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STAFF REPORT FOR THE 2017 ARTICLE IV CONSULTATION—DEBT SUSTAINABILITY ANALYSIS

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The 2017 Tonga's debt sustainability analysis (DSA) increases the external debt distress rating from moderate to high risk, as the indicative thresholds for debt-to-GDP and debt-to-exports are breached in the projection horizon, given the large expected impact on economic growth and fiscal balances posed by future natural disasters.

The new classification is due to a change in the treatment of future spending related to natural disasters.[1,2] The DSA 2017 incorporates effects of natural disasters in the baseline projections with two separate projection horizons. The baseline projections assume no natural disaster until FY2023, and an alternative scenario with a disaster in FY2018 is considered separately. After FY2023, the baseline scenario assumes a permanently lower GDP growth rate and wider fiscal and current account deficits. Overall, these assumptions are the main driving factor for debt dynamics. The DSA rating is not derived from the baseline scenario but from an alternative DSA scenario that excludes remittances, because remittances finance consumption, they are very volatile, and the channels for the transmission of remittances to Tonga are fragile.

This DSA highlights the importance of preserving Tonga's policy to cap external debt and to borrow externally only in exceptional circumstances and on highly concessional terms. At the same time, there is a need to contain fiscal expenditure to maintain fiscal buffers, which would help Tonga reduce its large reliance on donor funding to finance potential future disasters costs.

[1] To account for the average effect of natural disasters, this DSA incorporates in the baseline scenario for FY2023 onwards a long-term growth rate of 1.1 percent, which is permanently lower than the 1.8 percent potential growth rate in the absence of natural disasters, and a debt-creating flow of one percent of GDP per year. Average yearly natural disasters damages for Tonga amount to approximately three percent of GDP.

[2] IMF Board Paper "Small States Resilience to Natural Disasters and Climate Change—Role for the IMF," 2016.

BACKGROUND

1. Reconstruction costs after Cyclone Ian in 2014 and a legacy of large external loans have contributed to the accumulation of external debt in Tonga. The current Government's policy of no non-concessional external debt has helped to keep the outstanding amount of debt under control. External debt was 41.8 percent of GDP in FY2017 decreasing from 44 percent of GDP in FY2016, thus remaining below the Government's threshold of 50 percent.

2. The external debt distress rating is raised from moderate to high, to better account for the spending needed to finance reconstruction after future natural disasters. The medium-term baseline projections are adjusted to fully internalize the average effect of natural disasters on GDP growth, and on the current account and fiscal balances. The methodology used in this DSA is in line with the 2016 IMF Board Paper "Small States' Resilience to Natural Disasters and Climate Change." Given the elevated costs associated with reconstruction following natural disasters, the inclusion of additional spending in the medium-term projections is the main driver of worsened external debt dynamics for Tonga.

3. In the short-term, external debt remains stable in the baseline scenario, with a considerable increase in debt service ratios and utilization of FX reserves. Planned repayments of the China EXIM loans starting in FY2019 partially offset the financing requirements stemming from the government's infrastructure spending. The repayments, though positive in terms of stabilizing the debt burden, will put considerable pressure on debt service ratios and on Tonga's foreign exchange (FX) reserves in the upcoming years. Debt service is projected at 1.5 percent of GDP in FY2018 and, subsequently, to more than double to 3.8 percent of GDP from FY2019 onwards.

4. The Government of Tonga has a limited exposure to domestic public and private enterprises, through its on-lending of funds. As of end FY2017, total government loans outstanding stood at T$52.5 million, of which T$11.1 million or 1.2 percent of GDP are currently in arrears. The largest component of these arrears is on-lent funds to companies with majority of state ownership, which are currently under liquidation.

METHODOLOGY AND ASSUMPTIONS: NATURAL DISASTERS IN THE BASELINE SCENARIO

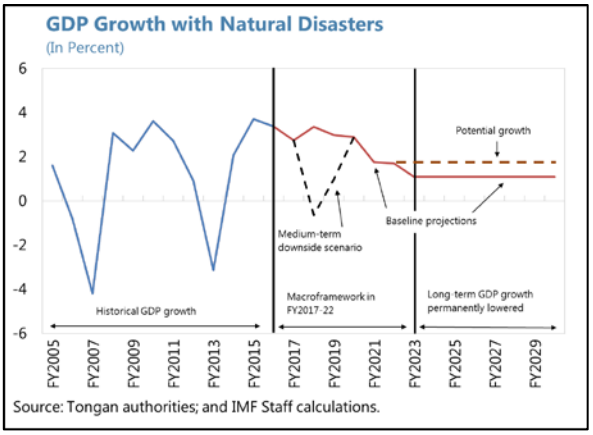
5. Tonga is very vulnerable to natural disasters, in terms of both recurrence and average damage as a percent of GDP. The 2016 World Risk Index[3] ranks Tonga as the world's second most vulnerable country to natural disasters, while a recent IMF Board Paper[4] ranked Tonga as eleventh most vulnerable Small Developing State to natural disasters.

6. The assumptions used to prepare the DSA are consistent with the macroeconomic framework of the Staff Report for the 2017 Article IV Consultation and are as follows:

[3] United Nations University Institute for Environment and Human Security, 2016, http://weltrisikobericht.de/english/

[4] IMF Board Paper "Small States Resilience to Natural Disasters and Climate Change—Role for the IMF," 2016.

- **Real GDP growth** is projected to remain between 2.7 percent and 3.4 percent in FY2017 through FY2020, mainly due to strong construction activity and increasing exports of tourism and agriculture. For FY2020 through FY2022, growth is projected to gradually decline towards the long-term average of 1.8 percent, assuming no natural disasters. To incorporate the average effect of natural disasters on growth, consistently with IMF (2016), long-term GDP growth is lowered by 0.7 percentage points to 1.1 percent from FY2023 onwards.[5,6]



- **Inflation**, measured as the GDP deflator growth, is projected to stabilize around 2.1 percent from FY2018 onwards, after an increase to 3.1 percent occurred in FY2017. The GDP deflator increased in FY2017 due to dry weather pushing up domestic food and kava prices. In the same period, the spike in CPI inflation was much larger reflecting a sharp increase of import taxes on fatty meat and tobacco products.
- **Higher own-financed reconstruction spending in both the fiscal and current account balances.** To quantify the additional burden on the fiscal expenditure of reconstruction costs, staff used data on natural disasters starting in 1980 to calculate (i) the probability that a natural disaster occurs in each year; and (ii) the average cost of damages associated with natural disasters. Using these data, the estimated average yearly damage is calculated as the multiplication of (i) and (ii), yielding for Tonga an approximate yearly damage of three percent of GDP. This DSA assumes that one percent of GDP from this damage is the yearly reconstruction cost that must be financed by government borrowing in the baseline scenario starting in FY2023.
- **The current account (CA) deficit** has been wavering around 12 percent of GDP in the latest periods, notwithstanding a strong private remittances component. In the medium-term, the CA is projected to stabilize around 12 percent of GDP before the effect of natural disasters. To take these latter into account, this DSA assumes that reconstruction spending has a 100 percent import component and, consequently, the CA deficit is widened by one percent of GDP from FY2023 onwards.
- **The fiscal deficit** is projected to widen to 2.3 percent of GDP in FY2018 and reach 4.4 percent of GDP in FY2020 due to increased infrastructure investments. It is then projected to stabilize at around 1.4 percent of GDP before the effect of natural disasters. From FY2023 onwards, the

[5] Given large natural disasters occur approximately every four to five years, growth projections for FY2018-22 exclude the average effect of natural disasters. The possibility that a disaster occurs in FY2018 is accounted for in a separate scenario.

[6] Limited data availability affects the calculation of an average impact, which relies on staff estimates. Data covering FY2002-16 show an average GDP growth rate of 1.2 percent when natural disasters are included. The impact of 0.7 percentage points is in line with estimates calculated by Cabezon et al, 2015, "Enhancing Macroeconomic Resilience to Natural Disasters and Climate Change in the Small States of the Pacific."

deficit is projected to widen by one percent of GDP, to account for average additional borrowing due to natural disasters.

- **Remittances** flows in Tonga are large, mainly from a low skilled labor force of seasonal workers in Australia and New Zealand. Although the flows have recently been strong, they are volatile and subject to changes in the economic cycle of these two countries, which can affect the income of and the demand for low skilled workers. In Tonga, remittances are used by relatives of emigrants to finance consumption, mostly of imported goods. Finally, it is expected that future pressures on flows will stem from the increased costs of remittances associated with the de-risking and loss of correspondent banking relationship phenomena.
- **The financing requirements**, which from FY2023 onwards include natural disasters spending, are assumed to be met mainly through additional external borrowing. The average grant element of this borrowing in the medium term converges to close to 40 percent. The calculation of the average grant element assumes that future financing from the ADB and IDA remains on a 50 percent grant and 50 percent loan basis, and that additional borrowings not covered by the ADB or IDA are on terms that are concessional but not as favorable as the ADB or IDA.[7]

EXTERNAL DSA

7. The present value (PV) of external debt-to-GDP plus remittances ratio hits the indicative threshold in FY2037, while the PV of external debt-to-GDP ratio (excluding remittances from the denominator) breaches the indicative threshold in FY2032 (Figures 1a and 1b). At the end of the projection horizon in 2037, the PV of debt-to-GDP is 4.2 percentage points above the indicative threshold. These results are mainly driven by the incorporation of natural disasters, which have negatively affected Tonga's economic growth and overall contribute to weaker and more volatile fiscal and external positions.[8]

8. Excluding private remittances from the denominator of the debt-to-GDP projections (and the associated thresholds) provides a more accurate reflection of the sustainability of Tonga's external debt. Remittances, at 27.4 percent of GDP in FY2017, play a large role in Tonga's macroeconomic framework. At the same time, remittances in Tonga are almost entirely used to finance consumption, which has a large import component. Remittances are also highly volatile. Furthermore, similar to a number of other Pacific Islands, Tonga has intermittently faced pressures on remittance channels as banks have responded to tightening AML/CFT standards by closing bank accounts of money transfer operators. Therefore, remittances—though large—should not be considered a mitigating factor in the debt sustainability assessment, as they are volatile and are not a reliable source of FX. Staff therefore assess Tonga's debt sustainability using the alternative scenario which does not include remittances.

9. The largest contributor to the combination shock to the PV of debt-to-GDP is a decrease in external transfers. This result highlights the large reliance of Tonga on external non-debt creating funding (e.g. grants in the case of official transfers) to finance fiscal expenditure. Although the scenario is unlikely,

[7] The assumptions on future grant financing are based on discussions with donors (development agencies of New Zealand and Australia; as well as IDA and ADB). The assumptions in this DSA also allow for a portion of the costs associated with natural disaster-related damages to be financed by additional grants from development partners.

[8] Nevertheless, the large amount of in-kind official and private transfers in Tonga's balance of payments mean that a sizable part of Tonga's current account deficit is not debt-creating.

the shock shows how vulnerable are public finances should a significant shortfall in donor funding materialize.

10. The repayment of the EXIM loans in the coming fiscal years more than doubles the debt-service ratios. The servicing of these loans, particularly in terms of principal repayments, is expected to reduce Tonga's FX reserves, and is subject to exchange rate risk. Thus, should existing buffers not be sufficient to meet the large payments, the additional debt service burden may lead to new financing needs in addition to the existing pressures from the government's infrastructure spending, putting at risk the stabilization of debt that is currently projected in the baseline scenario.

11. Finally, the DSA considers a downside scenario, in which a natural disaster occurs in FY2018, sooner than the incorporation of the average annual effect into the projections. (Figure 1, green line). Under this scenario, which in accordance with staff estimates has a probability of around 30 percent, the sustainability threshold would be breached much sooner. For this scenario, a damage of 10 percent of GDP and a reduction of GDP growth of four percent are assumed in FY2018, both in line with historical averages.

PUBLIC DSA

12. The PV of public debt-to-GDP ratio does not breach the indicative threshold in the DSA projections (Figure 2). Nevertheless, the baseline scenario features an increasing debt burden from FY2023 onwards, reflecting the additional indebtedness due to spending on natural disasters.

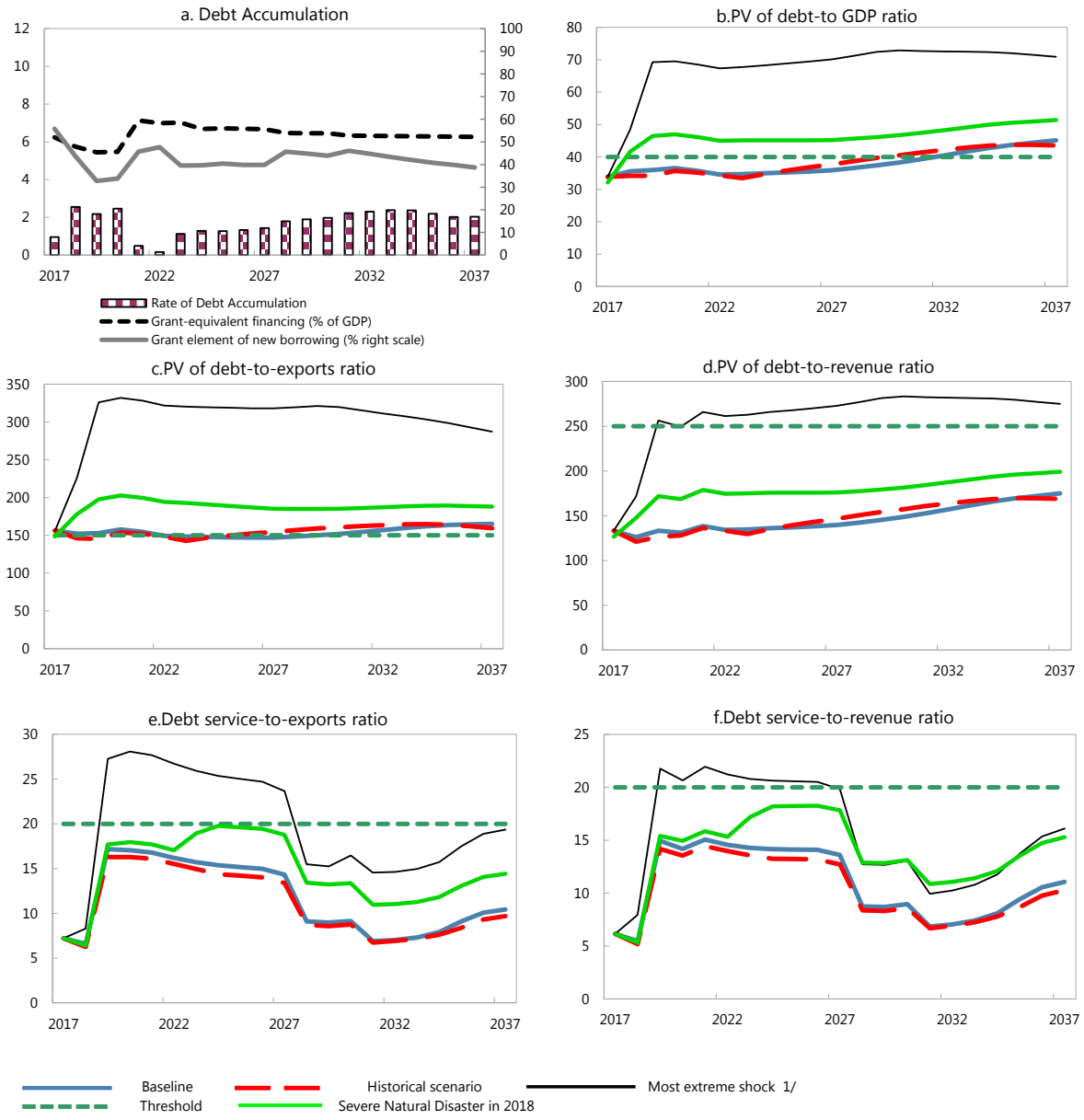
CONCLUSION

13. The risk of external debt distress rating in the DSA 2017 is increased to *high*, due to Tonga's fiscal fragility and the potentially large impact of natural disasters on debt sustainability. The reclassification is based on the model which does not include remittances. This notwithstanding, the current debt burden is still at a moderate level. Against this background, the authorities should focus fiscal efforts on maintaining fiscal sustainability by targeting a primary surplus of one percent of GDP in the medium term, while keeping buffers at a minimum of four-to-five months of recurrent expenditure, in view of future reconstruction efforts. The most extreme shock considered by the DSA framework highlights Tonga's reliance on transfers, and shows the country is very vulnerable should a shortfall in non-debt creating financing materialize.

Authorities' Views

14. The authorities agreed with staff's DSA assessment, including on the reclassification to "high risk". Staff delivered a presentation on the new DSA with natural disasters to officials from the NRBT and the MOFNP. The authorities welcomed the explicit account of natural disasters in the long run projections and potentially significant adverse effects on growth and fiscal accounts. In their view, the higher share of loans financing from development partners in the previous framework without natural disasters posed a threat to debt sustainability in the long run. The authorities agreed on the need for further research work to continue improving the quantification of the macroeconomic burden of disasters. Finally, they agreed with the need for a more prudent fiscal policy and to maintain sufficient buffers, in view of Tonga's vulnerability to external shocks.

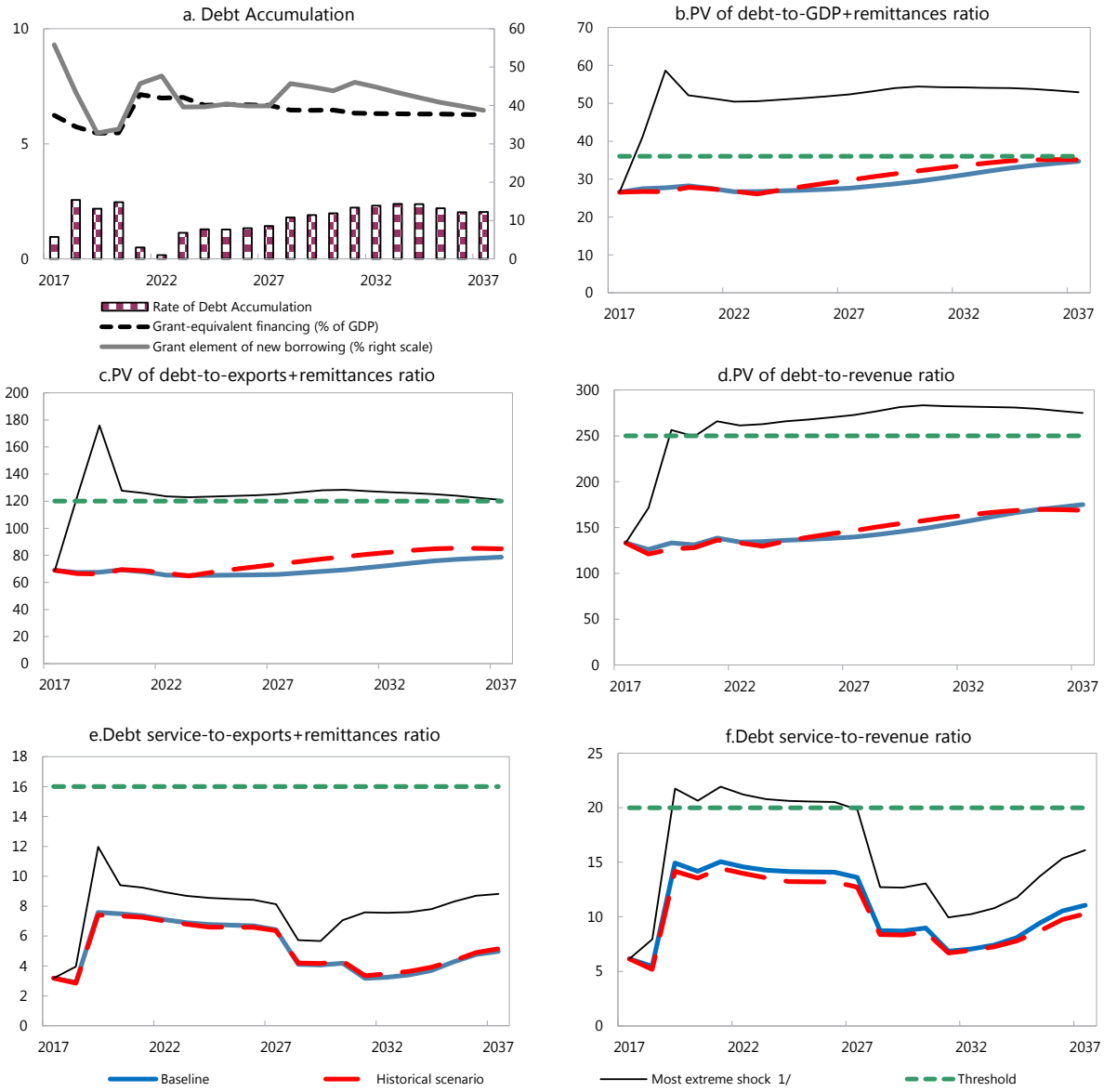
Figure 1a. Tonga: Indicators of Public and Publicly Guaranteed External Debt under Alternatives Scenarios Excluding Remittances, 2017–37 1/



Sources: Country authorities; and staff estimates and projections.

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

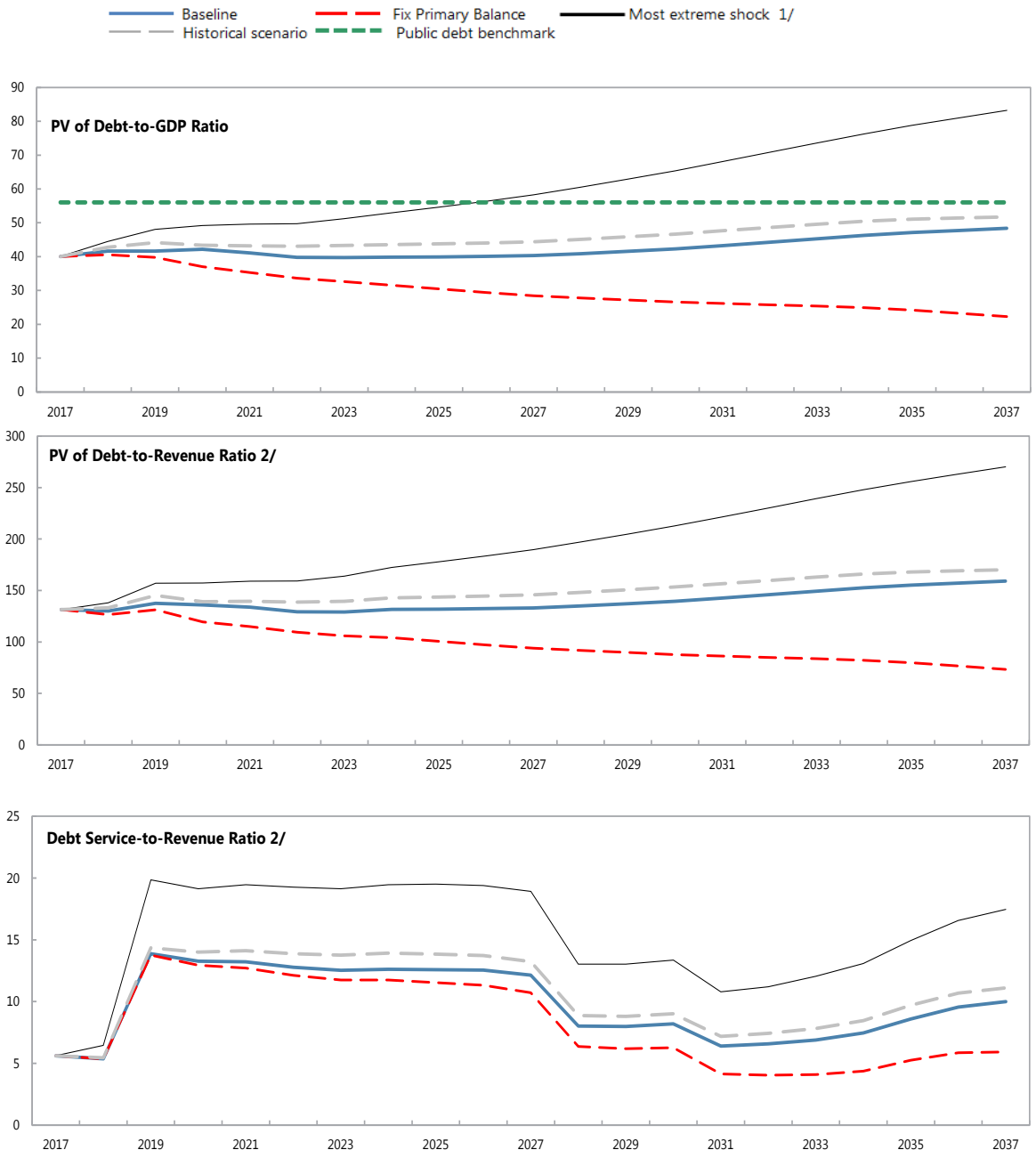
Figure 1b. Tonga: Indicators of Public and Publicly Guaranteed External Debt Including Remittances, 2017–37 1/



Sources: Country authorities; and staff estimates and projections.

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

Figure 2. Tonga: Indicators of Public Debt Under Alternative Scenarios, 2017–37 1/



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

Table 1. Tonga: External Debt Sustainability Framework, Baseline Scenario, 2014–37 1/

(In percent of GDP, unless otherwise indicated)

	Actual			Historical 6/ Average	Standard 6/ Deviation	Projections									
	2014	2015	2016			2017	2018	2019	2020	2021	2022	2017-2022 Average	2027	2037	2023-2037 Average
External debt (nominal) 1/	**41.9**	**45.2**	**41.7**			**45.0**	**47.4**	**48.5**	**50.0**	**50.0**	**49.5**		**55.3**	**68.3**	
of which: public and publicly guaranteed (PPG)	41.9	45.2	41.7			45.0	47.4	48.5	50.0	50.0	49.5		55.3	68.3	
Change in external debt	-2.2	3.4	-3.5			3.2	2.5	1.1	1.5	0.0	-0.5		1.3	0.9	
Identified net debt-creating flows	5.7	13.3	12.0			8.2	7.6	8.8	7.6	8.3	8.4		8.0	10.1	
Non-interest current account deficit	**6.1**	**14.3**	**12.5**	**12.9**	**5.9**	**11.3**	**11.1**	**12.2**	**10.8**	**11.1**	**11.1**		**10.4**	**12.6**	11.3
Deficit in balance of goods and services	40.6	47.7	44.5			52.4	59.0	62.9	60.8	60.8	61.4		60.1	63.4	
Exports	16.8	17.0	20.2			21.7	23.4	23.5	23.2	23.1	23.2		24.4	27.3	
Imports	57.5	64.7	64.7			74.1	82.4	86.4	84.0	83.9	84.5		84.6	90.7	
Net current transfers (negative = inflow)	-33.2	-31.7	-30.7	-28.8	3.3	-38.8	-45.1	-47.3	-46.3	-46.0	-46.5		-46.9	-46.9	-46.9
of which: official	-8.1	-6.1	-7.3			-11.9	-15.9	-17.8	-17.0	-16.7	-17.1		-17.1	-17.1	
Other current account flows (negative = net inflow)	-1.4	-1.7	-1.3			-2.2	-2.7	-3.4	-3.7	-3.8	-3.7		-2.9	-3.9	
Net FDI (negative = inflow)	**-1.7**	**-2.4**	**-2.6**	**-3.6**	**4.5**	**-2.7**	**-2.8**	**-2.8**	**-2.7**	**-2.7**	**-2.7**		**-2.8**	**-3.1**	-2.9
Endogenous debt dynamics 2/	**1.3**	**1.5**	**2.1**			**-0.5**	**-0.8**	**-0.6**	**-0.5**	**0.0**	**0.0**		**0.5**	**0.6**	
Contribution from nominal interest rate	0.7	0.7	0.7			0.6	0.7	0.8	0.9	0.9	0.9		1.0	1.3	
Contribution from real GDP growth	-0.9	-1.6	-1.6			-1.1	-1.5	-1.4	-1.3	-0.9	-0.9		-0.6	-0.7	
Contribution from price and exchange rate changes	1.5	2.4	3.0			...	...	...	...	...	...		...	...	
Residual (3-4) 3/	**-7.8**	**-10.0**	**-15.5**			**-5.0**	**-5.1**	**-7.7**	**-6.1**	**-8.3**	**-8.9**		**-6.7**	**-9.2**	
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	
PV of external debt 4/	...	...	31.4			33.8	35.6	36.0	36.6	35.7	34.6		35.9	45.1	
In percent of exports	...	...	155.0			156.2	152.1	153.0	157.8	154.6	149.3		147.0	165.2	
PV of PPG external debt	**...**	**...**	**31.4**			**33.8**	**35.6**	**36.0**	**36.6**	**35.7**	**34.6**		**35.9**	**45.1**	
In percent of exports	**...**	**...**	**155.0**			**156.2**	**152.1**	**153.0**	**157.8**	**154.6**	**149.3**		**147.0**	**165.2**	
In percent of government revenues	**...**	**...**	**134.9**			**133.2**	**126.1**	**133.2**	**131.2**	**138.6**	**134.3**		**139.6**	**174.9**	
Debt service-to-exports ratio (in percent)	**8.9**	**8.9**	**7.6**			**7.2**	**6.6**	**17.2**	**17.0**	**16.8**	**16.2**		**14.3**	**10.4**	
PPG debt service-to-exports ratio (in percent)	**8.9**	**8.9**	**7.6**			**7.2**	**6.6**	**17.2**	**17.0**	**16.8**	**16.2**		**14.3**	**10.4**	
PPG debt service-to-revenue ratio (in percent)	**7.3**	**6.8**	**6.6**			**6.2**	**5.5**	**14.9**	**14.2**	**15.1**	**14.6**		**13.6**	**11.1**	
Total gross financing need (Millions of U.S. dollars)	25.8	58.3	48.2			43.9	41.9	58.8	55.3	58.5	60.3		63.2	94.8	
Non-interest current account deficit that stabilizes debt ratio	8.2	10.9	16.0			8.1	8.7	11.1	9.3	11.1	11.6		9.1	11.7	
Key macroeconomic assumptions															
Real GDP growth (in percent)	2.1	3.7	3.4	1.5	2.8	2.7	3.4	3.0	2.9	1.9	1.9	2.6	1.1	1.1	1.1
GDP deflator in US dollar terms (change in percent)	-3.3	-5.3	-6.2	2.6	9.0	-1.4	-4.3	0.6	2.1	2.0	1.8	0.1	1.8	1.8	1.8
Effective interest rate (percent) 5/	1.7	1.6	1.6	1.6	0.4	1.6	1.6	1.7	1.9	1.9	1.8	1.8	2.0	2.0	1.9
Growth of exports of G&S (US dollar terms, in percent)	-18.6	-0.7	15.3	9.8	25.2	8.4	6.8	4.1	3.6	3.6	4.0	5.1	4.0	4.1	4.1
Growth of imports of G&S (US dollar terms, in percent)	-9.6	10.6	-3.0	6.4	8.5	15.9	9.9	8.8	2.1	3.8	4.5	7.5	3.6	3.7	3.4
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	55.8	43.5	32.8	33.8	45.7	47.7	43.2	39.9	38.7	42.0
Government revenues (excluding grants, in percent of GDP)	20.6	22.4	23.3			25.4	28.2	27.0	27.9	25.8	25.8		25.7	25.8	25.7
Aid flows (in Millions of US dollars) 7/	36.2	24.5	24.6			30.7	28.5	24.6	26.6	39.7	40.5		42.4	51.8	
of which: Grants	36.2	24.5	24.6			21.7	16.2	14.4	14.4	23.7	24.8		26.2	35.0	
of which: Concessional loans	0.0	0.0	0.0			9.0	12.4	10.1	12.2	16.0	15.7		16.2	16.8	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			6.2	5.7	5.5	5.5	7.1	7.0		6.7	6.3	6.5
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			87.0	69.7	55.1	54.4	73.3	76.2		67.9	70.1	71.4
Memorandum items:															
Nominal GDP (Millions of US dollars)	443.5	435.4	422.3			427.7	422.9	438.3	460.4	478.4	496.2		573.1	764.6	
Nominal dollar GDP growth	-1.3	-1.8	-3.0			1.3	-1.1	3.7	5.0	3.9	3.7	2.7	2.9	2.9	2.9
PV of PPG external debt (in Millions of US dollars)			133.4			137.4	148.4	157.6	168.4	170.6	171.4		205.3	344.6	
(PVt-PVt-1)/GDPt-1 (in percent)						1.0	2.6	2.2	2.5	0.5	0.2	1.5	1.4	2.0	1.8
Gross workers' remittances (Millions of US dollars)	102.7	102.2	112.2			117.4	124.3	130.4	136.0	141.5	147.2		171.9	229.4	
PV of PPG external debt (in percent of GDP + remittances)	...	...	24.8			26.5	27.5	27.7	28.2	27.6	26.7		27.6	34.7	
PV of PPG external debt (in percent of exports + remittances)	...	...	67.0			68.9	67.4	67.5	69.4	67.8	65.5		65.9	78.7	
Debt service of PPG external debt (in percent of exports + remittances)	...	...	3.3			3.2	2.9	7.6	7.5	7.4	7.1		6.4	5.0	

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 2a. Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt Excluding Remittances, 2017–37

(In percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
PV of debt-to GDP ratio								
Baseline	34	36	36	37	36	35	**36**	45
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	34	34	34	36	35	34	**38**	44
A2. New public sector loans on less favorable terms in 2017-2037 2	34	36	39	42	42	42	**51**	75
A3. Severe Natural Disaster in 2018	32	42	46	47	46	45	**45**	51
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	34	37	39	40	39	38	**39**	49
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	34	38	44	44	43	42	**44**	51
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	34	36	39	40	39	38	**39**	50
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	34	49	65	65	65	63	**66**	67
B5. Combination of B1-B4 using one-half standard deviation shocks	34	48	69	70	69	67	**70**	71
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	34	51	52	53	52	50	**52**	66
PV of debt-to-exports ratio								
Baseline	156	152	153	158	155	149	**147**	165
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	156	146	145	154	152	148	**154**	159
A2. New public sector loans on less favorable terms in 2017-2037 2	156	155	166	179	182	182	**211**	273
A3. Severe Natural Disaster in 2018	148	178	198	203	200	194	**185**	188
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	156	150	153	158	154	149	**147**	165
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	156	205	290	298	293	284	**280**	290
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	156	150	153	158	154	149	**147**	165
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	156	209	277	282	279	274	**271**	244
B5. Combination of B1-B4 using one-half standard deviation shocks	156	226	326	332	328	322	**318**	287
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	156	150	153	158	154	149	**147**	165
PV of debt-to-revenue ratio								
Baseline	133	126	133	131	139	134	**140**	175
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	133	121	127	128	136	133	**147**	169
A2. New public sector loans on less favorable terms in 2017-2037 2	133	129	144	149	163	163	**200**	289
A3. Severe Natural Disaster in 2018	126	147	172	169	179	175	**176**	199
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	133	130	146	143	151	147	**152**	191
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	133	135	162	159	169	164	**171**	197
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	133	127	146	144	152	147	**153**	192
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	133	174	241	235	250	246	**257**	259
B5. Combination of B1-B4 using one-half standard deviation shocks	133	172	256	249	266	261	**273**	275
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	133	181	194	191	201	195	**203**	254

Table 2a. Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt Excluding Remittances, 2017–37 (concluded)

(In percent)

Debt service-to-exports ratio								
Baseline	7	7	17	17	17	16	**14**	10
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	7	6	16	16	16	16	**13**	10
A2. New public sector loans on less favorable terms in 2017-2037 2	7	7	17	17	18	18	**18**	17
A3. Severe Natural Disaster in 2018	7	6	18	18	18	17	**19**	14
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	7	7	17	17	17	16	**14**	10
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	7	8	27	28	28	27	**24**	19
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	7	7	17	17	17	16	**14**	10
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	7	7	19	21	20	20	**18**	18
B5. Combination of B1-B4 using one-half standard deviation shocks	7	7	22	24	24	23	**21**	21
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	7	7	17	17	17	16	**14**	10
Debt service-to-revenue ratio								
Baseline	6	5	15	14	15	15	**14**	11
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	6	5	14	14	14	14	**13**	10
A2. New public sector loans on less favorable terms in 2017-2037 2	6	5	15	15	16	16	**17**	18
A3. Severe Natural Disaster in 2018	6	5	15	15	16	15	**18**	15
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	6	6	16	16	16	16	**15**	12
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	6	5	15	15	16	15	**14**	13
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	6	6	16	16	17	16	**15**	12
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	6	5	16	17	18	18	**17**	19
B5. Combination of B1-B4 using one-half standard deviation shocks	6	5	17	18	20	19	**18**	20
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	6	8	22	21	22	21	**20**	16
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	40	40	40	40	40	40	**40**	40

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 assumingan 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 2b. Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt Including Remittances, 2017–37

(In percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
PV of debt-to-GDP+remittances ratio								
Baseline	27	28	28	28	28	27	**28**	35
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	27	27	27	28	27	27	**30**	35
A2. New public sector loans on less favorable terms in 2017-2037 2	27	28	30	32	32	32	**40**	57
A3. Severe Natural Disaster in 2018								
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	27	28	30	30	29	29	**29**	37
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	27	29	34	34	34	33	**34**	39
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	27	28	30	30	30	29	**30**	37
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	27	42	56	51	50	49	**51**	51
B5. Combination of B1-B4 using one-half standard deviation shocks	27	41	59	52	51	50	**52**	53
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	27	36	37	37	36	35	**36**	46
PV of debt-to-exports+remittances ratio								
Baseline	69	67	68	69	68	65	**66**	79
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	69	67	66	69	69	67	**73**	85
A2. New public sector loans on less favorable terms in 2017-2037 2	69	69	73	79	80	80	**94**	130
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	69	66	67	69	68	65	**66**	79
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	69	79	98	100	98	95	**96**	107
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	69	66	67	69	68	65	**66**	79
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	69	123	165	124	122	120	**121**	116
B5. Combination of B1-B4 using one-half standard deviation shocks	69	123	176	128	126	123	**125**	121
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	69	66	67	69	68	65	**66**	79
PV of debt-to-revenue ratio								
Baseline	133	126	133	131	139	134	**140**	175
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	133	121	127	128	136	133	**147**	169
A2. New public sector loans on less favorable terms in 2017-2037 2	133	129	144	149	163	163	**200**	289
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	133	130	146	143	151	147	**152**	191
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	133	135	162	159	169	164	**171**	197
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	133	127	146	144	152	147	**153**	192
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	133	174	241	235	250	246	**257**	259
B5. Combination of B1-B4 using one-half standard deviation shocks	133	172	256	249	266	261	**273**	275
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	133	181	194	191	201	195	**203**	254

Table 2b. Tonga: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt Including Remittances, 2017–37 (concluded)

(In percent)

Debt service-to-exports+remittances ratio								
Baseline	3	3	8	7	7	7	**6**	5
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	3	3	7	7	7	7	**6**	5
A2. New public sector loans on less favorable terms in 2017-2037 2	3	3	8	8	8	8	**8**	8
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	3	3	8	7	7	7	**6**	5
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	3	3	9	9	9	9	**8**	7
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	3	3	8	7	7	7	**6**	5
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	3	4	11	9	9	9	**8**	8
B5. Combination of B1-B4 using one-half standard deviation shocks	3	4	12	9	9	9	**8**	9
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	3	3	8	7	7	7	**6**	5
Debt service-to-revenue ratio								
Baseline	6	5	15	14	15	15	**14**	11
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	6	5	14	14	14	14	**13**	10
A2. New public sector loans on less favorable terms in 2017-2037 2	6	5	15	15	16	16	**17**	18
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	6	6	16	16	16	16	**15**	12
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	6	5	15	15	16	15	**14**	13
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	6	6	16	16	17	16	**15**	12
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	6	5	16	17	18	18	**17**	19
B5. Combination of B1-B4 using one-half standard deviation shocks	6	5	17	18	20	19	**18**	20
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	6	8	22	21	22	21	**20**	16
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	40	40	40	40	40	40	**40**	40

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 assumingan 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 3. Tonga: Public Sector Debt Sustainability Framework, Baseline Scenario, 2014–37

(In percent of GDP, unless otherwise indicated)

	Actual			Average 5/	Standard Deviation 5/	Estimate	Projections								
	2014	2015	2016			2017	2018	2019	2020	2021	2022	2017-22 Average	2027	2037	2023-37 Average
Public sector debt 1/	47.1	51.4	49.2			51.2	53.5	54.2	55.6	55.4	54.7		59.7	71.5	
of which: foreign-currency denominated	41.9	45.2	41.7			45.0	47.4	48.5	50.0	50.0	49.5		55.3	68.3	
Change in public sector debt	-2.1	4.3	-2.2			2.0	2.3	0.7	1.4	-0.2	-0.7		1.1	0.8	
Identified debt-creating flows	-8.6	7.4	-2.7			2.4	0.8	-0.7	1.8	-0.1	-0.6		1.2	1.7	
Primary deficit	-7.3	1.8	-0.4	-2.8	2.8	-0.4	1.4	0.9	3.3	0.8	0.3	1.1	1.6	2.2	1.8
Revenue and grants	28.8	28.1	29.1			30.5	32.0	30.3	31.0	30.7	30.8		30.3	30.4	
of which: grants	8.2	5.6	5.8			5.1	3.8	3.3	3.1	5.0	5.0		4.6	4.6	
Primary (noninterest) expenditure	21.5	29.9	28.7			30.1	33.4	31.2	34.3	31.6	31.1		31.9	32.6	
Automatic debt dynamics	-1.3	5.6	-2.2			2.8	-0.6	-1.6	-1.6	-1.0	-0.9		-0.5	-0.6	
Contribution from interest rate/growth differential	-0.9	-1.5	-1.7			-1.0	-1.7	-1.6	-1.6	-1.1	-1.0		0.0	0.0	
of which: contribution from average real interest rate	0.1	0.2	-0.1			0.3	0.0	-0.1	-0.1	0.0	0.0		0.6	0.8	
of which: contribution from real GDP growth	-1.0	-1.7	-1.7			-1.3	-1.7	-1.6	-1.5	-1.0	-1.0		-0.6	-0.8	
Contribution from real exchange rate depreciation	-0.4	7.1	-0.5			3.7	1.1	0.0	0.0	0.1	0.1		...	...	
Other identified debt-creating flows	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Privatization receipts (negative)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Recognition of implicit or contingent liabilities	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Debt relief (HIPC and other)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Residual, including asset changes	6.6	-3.1	0.5			-0.4	1.5	1.4	-0.3	-0.1	-0.1		0.0	-0.9	
Other Sustainability Indicators															
PV of public sector debt	...	...	38.8			40.0	41.6	41.7	42.2	41.1	39.8		40.3	48.4	
of which: foreign-currency denominated	...	...	31.4			33.8	35.6	36.0	36.6	35.7	34.6		35.9	45.1	
of which: external	...	...	31.4			33.8	35.6	36.0	36.6	35.7	34.6		35.9	45.1	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	-4.9	4.2	1.9			1.3	3.1	5.1	4.9	4.9	4.3		5.3	5.3	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	133.5			131.4	130.0	137.5	136.0	133.7	129.3		133.1	159.2	
PV of public sector debt-to-revenue ratio (in percent)	...	...	167.0			157.6	147.6	154.2	151.3	159.4	154.4		156.8	187.4	
of which: external 3/	...	...	134.9			133.2	126.1	133.2	131.2	138.6	134.3		139.6	174.9	
Debt service-to-revenue and grants ratio (in percent) 4/	8.5	8.5	8.2			5.6	5.4	13.9	13.3	13.2	12.8		12.1	10.0	
Debt service-to-revenue ratio (in percent) 4/	11.8	10.6	10.2			6.7	6.1	15.6	14.8	15.8	15.3		14.3	11.8	
Primary deficit that stabilizes the debt-to-GDP ratio	-5.2	-2.4	1.7			-2.3	-0.9	0.2	1.9	1.1	1.0		0.5	1.4	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	2.1	3.7	3.4	1.5	2.8	2.7	3.4	3.0	2.9	1.9	1.9	2.6	1.1	1.1	1.1
Average nominal interest rate on forex debt (in percent)	1.7	1.6	1.6	1.6	0.4	1.6	1.6	1.7	1.9	1.9	1.8	1.8	2.0	2.0	1.9
Average real interest rate on domestic debt (in percent)	2.6	1.5	-4.0	-1.0	3.3	4.2	0.9	0.8	0.9	1.2	1.4	1.6	2.0	3.4	2.4
Real exchange rate depreciation (in percent, + indicates depreciation)	-1.0	17.5	-1.1	-0.3	10.5	9.2	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	1.0	1.5	7.1	3.3	3.2	-2.1	2.2	2.1	2.1	2.1	2.1	1.4	2.1	2.1	2.1
Growth of real primary spending (deflated by GDP deflator, in percent)	-13.8	44.5	-0.9	3.0	15.2	7.9	14.9	-3.9	13.3	-6.4	0.4	4.4	1.2	1.3	1.4
Grant element of new external borrowing (in percent)	...	...	...	...	...	55.8	43.5	32.8	33.8	45.7	47.7	43.2	39.9	38.7	...

Sources: Country authorities; and staff estimates and projections.

1/ [Indicate coverage of public sector, e.g., general government or nonfinancial public sector. Also whether net or gross debt is used.]

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.