INTERNATIONAL MONETARY FUND AND
INTERNATIONAL DEVELOPMENT ASSOCIATION

TONGA

Joint IMF/World Bank Debt Sustainability Analysis 2010[1]

Prepared by the staffs of the International Monetary Fund and
The International Development Association

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Based on the joint IMF-WB low-income country debt sustainability assessment (LIC DSA), Tonga remains at a high risk of debt distress. Under the baseline scenario, both the PV-of-debt to GDP as well as the PV-of-debt to export ratios remain above the country-specific indicative thresholds for a prolonged period, and longer than indicated in the 2009 Debt Sustainability Analysis because of the recently contracted Y291 million ($42½ million) China EXIM bank loan for road construction. Nonetheless, Tonga's very high and relatively stable remittance inflows (over 30 percent of GDP)—which are by far the largest source of foreign exchange earnings—help mitigate liquidity risks. Tonga's overall public sector debt indicators, are elevated in the short term, but show a decreasing trend over the longer run. Taking into account the cushion provided to the economy by the large workers' remittances, the projected debt profile is consistent with manageable—if high risk—debt dynamics. However, additional debt will further heighten the already high risk of debt distress, as well as risks to external sustainability, and significantly constrain the space available for social and developmental priorities, as outlined in the National Strategic Planning Framework. These vulnerabilities underscore the importance of sound macroeconomic policies to improve Tonga's growth potential on a sustained basis, export diversification, and continued efforts in fiscal consolidation.

I. BACKGROUND

1. **The external and public debt sustainability analyses are based on the standard LIC DSA framework.**[2] The DSA presents the projected path of Tonga's external and public

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[1]This DSA was prepared jointly with the World Bank, and in collaboration with the Asian Development Bank, in accordance with the Debt Sustainability Framework for low-income countries approved by the Executive Boards of the IMF and IDA. The debt data underlying this exercise were provided by the Tongan authorities.

[2]See "Debt Sustainability in Low-Income Countries: Proposal for an Operational Framework and Policy Implications" (http://www.imf.org/external/np/pdr/sustain/2004/020304.htm and IDA/SECM2004/0035,

(continued)

sector debt burden indicators, and draws some conclusions on the forward-looking sustainability of debt.

2. **Tonga's total public sector debt stock (including publicly guaranteed debt) is high and rose substantially in FY2008/09 and FY2009/10, reaching over 50 percent of GDP.** This increase reflects the contracting of two loans from China's Exim Bank for reconstruction—together with face values totaling over 30 percent of GDP—as well as the impact of weaker external environment on both GDP and the fiscal balance.[3] Work under the first reconstruction loan was initially postponed, as the government sought to ensure it was used productively and negotiated for a greater use of local inputs. The first drawdown was made in April 2009, with over half the amount projected to be disbursed by end-June 2010. Currently, it is believed only 30 percent of the funds from this loan will be used to finance direct government capital spending, with the remaining 70 percent of funds expected to be on-lent to the private sector for office, residential, and retail construction. The second loan agreement was signed in February 2010, and the first disbursement (30 percent) occurred shortly after the signing.

3. **Despite the rise in overall debt, the government has continued to reduce its domestic debt level.** Domestic debt has fallen from around 20 percent of GDP at the beginning of the decade to around a projected 7¼ percent of GDP by June 2010. Outstanding bank loans were repaid in 2007/08. This fiscal year, the government issued bonds amounting to a net issuance of T$8 million to partly cover the deficit, leaving outstanding bonds at an expected 4¼ percent of GDP by end-June. The remaining domestic debt reflects mainly government guarantees and obligations to the Retirement Fund Board.

4. **Tonga's DSA builds on the baseline scenario assumptions presented in Box 1.** It assumes that near-term GDP growth will recover to rates close to its historical average. Although the current reconstruction will likely lift growth in the short-term, the DSA conservatively assumes little increase in long-term growth despite the current large infrastructure investment. The reconstruction and road infrastructure projects are assumed to take place over the period until 2014/15, although they will be drawn down over the period through 2012/13. Excluding reconstruction and road spending, public spending will be set to grow more slowly than projected revenues and grants over the medium term, limiting the longer-term need for additional external borrowing. Remittances—which are the largest

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2/3/04), "Debt Sustainability in Low-Income Countries: Further Considerations on an Operational Framework and Policy Implications" (http://www.imf.org/external/np/pdr/sustain/2004/091004.htm and IDA/SECM2004/0629, 9/10/04), and reference to "Staff Guidance Note on the Application of the Joint Bank-Fund Debt Sustainability Framework for Low-Income Countries" (http://www.imf.org/external/pp/longres.aspx?id=4419).

[3] These loan commitments were signed in November 2007 (for reconstruction), and February 2009 (for roads), and bear a 2 percent interest rate, 5-year grace, and a 20-year maturity. The arrangement with the Chinese contractor performing the work associated with these loans requires an initial disbursement of 30 percent to cover the down payment, while outstanding disbursements are well ahead of work performed.

source of foreign exchange earnings (one-half of Tongans live abroad, mostly in Australia, New Zealand, and United States)—are assumed in the medium and longer term and remain an important external cushion.

Post mortem analysis suggests a similar path for debt dynamics. As in the last DSA, Tonga is at high risk of debt distress, with the debt burden peaking early in the projection period and then gradually declining. However, this year debt is expected to peak later at higher level, and external debt remain above the country-specific risk thresholds for slightly longer. This reflects the addition of the second Exim bank loan this year and bad economic outcomes in 2009/10. The current DSA assumes similar longer-term growth and export prospects, but a worse non-interest current account position due to the additional imports associated with the Exim loans and other donor support. However, reflecting this the current DSA assumes going forward that the Tongan government takes additional corrective action and runs a larger primary surplus and undertakes less new borrowing as part of its medium-term fiscal strategy. Specifically, the current DSA assumes primary surpluses of around 1 percent of GDP rather that the 0.4 percent assumed last year, and new concessional external borrowing to finance capital construction of only 4 million a year over the period 2015/16–2029/30, rather than the over 9 million assumed last year.

Key Macroeconomic Assumptions

	Baseline		Historical	2009 DSA Baseline	
	2009/10-2014/15	2015/16-2029/30	Average	2008/09-2013/14	2014/15-2028/29
Real GDP growth (percent)	1.4	1.8	1.4	1.4	1.8
Growth of exports of goods and services (U.S. dollar terms)	3.8	4.9	6.5	1.8	4.7
Growth of remittance inflows (U.S. dollar terms)	5.9	5.2	5.1	…	…
Non-interest current account balance (in percent of GDP)	-16.6	-10.4	-4.7	-8.8	-6.2
GDP deflator growth (U.S. dollar terms)	0.5	2.9	4.2	0.8	2.9
Primary deficit (in percent of GDP)	2.6	-0.9	0.0	0.3	-0.4

II. EXTERNAL DSA

Baseline

5. **Under the baseline, the external debt trajectory breaches several policy-dependent thresholds in 2009/10 before receding to safer levels.** Public and publicly guaranteed (PPG) external debt is currently over 30 percent of GDP, the indicative threshold level, increasing in line with the reconstruction borrowing (disbursement of the China EXIM bank loan) in the last two years. Given the drawdown of the Exim Bank loans the PV of PPG external debt is projected to increase to about 42 percent of GDP by 2011/12, 12 percentage points above the threshold, before dropping under the threshold by 2017/18 and declining to around 8 percent of GDP by 2030.

Box 1: Key Assumptions

- Real GDP growth is projected to average around 1½ percent over the period 2009/10–2014/15, reflecting a slowdown from the global financial crisis in the first two years and a recovery thereafter. Growth is assumed to strengthen marginally over the longer run, reflecting the impact of the current rebuilding and road construction exercises (amounting to over 30 percent of projected 2009/10 GDP). However, growth will likely remain low given structural impediments.
- As growth recovers, the current balance is assumed to narrow from a deficit over 5 percent of GDP in 2009/10 to surplus of ½ percent by 2014/15. The surplus is generated through wage restraint following the recent public sector restructuring and some tax administration gains.
- Over the longer-term, current revenue and spending are assumed to be broadly stable as a percent of GDP, with an average current balance of around ¾ percent of GDP. This results in a primary fiscal balance of around 1 percent of GDP, somewhat smaller outturns than before the current recession.
- Grants are projected to decline from current high levels, but remain significant at around 2½ percent of GDP over the longer term. This reflects the importance of donor commitments given the relatively small size of the Tongan economy and its vulnerability to external shocks. These grants, together with projected disbursements from concessional loans are assumed to be spent entirely on development projects and associated maintenance. Following the last disbursement of the current China Exim Bank loan (in 2012/13), we assume all future external borrowing is from concessional IFI (AsDB and World Bank) facilities.
- The external current account deficit is projected to reach 20 percent of GDP in 2011/12, up from 14 percent of GDP in 2008/09, driven largely by the large construction-related imports. Over the medium term, the deficit should return to around 10½ percent of GDP.
- Net FDI is projected to stabilize at around 9 percent of GDP.
- The export base is projected to remain narrow and relatively undiversified, while remittances have recently dropped as a result of the decline in economic activity in the United States and New Zealand, from which the greater part of remittances emanate. They are, however, expected to recover as these economies rebound from the impact of the global economic slowdown, including seasonal worker programs in Australia and New Zealand.

6. **External debt remains well above the PV of debt-to-export distress threshold**. Reflecting Tonga's low exports, the PV of PPG external debt-to-exports ratio is well over two-and-a-half times the indicative threshold of 100 percent, and is projected to remain above the threshold well past 2020. However, Tonga's large remittances, which are the largest source of foreign exchange earnings (one half of Tongans live abroad, mostly in Australia, New Zealand, and the United States), would help to reduce liquidity risks. Tonga's remittances have averaged more than twice export receipts over the past decade, and have provided a considerably more stable source of foreign exchange inflows.[4] Relative to

[4] Remittance income growth has historically been much more stable than export growth. The coefficient of variation of remittances has been 1.3, much lower than the coefficient of 2 for export receipts.

remittances and exports the PV of PPG debt is projected to exceed 100 percent in 2010–12, and is projected to remain above the (lower) modified threshold until around 2013/14, 10 years sooner than when remittances are ignored. The PV of debt is expected to decline below the revenue threshold by 2014.

Tonga: External Debt Indicators

	Indicative Thresholds 1/	2008/09	2009/10
NPV of external debt			
In percent of GDP	30	24	34
In percent of exports	100	171	220
In percent of remittances and exports	90	60	93
In percent of revenue	200	136	183
Debt service			
In percent of exports	15	9	9
In percent of remittances and exports	14	3	4
In percent of revenue	25	7	7

1/ Represents Low Income Country DSA indicative thresholds for Tonga thiat is classified as a poor performer under the World Bank's Country Policy Institutional Assessment. The threshold for the ratios in percent of remittance and exports are modified by a 10 percent rule-of-thumb.

7. **Debt and debt service are expected to stay above the exports threshold for most of the projection period, but not when remittances are accounted for**. The impact of the global economic crisis will make it harder for Tonga to expand its very narrow export base in the short term, aggravating solvency and liquidity risks. Remittances will decline in the short term, but they are expected to recover and stabilize at around 30 percent of GDP over the longer term, somewhat below historical highs, but still providing a vital cushion against external debt distress and liquidity risks. Relative to exports and remittances, external debt service remains well under 10 percent throughout the projection period to 2029/30. The ratio of debt service to revenue remains well below the threshold of 25 percent throughout the projection period (Figure 1), albeit with a deterioration in the short to medium term.

Alternative scenario and stress tests

8. **Stress tests show the vulnerability of the debt position to a slowdown in exports or a significant depreciation.** The export shock stress test causes the present value of debt to exceed 500 percent of exports and remain more that 10 percent above the 100 percent threshold for the entire projection period. Similarly debt service to exports ratios rise even further above the 15 percent threshold, reaching over 30 percent in 2015. A large one-time depreciation causes the present value of debt to rise to around 60 percent of GDP and remain persistently above the 30 percent threshold even after 2020. Similarly a large depreciation also causes the present value of debt-to-revenue ratio to persistently breach threshold. Several other potential shocks would also see debt levels remain above the indicative GDP and export thresholds for a prolonged period. Similar stresses emerge when remittances are considered. The historical scenario is more sanguine mainly due to the fact that the current

rise in construction projects and donor assistance result in a larger current account deficit than occurred historically. Therefore, if the current account deficit were at historical levels, debt could be reduced more quickly, although these smaller current account deficits are unlikely in coming years.

III. PUBLIC SECTOR DSA

Baseline

9. **The public sector DSA reinforces the conclusions of the external DSA**. The resumption of large scale public sector borrowing for road building and reconstruction of the capital reversed the trend, with present value of debt building up to almost 50 percent of GDP in 2011/12 before declining steadily thereafter under the baseline scenario. This highlights the importance of fiscal prudence, and a continued commitment to limit new public borrowing.

Alternative scenario and stress tests

10. **Stress tests indicate that vulnerabilities remain throughout the projection period, especially to a sizable depreciation**. Among the stress tests performed, a 30 percent depreciation results in the largest rise in the overall public debt burden. The NPV of public debt would rise and remain above 60 percent of GDP until 2013/14 and would be at 30 percent of GDP in 2030.[5] Maintaining the primary balance at its historical level (around balance) brings debt down faster given the large deficits implied by the Exim bank financed construction currently in train. This burst of construction will require larger longer-term primary surpluses (of around 1 percent of GDP) to ensure debt in line with our baseline.

IV. STAFF ASSESSMENT

11. **Tonga remains at a high risk of external debt distress.** While Tonga benefits from very high and stable remittance inflows, which clearly mitigate its liquidity risks, remittances are insufficient to limit risks from projected debt service payments. Nonetheless, Tonga is able to service its current obligations, and the overall public sector debt dynamics, while elevated over the short term, shows a downward trend over the longer run, suggesting that debt dynamics are manageable, despite being at high risk.

12. **Key medium-term vulnerabilities include lower GDP growth, major external shocks, and borrowing on less concessional terms.** These vulnerabilities underscore the importance of sound macroeconomic policies to improve Tonga’s growth potential on a sustained basis, export diversification, and continued efforts in fiscal consolidation.

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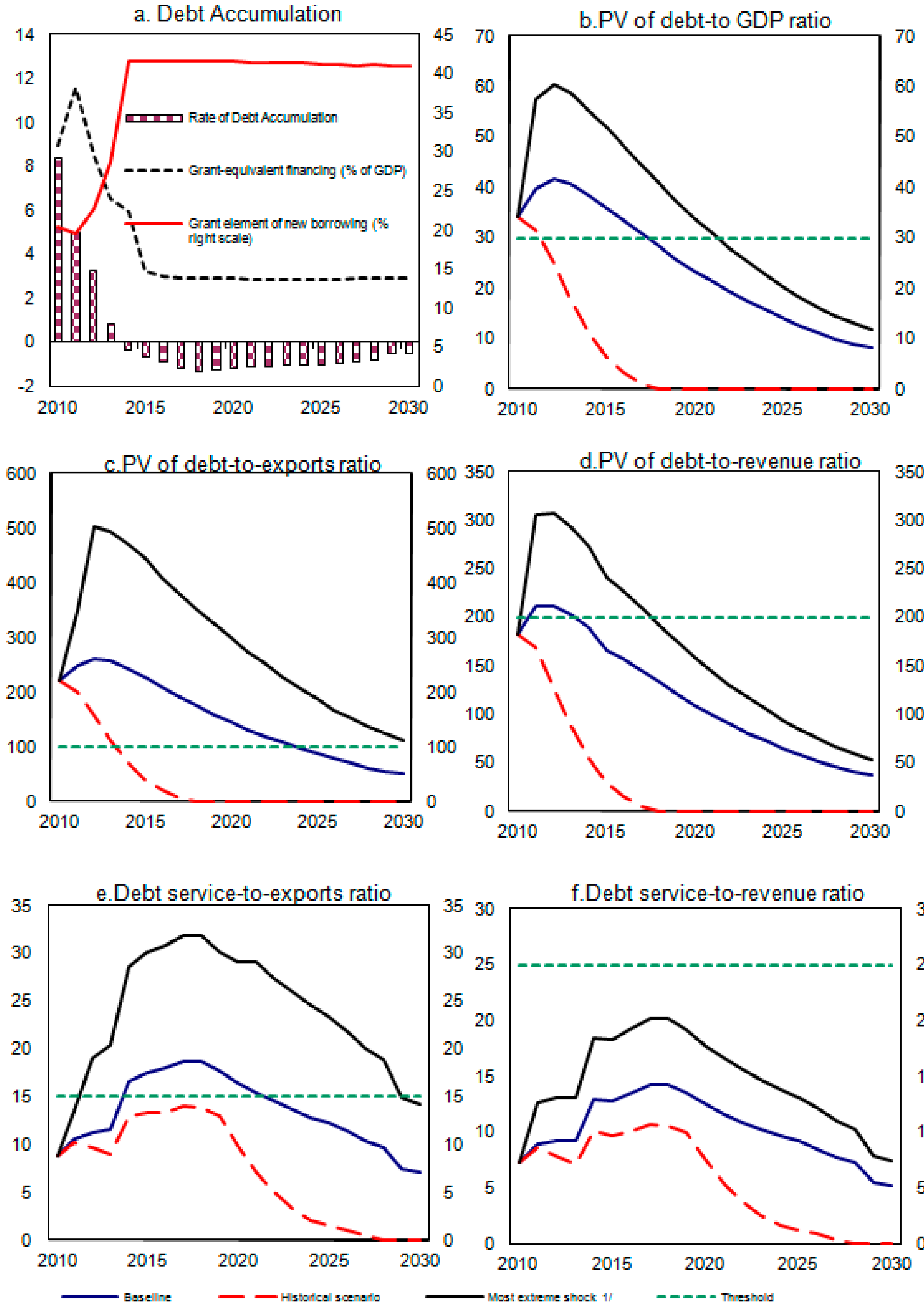
[5] In the Fix Balance scenario, we assume a more ambitious medium-term fiscal program, where the primary balance is kept at 1 percent of GDP after 2010/11.

Moreover, increased utilization of donor grants and limiting recourse to further borrowing (even on concessional terms) is necessary to maintain manageable public debt dynamics and reduce the risk of external debt distress. Sound public debt management, anchored in a medium-term debt management strategy and in line with the medium-term fiscal framework, is also essential to guide future development financing in Tonga. Priority should be given to projects which would help generate high growth and employment, especially in the context of the NSPF, to help ensure debt service capacity in the future.

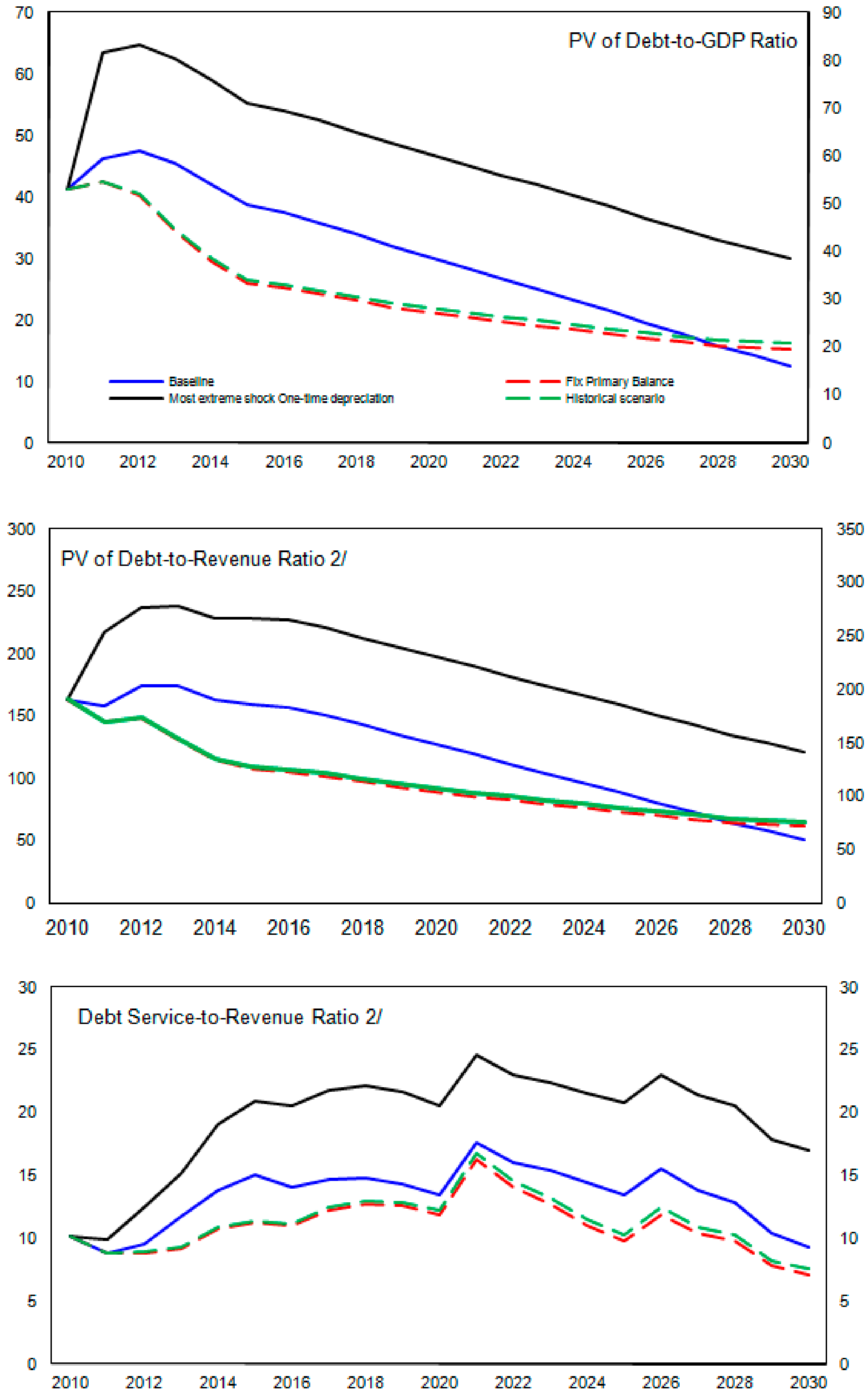
Figure 1. Tonga: Indicators of Public and Publicly Guaranteed External Debt under Alternative Scenarios, 2010–2030 1/



Sources: Country authorities; and staff estimates and projections.

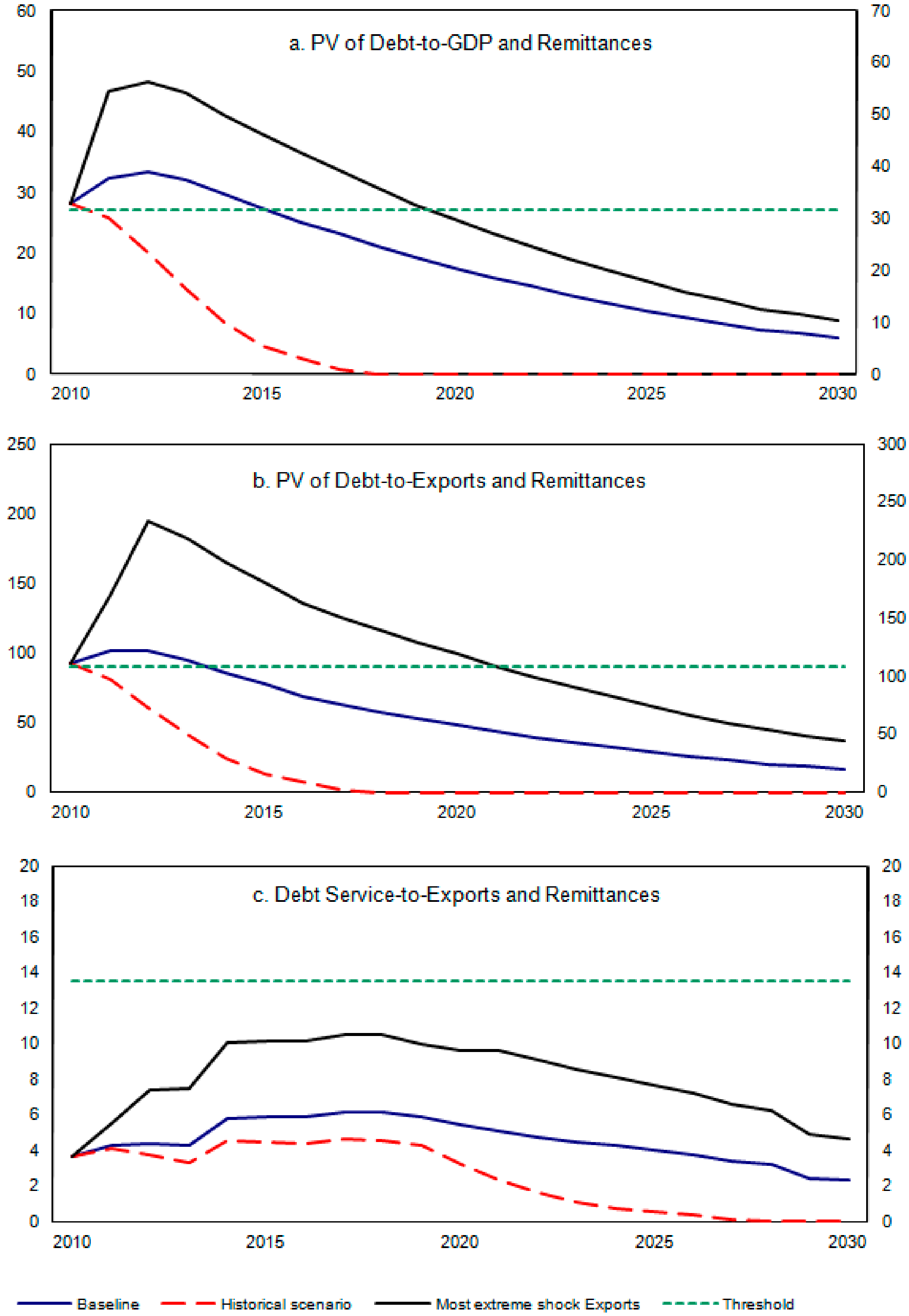
1/ The most extreme stress test is the test that yields the highest ratio in 2020. In figure b. it corresponds to a Non-debt flows shock; in c. to a Exports shock; in d. to a Non-debt flows shock; in e. to a Exports shock and in figure f. to a One-time depreciation shock. Data refers to last date in fiscal year (e.g., 2010, refers to FY ending June 30, 2010).

Figure 2.Tonga: Indicators of Public Debt Under Alternative Scenarios, 2010-2030 1/



Sources: Country authorities; and staff estimates and projections.
1/ The most extreme stress test is the test that yields the highest ratio in 2020. Data refers to last date in fiscal year (e.g., 2010, refers to FY ending June 30, 2010).
2/ Revenues are defined inclusive of grants.

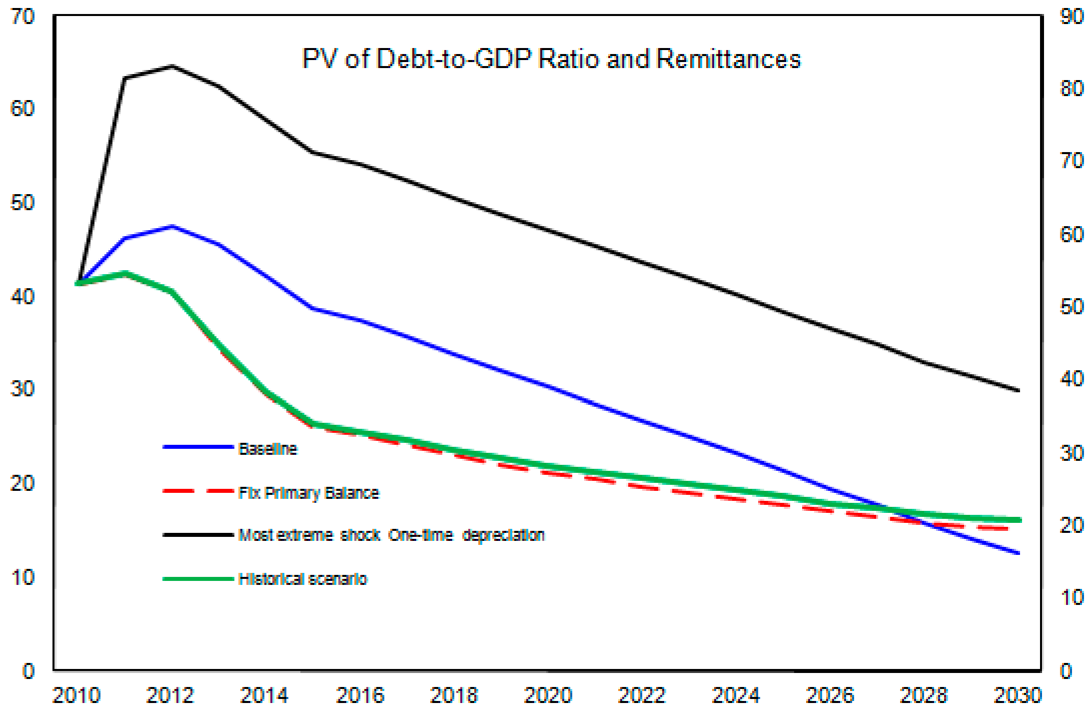
Figure 3. Tonga: Indicators of Public and Publicly Guaranteed External Debt under Alternatives Scenarios, 2010-2030 1/



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2020. In figure a, it corresponds to a non-debt flows shock; in b, to exports shock; in c, to exports shock. Data refers to last date in fiscal year (e.g., 2010, refers to FY ending June 30, 2010).

Figure 4.Tonga: Indicators of Public Debt Under Alternative Scenarios, 2010-2030 1/



Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in 2020. Data refers to last date in fiscal year (e.g., 2010, refers to FY ending June 30, 2010).

2/ Revenues are defined inclusive of grants.

Table 1a.Tonga: External Debt Sustainability Framework, Baseline Scenario, 2007-2030 1/

(In percent of GDP, unless otherwise indicated)

	Actual			Historical 0 Average 0	Standard Deviation	Projections										
	2007	2008	2009			2010	2011	2012	2013	2014	2015	2010-2015 Average		2020	2030	2016-2030 Average
External debt (nominal) 1/	**27.1**	**25.3**	**31**			**44.2**	**50.7**	**52.8**	**51.2**	**47.9**	**44.8**			**29.4**	**11.6**	
o/w public and publicly guaranteed (PPG)	27.1	25.3	31.5			44.2	50.7	52.8	51.2	47.9	44.8			29.4	11.6	
Change in external debt	-1.9	-1.8	6.2			12.7	6.5	2.1	-1.6	-3.2	-3.2			-2.8	-1.0	
Identified net debt-creating flows	1.6	-1.4	3.9			10.8	12.5	12.6	10.0	7.8	4.9			0.7	1.9	
Non-interest current account deficit	**8.2**	**8.7**	**13.8**	**4.7**	**5.7**	**16.5**	**19.0**	**19.1**	**17.1**	**15.2**	**12.6**			**10.1**	**11.3**	10.4
Deficit in balance of goods and services	37.5	37.6	38.7			38.3	42.7	43.3	43.3	43.2	42.2			41.2	41.9	
Exports	10.8	14.4	13.9			15.5	15.9	16.0	15.9	15.8	15.7			16.1	16.1	
Imports	48.4	51.9	52.6			53.8	58.6	59.3	59.2	59.0	58.0			57.3	58.1	
Net current transfers (negative = inflow)	-27.9	-27.6	-23.1	-28.3	4.7	-19.9	-21.9	-22.2	-24.2	-26.0	-27.7			-29.6	-29.6	-29.6
o/w official	0.0	-0.1	-0.2			-1.7	-1.8	-0.1	-0.1	-0.1	0.0			0.0	0.1	
Other current account flows (negative = net inflow)	-1.4	-1.3	-1.9			-1.8	-1.8	-1.9	-2.0	-2.0	-1.9			-1.5	-1.1	
Net FDI (negative = inflow)	**-5.7**	**-7.1**	**-11.5**	**-4.3**	**4.2**	**-6.6**	**-6.5**	**-6.6**	**-7.2**	**-7.5**	**-7.7**			**-9.2**	**-9**	-9.2
Endogenous debt dynamics 2/	**-1.0**	**-2.9**	**1.6**			**0.9**	**0.0**	**0.1**	**0.1**	**0.1**	**0.0**			**-0.1**	**-0.1**	
Contribution from nominal interest rate	0.2	0.4	0.5			0.7	0.7	0.9	1.0	0.9	0.9			0.4	0.1	
Contribution from real GDP growth	0.3	-0.5	0.1			0.2	-0.7	-0.8	-0.9	-0.9	-0.8			-0.5	-0.2	
Contribution from price and exchange rate changes	-1.6	-2.8	1.0			…	…	…	…	…	…			…	…	
Residual (3-4) 3/	**-3.4**	**-0.4**	**2.3**			**1.9**	**-6.0**	**-10.5**	**-11.6**	**-11.0**	**-8.1**			**-3.5**	**-2.9**	
o/w exceptional financing	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	
PV of external debt 4/	...	...	23.7			34.1	39.8	41.8	40.9	38.4	35.8			23.4	8.1	
In percent of exports	...	...	170.7			219.8	249.7	261.2	257.3	243.2	228.2			144.9	50.2	
PV of PPG external debt	**...**	**...**	**24**			**34.1**	**39.8**	**41.8**	**40.9**	**38.4**	**35.8**			**23.4**	**8.1**	
In percent of exports	**...**	**...**	**171**			**220**	**250**	**261**	**257**	**243**	**228**			**145**	**50**	
In percent of government revenues	**...**	**...**	**136**			**183**	**212**	**212**	**203**	**189**	**166**			**110**	**37**	
Debt service-to-exports ratio (in percent)	**9.8**	**10.0**	**8.7**			**8.8**	**10.5**	**11.2**	**11.6**	**16.6**	**17.5**			**16.4**	**7.1**	
PPG debt service-to-exports ratio (in percent)	**9.8**	**10.0**	**8.7**			**8.8**	**10.5**	**11.2**	**11.6**	**16.6**	**17.5**			**16.4**	**7.1**	
PPG debt service-to-revenue ratio (in percent)	**4.3**	**5.8**	**6.9**			**7.3**	**8.9**	**9.1**	**9.2**	**12.9**	**12.8**			**12.4**	**5.2**	
Total gross financing need (Millions of U.S. dollars)	10.9	10.3	11.3			33.4	43.1	45.0	38.5	35.9	27.7			16.0	22.9	
Non-interest current account deficit that stabilizes debt ratio	10.1	10.4	7.6			3.8	12.5	17.1	18.7	18.4	15.8			12.8	12.3	
Key macroeconomic assumptions																
Real GDP growth (in percent)	-1.2	2.0	-0.4	1.4	1.9	-0.5	1.7	1.7	1.8	1.8	1.8	1.4		1.8	1.8	1.8
GDP deflator in US dollar terms (change in percent)	5.7	11.5	-3.9	4.2	9.0	-9.2	0.9	1.4	2.8	3.9	2.9	0.5		2.9	2.9	2.9
Effective interest rate (percent) 5/	0.9	1.5	1.9	1.0	0.5	2.1	1.7	1.9	1.9	1.9	1.9	1.9		1.4	1.1	1.4
Growth of exports of G&S (US dollar terms, in percent)	-19.8	50.6	-7.4	6.5	25.1	1.0	5.3	3.6	3.8	4.9	4.3	3.8		4.7	4.7	4.9
Growth of imports of G&S (US dollar terms, in percent)	-6.1	22.2	-3.0	10.1	12.8	-7.6	11.7	4.4	4.3	5.4	2.9	3.5		5.2	4.7	4.8
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	20.3	19.5	22.8	28.6	41.6	41.6	29.1		41.5	41.0	41.3
Government revenues (excluding grants, in percent of GDP)	24.6	24.9	17.4			18.7	18.8	19.7	20.1	20.3	21.5			21.3	21.9	21.5
Aid flows (in Millions of US dollars) 7/	11.3	4.6	21.6			20.8	31.5	25.6	22.0	23.0	13.9			15.6	23.5	
o/w Grants	11.3	4.6	21.6			19.5	31.5	23.6	20.0	19.0	9.9			11.6	19.5	
o/w Concessional loans	0.0	0.0	0.0			1.3	0.0	2.0	2.0	4.0	4.0			4.0	4.0	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			9.0	11.6	8.5	6.5	5.9	3.2			2.9	2.9	2.9
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			49.0	69.4	71.6	85.9	89.7	83.1			84.8	89.7	86.3
Memorandum items:																
Nominal GDP (Millions of US dollars)	301.6	343.1	328.4			296.6	304.4	313.9	328.3	347.2	363.7			458.4	728.2	
Nominal dollar GDP growth	4.4	13.8	-4.3			-9.7	2.6	3.1	4.6	5.8	4.7	1.9		4.7	4.7	4.7
PV of PPG external debt (in Millions of US dollars)			80.8			108.3	123.1	133.1	135.8	134.6	132.3			108.7	59.8	
(PVt-PVt-1)/GDPt-1 (in percent)						**8.4**	5.0	3.3	0.9	-0.4	-0.7	2.7		-1.2	-0.5	-1.0
Gross remittances (Millions of US dollars)	93.3	106.7	84.0			63.0	70.7	79.3	89.3	100.6	111.7			150.0	238.2	
PV of PPG external debt (in percent of GDP + remittances)	...	...	18.9			28.2	32.3	33.4	32.2	29.7	27.4			17.6	6.1	
PV of PPG external debt (in percent of exports + remittances)	...	...	60.1			92.8	101.6	101.3	94.9	85.7	77.2			47.8	16.6	
Debt service of PPG external debt (in percent of exports + remittances)	...	...	3.1			3.7	4.3	4.4	4.3	5.8	5.9			5.4	2.3	

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).

Table 1b.Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2010-2030
(In percent)

	Projections							
	2010	2011	2012	2013	2014	2015	**2020**	2030
PV of debt-to GDP ratio								
Baseline	34	40	42	41	38	36	**23**	8
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2010-2030 1/	34	32	25	18	11	6	**0**	0
A2. New public sector loans on less favorable terms in 2010-2030 2	34	42	45	44	42	40	**29**	15
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2011-2012	34	41	44	43	40	38	**25**	9
B2. Export value growth at historical average minus one standard deviation in 2011-2012 3/	34	43	49	48	45	42	**29**	11
B3. US dollar GDP deflator at historical average minus one standard deviation in 2011-2012	34	43	48	47	44	41	**27**	9
B4. Net non-debt creating flows at historical average minus one standard deviation in 2011-2012 4/	34	44	49	48	45	42	**29**	11
B5. Combination of B1-B4 using one-half standard deviation shocks	34	43	50	49	46	43	**30**	11
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011 5/	34	58	60	59	55	52	**34**	12
PV of debt-to-exports ratio								
Baseline	220	250	261	257	243	228	**145**	50
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2010-2030 1/	220	199	156	113	71	40	**0**	0
A2. New public sector loans on less favorable terms in 2010-2030 2	220	261	279	277	265	253	**177**	93
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2011-2012	220	254	265	261	246	232	**148**	51
B2. Export value growth at historical average minus one standard deviation in 2011-2012 3/	220	347	502	494	469	445	**300**	112
B3. US dollar GDP deflator at historical average minus one standard deviation in 2011-2012	220	254	265	261	246	232	**148**	51
B4. Net non-debt creating flows at historical average minus one standard deviation in 2011-2012 4/	220	273	304	300	285	270	**182**	68
B5. Combination of B1-B4 using one-half standard deviation shocks	220	297	367	361	342	325	**216**	80
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011 5/	220	254	265	261	246	232	**148**	51
PV of debt-to-revenue ratio								
Baseline	183	212	212	203	189	166	**110**	37
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2010-2030 1/	183	168	127	89	55	29	**0**	0
A2. New public sector loans on less favorable terms in 2010-2030 2	183	222	227	219	206	184	**134**	69
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2011-2012	183	220	225	215	200	176	**116**	39
B2. Export value growth at historical average minus one standard deviation in 2011-2012 3/	183	228	248	237	222	197	**138**	50
B3. US dollar GDP deflator at historical average minus one standard deviation in 2011-2012	183	228	244	233	216	191	**126**	43
B4. Net non-debt creating flows at historical average minus one standard deviation in 2011-2012 4/	183	231	248	237	222	197	**137**	50
B5. Combination of B1-B4 using one-half standard deviation shocks	183	230	254	243	227	202	**140**	50
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011 5/	183	306	307	293	272	241	**159**	54

Table 1b.Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2010-2030 (continued)

(In percent)

Debt service-to-exports ratio

Baseline	9	10	11	12	17	18	**16**	7
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2010-2030 1/	9	10	10	9	13	13	**10**	0
A2. New public sector loans on less favorable terms in 2010-2030 2	9	10	11	12	17	18	**14**	6
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2011-2012	9	10	11	12	17	18	**16**	7
B2. Export value growth at historical average minus one standard deviation in 2011-2012 3/	9	14	19	20	29	30	**29**	14
B3. US dollar GDP deflator at historical average minus one standard deviation in 2011-2012	9	10	11	12	17	18	**16**	7
B4. Net non-debt creating flows at historical average minus one standard deviation in 2011-2012 4/	9	10	12	12	17	18	**18**	9
B5. Combination of B1-B4 using one-half standard deviation shocks	9	12	14	15	21	22	**21**	10
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011 5/	9	10	11	12	17	18	**16**	7

Debt service-to-revenue ratio

Baseline	7	9	9	9	13	13	**12**	5
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2010-2030 1/	7	9	8	7	10	10	**7**	0
A2. New public sector loans on less favorable terms in 2010-2030 2	7	9	9	9	13	13	**11**	4
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2011-2012	7	9	10	10	13	13	**13**	5
B2. Export value growth at historical average minus one standard deviation in 2011-2012 3/	7	9	9	10	13	13	**13**	6
B3. US dollar GDP deflator at historical average minus one standard deviation in 2011-2012	7	9	10	10	15	14	**14**	6
B4. Net non-debt creating flows at historical average minus one standard deviation in 2011-2012 4/	7	9	9	10	13	13	**13**	6
B5. Combination of B1-B4 using one-half standard deviation shocks	7	9	10	10	14	14	**14**	6
B6. One-time 30 percent nominal depreciation relative to the baseline in 2011 5/	7	13	13	13	18	18	**18**	7
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	36	36	36	36	36	36	**36**	36

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 2a.Tonga: Public Sector Debt Sustainability Framework, Baseline Scenario, 2007-2030 1/
(In percent of GDP, unless otherwise indicated)

	Actual			Average	Standard Deviation	Estimate	Projections								
	2007	2008	2009			2010	2011	2012	2013	2014	2015	2010-15 Average	2020	2030	2016-30 Average
Public sector debt 2/	37.3	33.9	38.6			51.4	57.1	58.5	55.8	51.6	47.6		36.3	16.1	
o/w foreign-currency denominated	27.1	25.3	31.5			44.2	50.7	52.8	51.2	47.9	44.8		29.4	11.6	
Change in public sector debt	-2.3	-3.4	4.7			12.7	5.7	1.4	-2.7	-4.1	-4.0		-2.2	-1.8	
Identified debt-creating flows	-4.2	-5.9	8.4			5.1	5.8	3.0	2.6	-0.2	-1.4		-1.9	-1.8	
Primary deficit	-1.6	-2.1	2.6	0.0	1.9	2.9	3.9	3.4	3.9	1.6	0.2	2.6	-0.8	-1.3	-0.9
Revenue and grants	28.3	26.3	24.0			25.3	29.2	27.2	26.2	25.7	24.3		23.8	24.6	
of which: grants	3.7	1.3	6.6			6.6	10.4	7.5	6.1	5.5	2.7		2.5	2.7	
Primary (noninterest) expenditure	26.7	24.1	26.6			28.2	33.0	30.6	30.1	27.4	24.5		23.0	23.3	
Automatic debt dynamics	-2.6	-3.4	1.3			3.1	1.9	-0.4	-1.3	-1.9	-1.6		-1.1	-0.5	
Contribution from interest rate/growth differential	-0.4	-1.3	-0.1			0.4	-0.6	-0.7	-0.9	-1.0	-0.5		-0.5	-0.3	
of which: contribution from average real interest rate	-0.9	-0.5	-0.2			0.2	0.2	0.3	0.1	0.0	0.4		0.2	0.1	
of which: contribution from real GDP growth	0.5	-0.7	0.1			0.2	-0.8	-0.9	-1.0	-1.0	-0.9		-0.7	-0.3	
Contribution from real exchange rate depreciation	-2.2	-2.1	1.3			2.7	2.5	0.2	-0.3	-0.9	-1.1		...	...	
Other identified debt-creating flows	0.0	-0.3	4.6			-0.9	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Privatization receipts (negative)	0.0	0.0	4.6			0.2	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recognition of implicit or contingent liabilities	0.0	-0.3	0.0			-1.1	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	1.8	2.5	-3.7			7.7	-0.1	-1.5	-5.4	-3.9	-2.7		-0.3	0.0	
Other Sustainability Indicators															
PV of public sector debt	10.2	8.6	30.9			41.3	46.2	47.6	45.5	42.1	38.7		30.3	12.6	
o/w foreign-currency denominated	0.0	0.0	23.7			34.1	39.8	41.8	40.9	38.4	35.8		23.4	8.1	
o/w external	...	...	23.7			34.1	39.8	41.8	40.9	38.4	35.8		23.4	8.1	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 3/	-0.2	-0.4	4.6			5.5	6.5	6.0	7.0	5.2	3.9		2.4	1.0	
PV of public sector debt-to-revenue and grants ratio (in percent)	36.1	32.8	128.6			163.5	158.5	174.9	173.7	163.5	159.4		127.1	51.2	
PV of public sector debt-to-revenue ratio (in percent)	41.6	34.6	177.0			221.1	245.8	241.8	226.2	207.5	179.6		142.2	57.5	
o/w external 4/	…	…	136.0			182.7	211.7	212.4	203.2	189.3	166.4		109.6	36.9	
Debt service-to-revenue and grants ratio (in percent) 5/	4.7	6.5	8.4			10.2	8.8	9.5	11.7	13.8	15.1		13.5	9.3	
Debt service-to-revenue ratio (in percent) 5/	5.5	6.9	11.6			13.8	13.7	13.1	15.3	17.5	17.0		15.1	10.4	
Primary deficit that stabilizes the debt-to-GDP ratio	0.8	1.2	-2.1			-9.8	-1.9	2.0	6.6	5.8	4.2		1.4	0.5	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	-1.2	2.0	-0.4	1.4	1.9	-0.5	1.7	1.7	1.8	1.8	1.8	1.4	1.8	1.8	1.8
Average nominal interest rate on forex debt (in percent)	0.9	1.5	1.9	1.0	0.5	2.1	1.7	1.9	1.9	1.9	1.9	1.9	1.4	1.1	1.4
Average real interest rate on domestic debt (in percent)	-2.4	-2.7	-2.4	-4.0	3.5	0.6	2.3	2.4	1.5	0.6	0.6	1.3	0.6	0.6	0.6
Real exchange rate depreciation (in percent, + indicates depreciation)	-7.6	-8.1	5.1	-1.3	11.2	8.5	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	5.4	5.8	5.5	6.8	3.5	3.4	4.2	4.1	5.1	6.0	6.0	4.8	6.0	6.0	6.0
Growth of real primary spending (deflated by GDP deflator, in percent)	-0.1	-0.1	0.1	0.0	0.1	0.1	0.2	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0
Grant element of new external borrowing (in percent)	...	...	...	…	…	20.3	19.5	22.8	28.6	41.6	41.6	29.1	41.5	41.0	...

Sources: Country authorities; and staff estimates and projections.
1/ Data refers to last date in fiscal year (e.g., 2010 refers to FY ending June 30, 2010).
2/ Data covers general government and nonfinancial public enterprises. Gross debt is used.
3/ 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.
4/ Revenues excluding grants.
5/ Debt service is defined as the sum of interest and amortization of medium and long-term debt.

Table 2b.Tonga: Sensitivity Analysis for Key Indicators of Public Debt 2010-2030 1/

	Projections							
	2010	2011	2012	2013	2014	2015	2020	2030
PV of Debt-to-GDP Ratio								
Baseline	41	46	48	46	42	39	30	13
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	41	42	41	35	30	26	22	16
A2. Primary balance is unchanged from 2010	41	42	40	34	30	26	21	15
A3. Permanently lower GDP growth 2/	41	46	48	47	44	41	36	32
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2011-2012	41	48	51	50	47	44	40	30
B2. Primary balance is at historical average minus one standard deviations in 2011-2012	41	44	44	42	39	35	27	9
B3. Combination of B1-B2 using one half standard deviation shocks	41	44	43	42	39	36	30	17
B4. One-time 30 percent real depreciation in 2011	41	63	65	63	59	55	47	30
B5. 10 percent of GDP increase in other debt-creating flows in 2011	41	56	58	56	52	49	40	22
PV of Debt-to-Revenue Ratio 3/								
Baseline	163	159	175	174	163	159	127	51
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	163	146	149	132	116	109	92	65
A2. Primary balance is unchanged from 2010	163	145	148	131	115	107	89	62
A3. Permanently lower GDP growth 2/	163	159	177	177	169	167	152	130
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2011-2012	163	162	185	188	181	182	167	123
B2. Primary balance is at historical average minus one standard deviations in 2011-2012	163	152	162	160	150	145	113	38
B3. Combination of B1-B2 using one half standard deviation shocks	163	150	158	158	149	147	124	68
B4. One-time 30 percent real depreciation in 2011	163	218	238	239	229	228	197	122
B5. 10 percent of GDP increase in other debt-creating flows in 2011	163	193	212	213	203	200	168	89

Table 2b.Tonga: Sensitivity Analysis for Key Indicators of Public Debt 2010-2030 1/ (continued)

	Projections							
	2010	2011	2012	2013	2014	2015	2020	2030
Debt Service-to-Revenue Ratio 3/								
Baseline	10	9	9	12	14	15	13	9
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	10	9	9	9	11	11	12	8
A2. Primary balance is unchanged from 2010	10	9	9	9	11	11	12	7
A3. Permanently lower GDP growth 2/	10	9	10	12	14	16	15	15
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2011-2012	10	9	10	12	15	17	16	15
B2. Primary balance is at historical average minus one standard deviations in 2011-2012	10	9	9	10	13	14	13	8
B3. Combination of B1-B2 using one half standard deviation shocks	10	9	9	10	12	15	14	10
B4. One-time 30 percent real depreciation in 2011	10	10	12	15	19	21	21	17
B5. 10 percent of GDP increase in other debt-creating flows in 2011	10	9	11	17	16	17	15	14

Sources: Country authorities; and staff estimates and projections.
1/ Data refers to last date in fiscal year (e.g., 2010 refers to FY ending June 30, 2010).
2/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of the length of the projection period.
3/ Revenues are defined inclusive of grants.