68.4
Memorandum items:															
Nominal GDP (in billions of U.S. dollars)	772.4	878.8	1,086.1			1,393.1	1,565.3	1,710.2	1,862.1	2,020.6	2,191.9		3,372.9	6,195.0	
Nominal dollar GDP growth	14.2	13.8	23.6			28.3	12.4	9.3	8.9	8.5	8.5	12.6	6.0	6.2	7.2
NPV of PPG external debt (in billions of U.S. dollars)			827.6			800.6	816.8	873.2	1,028.6	1,197.2	1,311.2		1,164.9	562.9	
(NPVt-NPVt-1)/GDPt-1 (in percent)						-2.5	1.2	3.6	9.1	9.1	5.6	4.3	-3.4	-0.7	-1.2

Source: Fund staff projections and simulations.

1/ All external debt is public or publicly guaranteed. In 2007/08, cumulative interest during construction for Tala (12 percent of GDP) is added to debt stock.

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

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

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

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

Table 4. Bhutan: Sensitivity Analyses for Key Indicators of Public and Publicly Guaranteed External Debt, 2007/08–27/28

(In percent)

	Staff Projection							
	07/08	08/09	09/10	10/11	11/12	12/13	17/18	27/28
NPV of debt-to-GDP ratio								
Baseline	57	52	51	55	59	60	35	9
A. Alternative scenarios								
A1. Key variables at their historical averages in 2008/09–27/28 1/	57	62	63	63	63	62	52	58
A2. New public sector loans on less favorable terms in 2008/09–27/28 2/	57	55	57	67	77	81	56	28
B. Bound tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008/09–09/10	57	53	52	57	61	61	35	9
B2. Export value growth at historical average minus one standard deviation in 2008/09–09/10 3/	57	57	64	68	72	72	43	11
B3. U.S. dollar GDP deflator at historical average minus one standard deviation in 2008/09–09/10	57	55	55	59	64	64	37	10
B4. Net nondebt creating flows at historical average minus one standard deviation in 2008/09–09/10 4/	57	51	48	52	56	57	32	9
B5. Combination of B1-B4 using one-half standard deviation shocks	57	51	45	50	54	55	31	8
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008/09 5/	57	73	72	77	83	84	48	13
NPV of debt-to-exports ratio								
Baseline	104	97	98	108	117	120	68	15
A. Alternative scenarios								
A1. Key variables at their historical averages in 2008/09–27/28 1/	104	115	121	123	124	125	101	97
A2. New public sector loans on less favorable terms in 2008/09–27/28 2/	104	101	110	131	152	163	111	47
B. Bound tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008/09–09/10	104	97	98	108	117	120	68	15
B2. Export value growth at historical average minus one standard deviation in 2008/09–09/10 3/	104	120	151	162	174	177	104	23
B3. U.S. dollar GDP deflator at historical average minus one standard deviation in 2008/09–09/10	104	97	98	108	117	120	68	15
B4. Net nondebt creating flows at historical average minus one standard deviation in 2008/09–09/10 4/	104	94	91	101	111	114	64	14
B5. Combination of B1-B4 using one-half standard deviation shocks	104	93	83	93	103	106	58	13
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008/09 5/	104	97	98	108	117	120	68	15
NPV of debt-to-revenue ratio								
Baseline	293	269	271	302	329	341	184	53
A. Alternative scenarios								
A1. Key variables at their historical averages in 2008/09–27/28 1/	293	319	336	346	349	355	275	338
A2. New public sector loans on less favorable terms in 2008/09–27/28 2/	293	282	305	367	425	463	301	165
B. Bound tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008/09–09/10	293	273	278	309	337	349	189	54
B2. Export value growth at historical average minus one standard deviation in 2008/09–09/10 3/	293	296	342	371	397	408	230	64
B3. U.S. dollar GDP deflator at historical average minus one standard deviation in 2008/09–09/10	293	281	291	324	353	366	198	56
B4. Net nondebt creating flows at historical average minus one standard deviation in 2008/09–09/10 4/	293	261	253	284	311	323	173	50
B5. Combination of B1-B4 using one-half standard deviation shocks	293	262	241	273	302	315	165	48
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008/09 5/	293	377	380	423	460	477	258	74
Debt service-to-exports ratio								
Baseline	14	13	12	11	10	9	12	3
A. Alternative scenarios								
A1. Key variables at their historical averages in 2008/09–27/28 1/	14	12	12	11	9	8	11	6
A2. New public sector loans on less favorable terms in 2008/09–27/28 2/	14	13	12	12	13	14	11	6
B. Bound tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008/09–09/10	14	13	12	11	10	9	12	3
B2. Export value growth at historical average minus one standard deviation in 2008/09–09/10 3/	14	14	15	14	13	12	17	5
B3. U.S. dollar GDP deflator at historical average minus one standard deviation in 2008/09–09/10	14	13	12	11	10	9	12	3
B4. Net nondebt creating flows at historical average minus one standard deviation in 2008/09–09/10 4/	14	13	12	10	9	9	11	3
B5. Combination of B1-B4 using one-half standard deviation shocks	14	13	11	10	9	8	10	3
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008/09 5/	14	13	12	11	10	9	12	3
Debt service-to-revenue ratio								
Baseline	40	35	32	30	27	25	31	11
A. Alternative scenarios								
A1. Key variables at their historical averages in 2008/09–27/28 1/	40	35	33	30	27	24	31	21
A2. New public sector loans on less favorable terms in 2008/09–27/28 2/	40	35	34	34	37	40	29	21
B. Bound tests								
B1. Real GDP growth at historical average minus one standard deviation in 2008/09–09/10	40	35	33	30	28	26	32	11
B2. Export value growth at historical average minus one standard deviation in 2008/09–09/10 3/	40	35	33	32	30	28	37	14
B3. U.S. dollar GDP deflator at historical average minus one standard deviation in 2008/09–09/10	40	36	35	32	29	27	34	12
B4. Net nondebt creating flows at historical average minus one standard deviation in 2008/09–09/10 4/	40	35	32	29	26	24	30	10
B5. Combination of B1-B4 using one-half standard deviation shocks	40	36	33	29	26	25	29	10
B6. One-time 30 percent nominal depreciation relative to the baseline in 2008/09 5/	40	49	45	41	38	35	44	15
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	15	15	15	15	15	15	15	15

Source: Fund 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 nondebt 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.

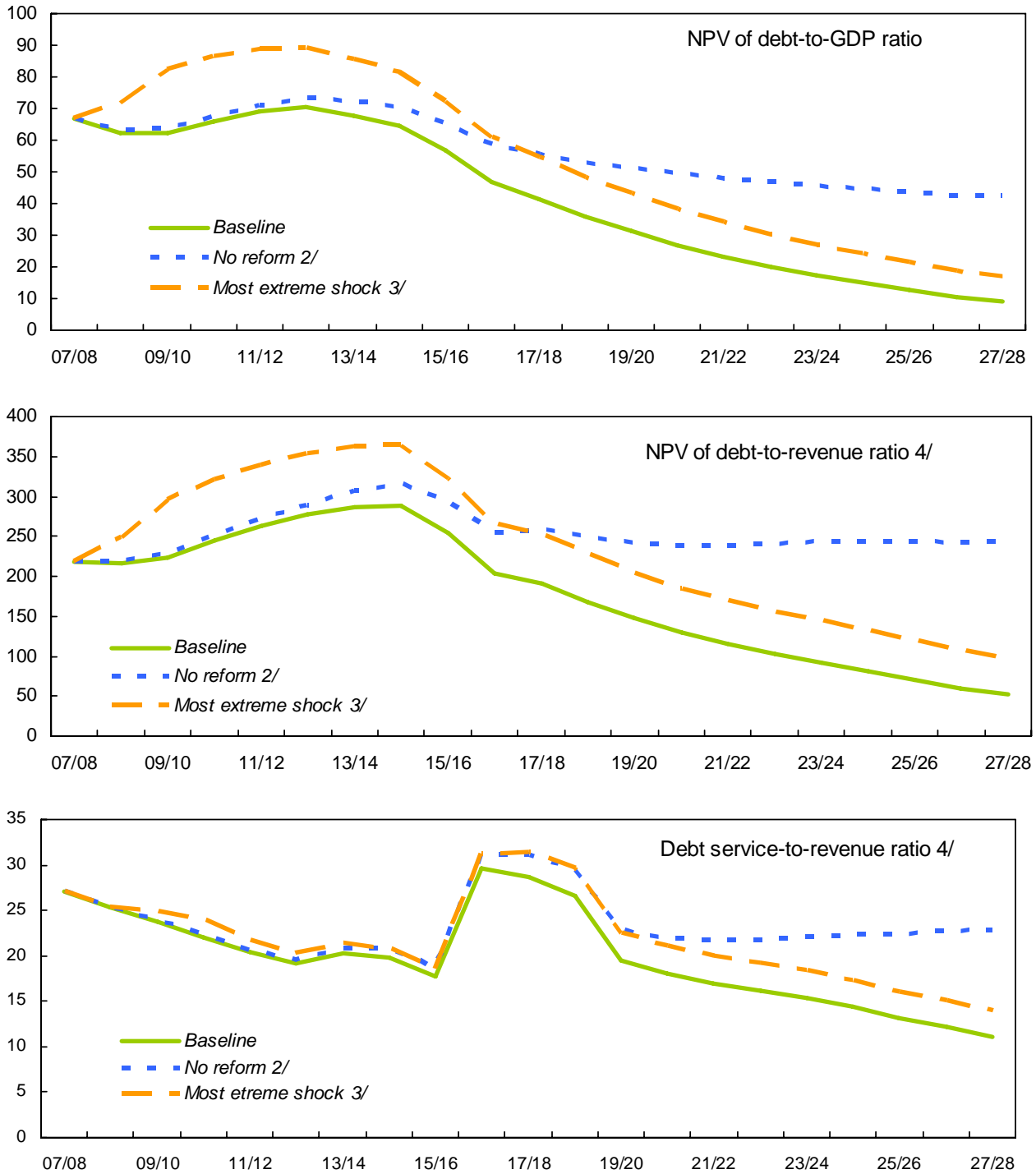
3/ Exports values are assumed to remain permanently at the lower level, but the current account as a share of GDP is assumed to return to its baseline level after the shock (implicitly assuming an offsetting adjustment in import levels).

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.

Figure 1. Bhutan: Indicators of Public Debt Under Alternative Scenarios, 2007/08–2027/28 1/



Source: Fund staff projections and simulations.

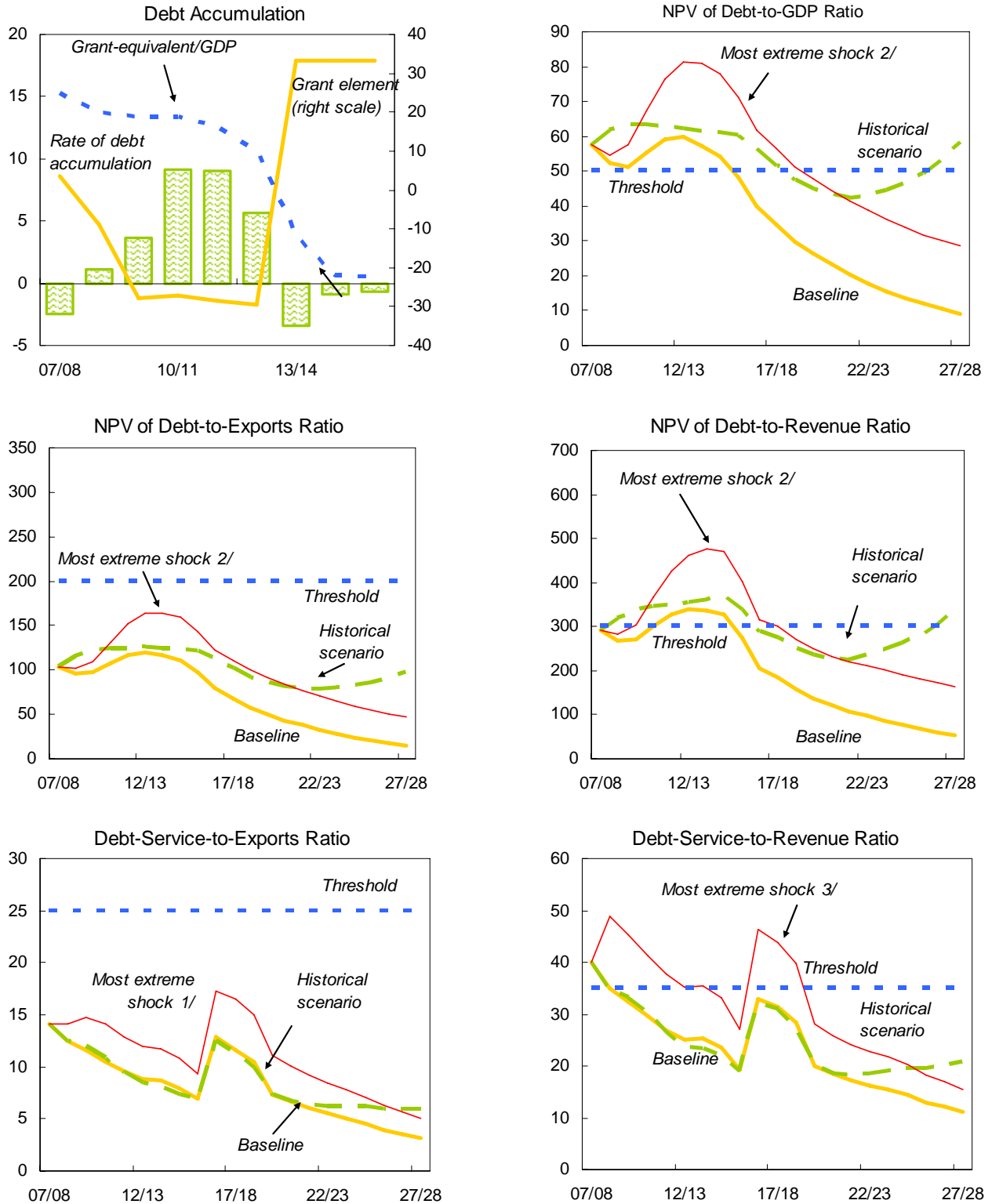
1/ Share of Indian rupee loans for additional borrowing is assumed to be zero.

2/ Primary balance is unchanged from 2007/08.

3/ Most extreme stress test is test that yields highest ratio in 2017/18, which is one standard deviation lower primary balance in 2008/09 and 2009/10 for all three cases.

4/ Revenue including grants.

Figure 2. Bhutan: Indicators of Public and Publicly Guaranteed External Debt Under Alternative Scenarios, 2007/08–2027/28



Sources: Fund staff projections and simulations.

1/ Export value growth at historical average minus one standard deviation in 2008/09–09/10.

2/ New public sector loans on less favorable terms in 2008/09–27/28.

3/ One-time 30 percent nominal depreciation relative to the baseline in 2008/09.