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STAFF REPORT FOR THE 2018 ARTICLE IV CONSULTATION—DEBT SUSTAINABILITY ANALYSIS

Approved By
James Daniel, Kevin Fletcher (IMF), and John Panzer (IDA)

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

The DSA concludes that Tuvalu remains at a high risk of debt distress, in line with the 2016 DSA conclusion. External debt has breached several thresholds as of 2017, including for the present value of debt-to-GDP. Risks to debt sustainability remain high due to elevated current spending, a projected decline in fishing revenue and grants, and risks of natural disasters. A persistent fiscal deficit is projected to deplete fiscal buffers and cause the present value of debt-to-GDP to breach its indicative threshold in the long run. This underscores the importance of containing the fiscal deficit and maintaining buffers.

RECENT DEBT DEVELOPMENTS

1. The government's external liabilities are a mix of concessional and commercial debt. Total public and publicly guaranteed debt (PPG) is estimated at 37 percent of GDP as of end-2017, mostly consisting of external debt. Bilateral donors provide only grant assistance, while multilateral development institutions, including the ADB, have provided both concessional loans and grants. Loans on non-concessional terms for the three fishing joint ventures—established by the National Fishing Corporation of Tuvalu (NAFICOT) and Asian companies—account for a large share of public debt. These loans are guaranteed by the government, constituting contingent liabilities.

2. External assets remain sizeable, but not fully sovereign. The Tuvalu Trust Fund (TTF), capitalized mainly by development partners, grew to 333 percent of GDP at end-2017. The TTF is not fully sovereign and cannot be drawn down freely: when its market value exceeds the "maintained value," which is indexed to the Australian CPI, the difference is automatically distributed to the Consolidated Investment Fund (CIF), which stands at 42 percent of GDP at end-2017. The transfers are deposited into the CIF, a cash buffer which the government of Tuvalu can draw upon to finance fiscal expenditure. Since the Tuvaluan government's access to the TTF is conditional, this DSA analyzes gross public debt, as in the 2016 DSA.

UNDERLYING ASSUMPTIONS

3. The baseline macroeconomic framework:

- **Real GDP growth** is projected to moderate in the long run. After reaching 4.3 percent this year, growth is projected to remain robust at 4 percent in the medium term, factoring in the implementation of infrastructure projects funded by development partners, including the Green Climate Fund. Growth is projected to slow to 2 percent in the long run, constrained by limited capacity, weak competitiveness, and inefficient SOEs. This also includes the average cost of natural disasters, which is estimated at 1 percent of GDP per year.

- **Inflation** is projected to reach 4 percent this year on higher public wages. Inflation is expected to moderate to 3 percent in the medium term, and 2 percent in the long run, as economic growth slows gradually.

- **The balance of payments.** The current account is projected to record a deficit of 10 percent of GDP in the medium term due to higher imports needed for infrastructure projects. Revenues from fishing license fees are projected at 46 percent of GDP on average in the medium term, weakening from 50 percent in 2017. FDI inflows would continue to be limited.

- **The fiscal deficit** is projected to widen due to moderating revenue and high current spending, resulting in an increase in concessional borrowing in the long run. Fishing revenues are projected to remain subdued relative to GDP with the waning of El Nino cycle. Grants are assumed to fall steadily, considering the uncertainty of donors' commitments. Current spending would remain elevated on a steady increase in wages, purchases of goods and services, healthcare, and scholarship programs. Capital spending is projected at around 10 percent of GDP on infrastructure development, but is projected to decline gradually due to limited fiscal space. Thus, the fiscal deficit is expected to widen to 5 percent of GDP in the medium term, and 7 percent in the long term. The domestic current deficit—excluding fishing revenues, grants, and capital expenditure—is projected to remain elevated at 65 percent of GDP.

DEBT SUSTAINABILITY

A. Baseline Scenario

4. External debt has breached several thresholds as of 2017 and is projected to breach them again in the long run.[1]

- External debt has breached the thresholds as of 2017, including on the present value of debt-to-GDP, present value of debt-to-exports, and debt service-to-exports. However, the ratios relative to exports are not very meaningful indicators for Tuvalu because Tuvalu's external income is almost entirely in the form of fishing license fees rather than export receipts.

- In the medium term, debt-to-GDP is projected to decline on amortization of existing loans and limited borrowing. The spike in the debt service profile in 2021 reflects one-off repayments for a Korean joint venture fishing vessel. The government is expected to finance the fiscal deficits, including payments of the outstanding debt, through drawdowns of the CIF. The drawdown of the CIF explains the large negative residuals in the DSA tables (Table 1, Table 2).

- In the long run, as the government depletes the fiscal buffers, concessional borrowing starts to increase in the early 2030s. The grant element of new borrowing is projected to increase sharply, as the authorities borrow concessional loans from development partners, including the ADB. Borrowing is expected to increase as fiscal buffers fall below prudent levels (e.g., three months of current expenditures), causing several debt indicators to breach their thresholds (Figure 1). New borrowing is expected to originate from external sources, as Tuvalu's weak banking sector precludes domestic financing.

B. Alternative Scenarios

5. Alternative scenarios. Three hypothetical scenarios are projected, including natural disasters, a sharp decline in fishing revenue, and on the upside, sustained donor support (Figure 3, Figure 4).

- **Natural disaster shock.** In this scenario, a big cyclone is assumed to impact Tuvalu in 2028. The magnitude of the cyclone is assumed to be similar to that of Cyclone Pam, with damage of near

[1] The threshold for PV of debt-to-GDP is determined by the World Bank's Country Policy and Institutional Assessment (CPIA) index, a measure of the country's institutional capacity.

30 percent of GDP. Under this hypothetical scenario, recovery and rehabilitation programs would widen the fiscal deficit to 10 percent of GDP in 2028, compared to a deficit of 6 percent of GDP in the baseline. The increase in the fiscal deficit is partly mitigated by an increase in donor aid and a drawdown of the Tuvalu Survival Fund, which is projected at 18 percent of GDP at end-2027. The fiscal deficit increases slightly in the following years to 12 percent of GDP in 2029 and 11 percent of GDP in 2030, as the government repairs infrastructure damages. The higher fiscal deficits would accelerate the depletion of fiscal buffers, causing the present value of debt-to-GDP to breach its threshold earlier than in the baseline.

- **Fishing revenue shock.** In this scenario, fishing revenue is assumed to decline sharply from 2028-32 due to changes in weather patterns. As a result, fishing revenue is assumed to fall to 40 percent of GDP (the average of three recent years), widening the fiscal deficit to 15 percent of GDP. The impact would be substantial, draining fiscal buffers and increasing the present value of debt-to-GDP such that it would breach its threshold earlier than in the baseline.

- **Positive grant shock.** In an upside scenario, grants are assumed to remain high on favorable global economic and financial conditions.[2] Under this scenario, grants are projected to remain at 18 percent of GDP (the average of grants in the past four years in absolute amount) from 2019 onwards. Debt-to-GDP would remain well below its threshold.

6. These scenarios show that the debt trajectory is vulnerable to fishing revenue and natural disaster shocks. Fishing revenue fallouts or natural disasters could accelerate the depletion of fiscal buffers. This would result in the present value of debt-to-GDP ratio breaching its threshold earlier than in the baseline. On the upside, continuing donor support could help contain fiscal deficits and keep debt-to-GDP below the threshold.[3]

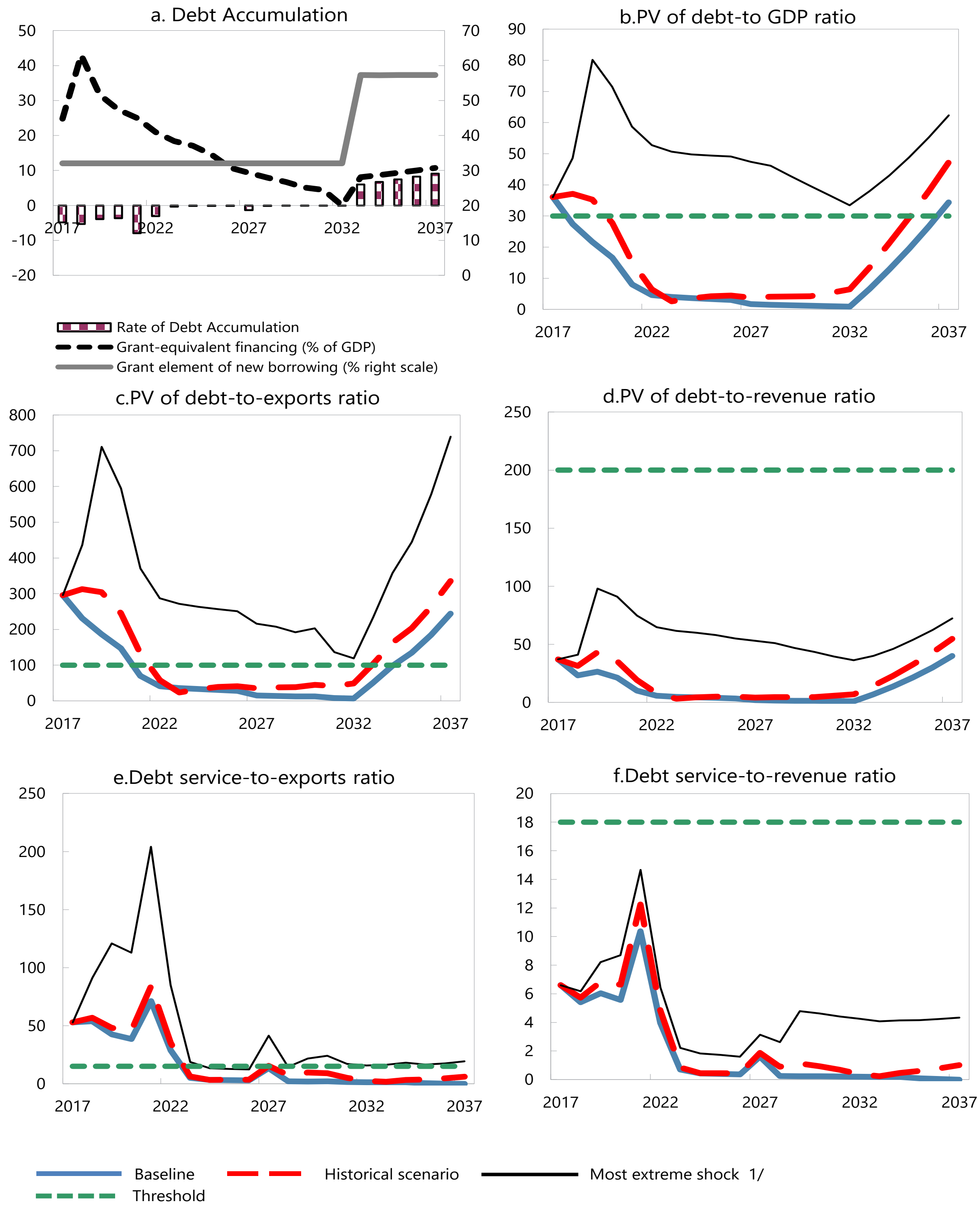
C. Conclusions

7. Tuvalu's DSA points to a continued high risk of debt distress, in line with the 2016 DSA conclusion. Under the baseline scenario, the fiscal balance is projected to move into a deficit from 2019 onwards, due to moderating revenues and high current spending. External debt-to-GDP levels are projected to breach thresholds in the long run, as the CIF balance declines and external borrowing increases. This debt trajectory highlights the importance of containing the fiscal deficit to lower the risk of debt distress. This would help maintain sufficient fiscal space to withstand natural disasters or fishing revenue fallouts.

[2] The baseline scenario projects a steady decline in donor grants to zero by 2032.

[3] In each scenario, debt service to exports or revenue ratios would remain well below their indicative thresholds, given concessional borrowing featuring extended grace periods, long maturity, and favorable interest rates.

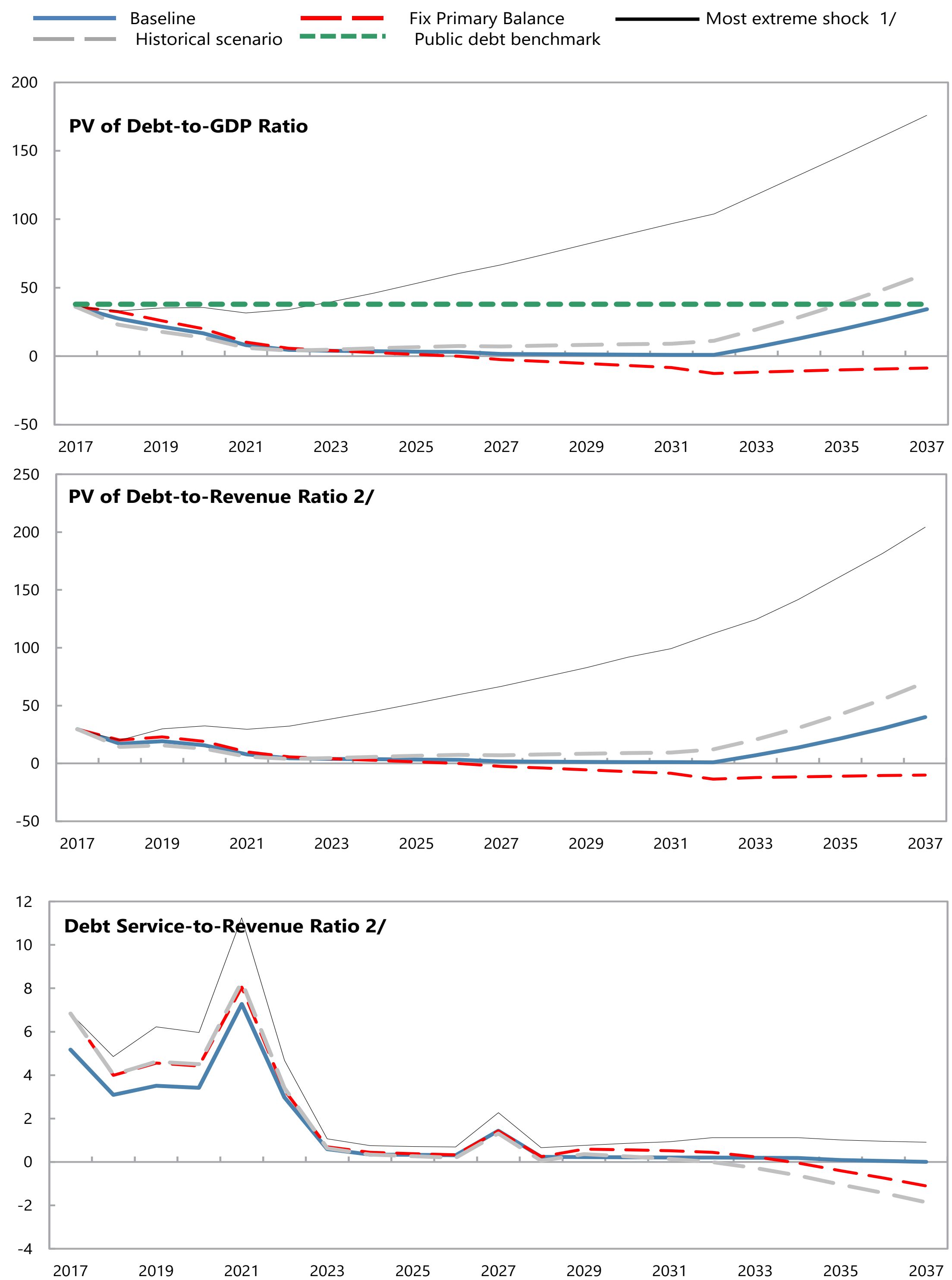
Figure 1. Tuvalu: Indicators of Public and Publicly Guaranteed External Debt under Baseline Scenarios, 2017-37 1/



Sources: Country authorities; and staff estimates and projections.

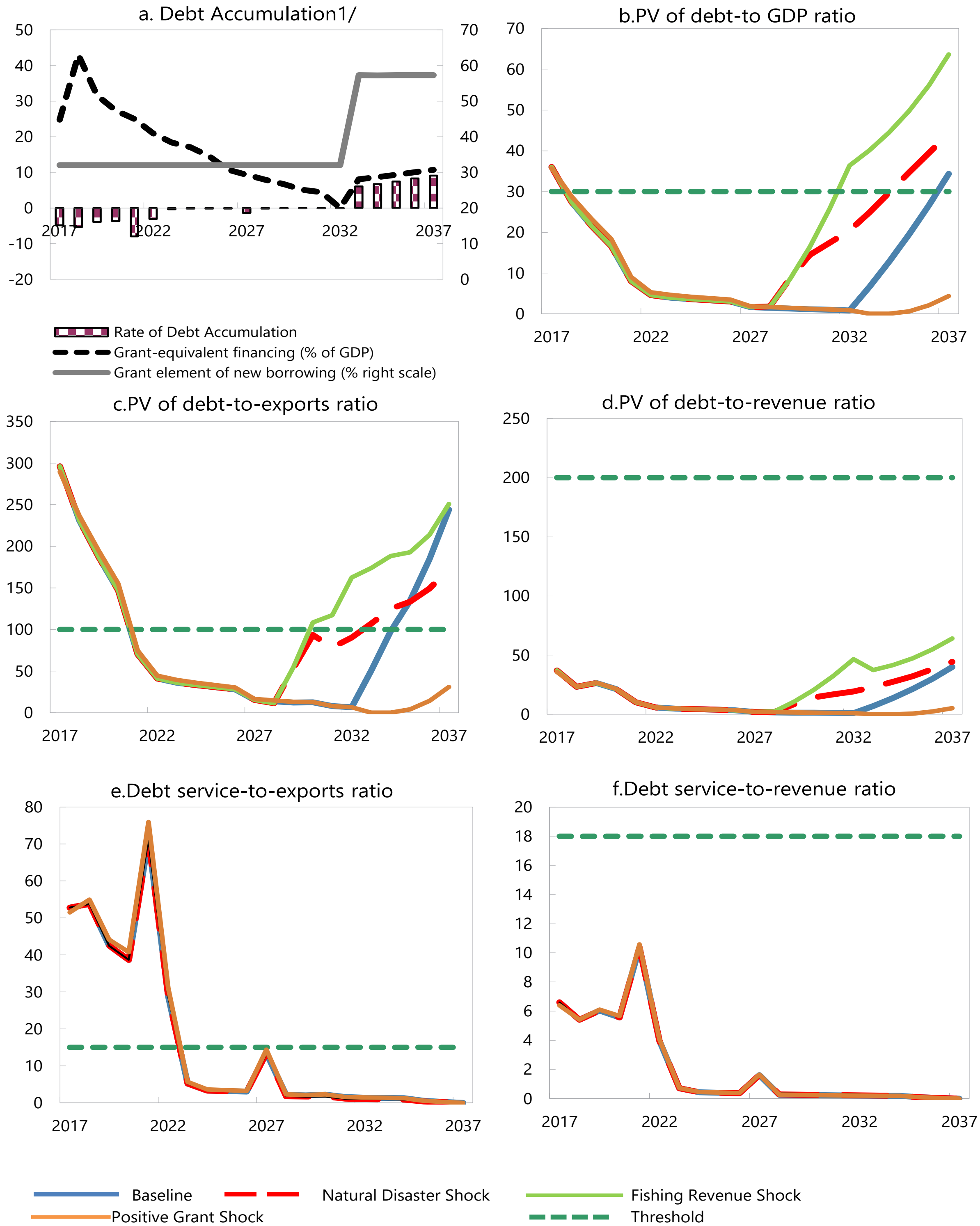
1/ The most extreme stress test is the test that yields the highest ratio on or before 2027. In figure b, it corresponds to a Combination shock; in c, to a Exports shock; in d, to a Combination shock; in e, to a Exports shock and in figure f, to a Combination shock.

Figure 2. Tuvalu: Indicators of Public Debt Under Baseline Scenarios, 2017-37 1/



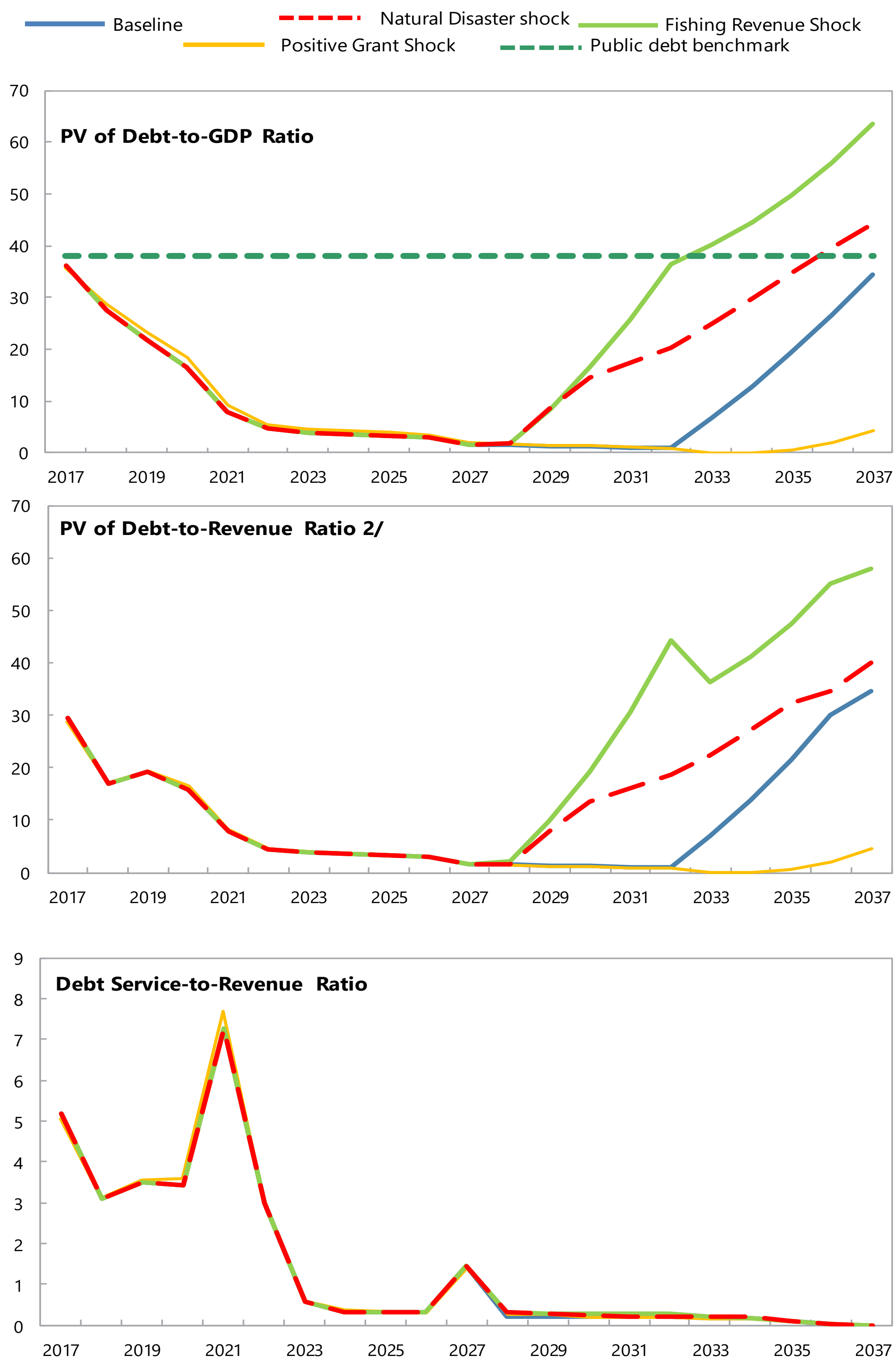
Sources: Country authorities; and staff estimates and projections.
1/ The most extreme stress test is the test that yields the highest ratio on or before 2027.
2/ Revenues are defined inclusive of grants.

Figure 3. Tuvalu: Indicators of Public and Publicly Guaranteed External Debt under Alternative Scenarios, 2017-37 1/



Sources: Country authorities; and staff estimates and projections.
1/ Debt accumulation is under the natural disaster shock.

Figure 4. Tuvalu: Indicators of Public Debt Under Alternative Scenarios, 2017-37 1/



Sources: Country authorities; and staff estimates and projections.

Table 1. Tuvalu: External Debt Sustainability Framework, Baseline Scenario, 2014-2037
(in percent of GDP, unless otherwise indicated)

	Actual			Historical [6/]	Standard [6/]	Projections									
				Average	Deviation							2017-2022			2023-2037
	2014	2015	2016			2017	2018	2019	2020	2021	2022	Average	2027	2037	Average
External debt (nominal) 1/	**59.9**	**53.5**	**45.4**			**37.0**	**27.6**	**21.8**	**16.7**	**8.1**	**4.6**		**1.4**	**76.3**	
of which: public and publicly guaranteed (PPG)	59.9	53.4	45.4			37.0	27.6	21.8	16.7	8.1	4.6		1.4	76.3	
Change in external debt	38.1	-6.4	-8.1			-8.4	-9.4	-5.8	-5.1	-8.7	-3.5		-1.4	16.3	
Identified net debt-creating flows	-2.0	56.9	-23.9			-6.6	-5.9	1.1	10.8	12.4	14.6		5.0	2.0	
Non-interest current account deficit	**-3.4**	**50.1**	**-25.6**	**4.8**	**24.9**	**-8.0**	**-6.8**	**0.2**	**10.0**	**11.6**	**13.8**		**4.2**	**2.4**	4.0
Deficit in balance of goods and services	121.4	215.9	135.0			140.9	153.7	139.8	139.5	128.5	126.2		99.9	81.9	
Exports	10.1	13.1	14.0			12.2	11.9	11.6	11.3	11.4	11.2		10.7	14.1	
Imports	131.5	229.0	149.0			153.1	165.5	151.4	150.8	140.0	137.4		110.7	96.0	
Net current transfers (negative = inflow)	-59.1	-80.1	-67.6	-53.2	13.8	-79.2	-61.3	-75.6	-68.4	-55.8	-49.3		-24.2	-10.6	-20.1
of which: official	-59.1	-80.1	-67.6			-79.2	-61.3	-75.6	-68.4	-55.8	-49.3		-24.2	-10.6	
Other current account flows (negative = net inflow)	-65.7	-85.7	-93.0			-69.7	-99.2	-64.0	-61.1	-61.2	-63.0		-71.5	-68.9	
Net FDI (negative = inflow)	**0.8**	**0.8**	**0.8**	**1.6**	**2.4**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**		**0.8**	**0.8**	0.8
Endogenous debt dynamics 2/	**0.6**	**6.1**	**1.0**			**0.6**	**0.1**	**0.2**	**0.1**	**0.1**	**0.0**		**0.0**	**-1.2**	
Contribution from nominal interest rate	0.5	3.0	2.5			2.0	1.5	1.2	0.9	0.7	0.3		0.1	0.0	
Contribution from real GDP growth	-0.3	-5.8	-1.6			-1.3	-1.4	-1.0	-0.9	-0.7	-0.3		-0.1	-1.2	
Contribution from price and exchange rate changes	0.5	8.8	0.1			...	...	...	...	...	...		...	...	
Residual (3-4) 3/	**40.1**	**-63.3**	**15.8**			**-1.7**	**-3.4**	**-6.9**	**-15.9**	**-21.1**	**-18.1**		**-6.4**	**14.3**	
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/	...	...	45.0			36.1	27.4	21.7	16.7	8.0	4.6		1.7	34.4	
In percent of exports	...	...	320.9			296.2	231.2	187.1	147.1	70.4	41.4		15.6	244.2	
PV of PPG external debt	**...**	**...**	**45.0**			**36.0**	**27.4**	**21.7**	**16.6**	**8.0**	**4.6**		**1.7**	**34.4**	
In percent of exports	**...**	**...**	**320.6**			**296.0**	**231.0**	**186.8**	**146.9**	**70.2**	**41.3**		**15.5**	**244.1**	
In percent of government revenues	**...**	**...**	**39.9**			**37.0**	**23.2**	**26.5**	**21.2**	**10.2**	**5.7**		**1.9**	**39.9**	
Debt service-to-exports ratio (in percent)	**16.4**	**61.2**	**52.5**			**52.8**	**53.8**	**42.5**	**38.7**	**71.3**	**28.8**		**13.4**	**0.0**	
PPG debt service-to-exports ratio (in percent)	**16.4**	**61.2**	**52.5**			**52.8**	**53.8**	**42.5**	**38.7**	**71.3**	**28.8**		**13.4**	**0.0**	
PPG debt service-to-revenue ratio (in percent)	**2.2**	**7.9**	**6.5**			**6.6**	**5.4**	**6.0**	**5.6**	**10.4**	**4.0**		**1.6**	**0.0**	
Total gross financing need (Millions of U.S. dollars)	-0.3	20.9	-6.4			-0.3	0.2	2.9	8.0	11.7	11.0		5.0	3.7	
Non-interest current account deficit that stabilizes debt ratio	-41.5	56.5	-17.5			0.4	2.6	6.0	15.1	20.2	17.3		5.6	-13.9	
Key macroeconomic assumptions															
Real GDP growth (in percent)	1.3	9.1	3.0	2.9	5.2	3.2	4.3	4.1	4.4	4.2	4.1	4.1	2.0	2.0	2.2
GDP deflator in US dollar terms (change in percent)	-2.1	-12.8	-0.2	2.4	9.9	6.7	6.9	4.1	4.1	3.8	3.5	4.8	2.0	2.0	2.1
Effective interest rate (percent) 5/	2.2	4.8	4.7	2.6	1.6	4.7	4.6	4.8	4.7	4.7	3.8	4.6	3.5	0.0	1.7
Growth of exports of G&S (US dollar terms, in percent)	4.7	23.8	9.8	26.7	62.6	-4.4	8.6	5.9	6.0	9.2	5.5	5.1	3.6	1.3	6.4
Growth of imports of G&S (US dollar terms, in percent)	2.4	65.8	-33.1	9.3	28.0	13.2	20.5	-0.9	8.2	0.4	5.8	7.9	1.2	1.5	1.8
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	57.3	40.4
Government revenues (excluding grants, in percent of GDP)	75.7	102.3	112.7			97.5	118.1	81.8	78.5	78.6	81.3		89.6	86.1	89.4
Aid flows (in Millions of US dollars) 7/	10.5	12.1	9.2			10.0	19.3	15.4	14.5	14.3	12.9		7.3	0.0	
of which: Grants	10.5	12.1	9.2			10.0	19.3	15.4	14.5	14.3	12.9		7.3	0.0	
of which: Concessional loans	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			24.8	43.0	31.6	27.4	25.0	21.0		9.3	10.7	9.4
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			99.9	99.9	99.9	99.9	99.9	99.9		99.7	57.3	80.9
Memorandum items:															
Nominal GDP (Millions of US dollars)	37.3	35.6	36.6			40.3	44.9	48.7	52.9	57.2	61.6		78.1	115.5	
Nominal dollar GDP growth	-0.7	-4.8	2.9			10.1	11.5	8.4	8.6	8.2	7.8	9.1	4.0	4.1	4.3
PV of PPG external debt (in Millions of US dollars)			16.2			14.5	12.3	10.6	8.8	4.6	2.8		1.3	39.8	
(PVt-PVt-1)/GDPt-1 (in percent)						-4.8	-5.3	-3.9	-3.6	-8.0	-3.1	-4.8	-1.3	9.1	2.3
Gross workers' remittances (Millions of US dollars)	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
PV of PPG external debt (in percent of GDP + remittances)	...	...	45.0			36.0	27.4	21.7	16.6	8.0	4.6		1.7	34.4	
PV of PPG external debt (in percent of exports + remittances)	...	...	320.6			296.0	231.0	186.8	146.9	70.2	41.3		15.5	244.1	
Debt service of PPG external debt (in percent of exports + remittance	...	...	52.5			52.8	53.8	42.5	38.7	71.3	28.8		13.4	0.0	

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; drawdowns of the CIF; 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 2. Tuvalu: Public Sector Debt Sustainability Framework, Baseline Scenario, 2014-2037
(In percent of GDP, unless otherwise indicated)

	Actual					Estimate	Projections								
	2014	2015	2016	Average 5/	Standard Deviation 5/	2017	2018	2019	2020	2021	2022	2017-22 Average	2027	2037	2023-37 Average
Public sector debt 1/	64.5	56.9	47.2			37.0	27.6	21.8	16.7	8.1	4.6		1.4	76.3	
of which: foreign-currency denominated	59.9	53.4	45.4			37.0	27.6	21.8	16.7	8.1	4.6		1.4	76.3	
Change in public sector debt	37.2	-7.6	-9.7			-10.3	-9.4	-5.8	-5.1	-8.6	-3.5		-1.4	16.3	
Identified debt-creating flows	5.2	-12.9	-7.6			0.8	-9.1	3.1	3.4	4.4	4.8		5.4	12.6	
Primary deficit	4.6	-15.2	-7.3	2.3	17.4	3.4	-6.5	4.1	4.2	5.0	5.2	2.6	5.4	15.0	8.3
Revenue and grants	103.8	136.3	138.0			122.2	161.0	113.4	105.9	103.6	102.3		98.9	86.1	
of which: grants	28.1	34.0	25.3			24.8	42.9	31.6	27.4	25.0	21.0		9.3	0.0	
Primary (noninterest) expenditure	108.3	121.2	130.7			125.7	154.5	117.4	110.1	108.6	107.5		104.4	101.1	
Automatic debt dynamics	0.7	2.3	-0.3			-2.6	-2.5	-0.9	-0.8	-0.5	-0.3		0.0	-2.3	
Contribution from interest rate/growth differential	-0.3	-3.9	0.0			-0.1	-0.5	-0.3	-0.3	-0.2	-0.2		0.0	-2.1	
of which: contribution from average real interest rate	0.1	1.5	1.7			1.4	1.0	0.8	0.6	0.5	0.2		0.1	-0.9	
of which: contribution from real GDP growth	-0.4	-5.4	-1.7			-1.5	-1.5	-1.1	-0.9	-0.7	-0.3		-0.1	-1.2	
Contribution from real exchange rate depreciation	1.0	6.2	-0.3			-2.4	-1.9	-0.6	-0.5	-0.3	-0.1		...	...	
Other identified debt-creating flows	-0.1	-0.1	-0.1			-0.1	-0.1	-0.1	-0.1	-0.1	-0.1		-0.1	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)	-0.1	-0.1	-0.1			-0.1	-0.1	-0.1	-0.1	-0.1	-0.1		-0.1	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	32.0	5.4	-2.0			-11.0	-0.3	-8.9	-8.5	-13.0	-8.3		-6.8	3.7	
Other Sustainability Indicators															
PV of public sector debt	...	...	46.8			36.0	27.4	21.7	16.6	8.0	4.6		1.7	34.4	
of which: foreign-currency denominated	...	...	45.0			36.0	27.4	21.7	16.6	8.0	4.6		1.7	34.4	
of which: external	...	...	45.0			36.0	27.4	21.7	16.6	8.0	4.6		1.7	34.4	
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...	
Gross financing need 2/	7.9	-9.3	-0.8			9.8	-1.5	8.0	7.8	12.5	8.2		6.8	15.0	
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	33.9			29.5	17.0	19.1	15.7	7.7	4.5		1.7	39.9	
PV of public sector debt-to-revenue ratio (in percent)	...	...	41.6			37.0	23.2	26.5	21.2	10.2	5.7		1.9	39.9	
of which: external 3/	...	...	39.9			37.0	23.2	26.5	21.2	10.2	5.7		1.9	39.9	
Debt service-to-revenue and grants ratio (in percent) 4/	3.2	4.3	4.7			5.2	3.1	3.5	3.4	7.3	3.0		1.4	0.0	
Debt service-to-revenue ratio (in percent) 4/	4.4	5.8	5.8			6.5	4.2	4.9	4.6	9.6	3.7		1.6	0.0	
Primary deficit that stabilizes the debt-to-GDP ratio	-32.6	-7.6	2.4			13.7	2.9	9.9	9.3	13.6	8.7		6.8	-1.3	
Key macroeconomic and fiscal assumptions															
Real GDP growth (in percent)	1.3	9.1	3.0	2.9	5.2	3.2	4.3	4.1	4.4	4.2	4.1	4.1	2.0	2.0	2.2
Average nominal interest rate on forex debt (in percent)	2.2	4.8	4.7	2.6	1.6	4.8	4.6	4.8	4.7	4.7	3.8	4.6	3.5	0.0	1.7
Average real interest rate on domestic debt (in percent)	2.0	2.3	5.9	4.1	1.8	6.3	...	...	...	...	...	6.3	...	...	...
Real exchange rate depreciation (in percent, + indicates depreciation	4.6	11.1	-0.5	1.2	14.5	-5.4	...	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	5.1	4.6	1.0	2.1	1.8	3.5	3.6	3.4	3.5	3.4	3.1	3.4	2.0	2.0	2.1
Growth of real primary spending (deflated by GDP deflator, in percer	32.8	22.1	11.2	6.6	11.8	-0.8	28.3	-20.9	-2.1	2.8	3.1	1.7	1.0	0.5	1.7
Grant element of new external borrowing (in percent)	...	...	...	...	...	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	57.3	...

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.

Table 3. Tuvalu: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2017-2037 (In percent)

	Projections							
	2017	2018	2019	2020	2021	2022	**2027**	2037
PV of debt-to GDP ratio								
Baseline	36	27	22	17	8	5	**2**	34
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	36	37	35	28	15	6	**4**	47
A2. New public sector loans on less favorable terms in 2017-2037 2	36	28	22	17	8	5	**2**	58
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	36	29	25	19	9	5	**2**	39
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	36	31	29	24	15	11	**8**	37
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	36	32	28	22	10	6	**2**	45
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	36	43	62	55	45	40	**36**	49
B5. Combination of B1-B4 using one-half standard deviation shocks	36	49	80	72	59	53	**47**	62
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	36	38	30	23	11	6	**2**	48
PV of debt-to-exports ratio								
Baseline	296	231	187	147	70	41	**15**	244
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	296	313	304	245	133	58	**35**	335
A2. New public sector loans on less favorable terms in 2017-2037 2	296	232	188	147	71	42	**16**	410
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	296	232	187	147	70	41	**16**	244
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	296	437	711	594	371	287	**216**	739
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	296	232	187	147	70	41	**16**	244
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	296	366	535	488	395	362	**338**	346
B5. Combination of B1-B4 using one-half standard deviation shocks	296	409	691	632	514	472	**442**	443
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	296	232	187	147	70	41	**16**	244
PV of debt-to-revenue ratio								
Baseline	37	23	27	21	10	6	**2**	40
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	37	31	43	35	19	8	**4**	55
A2. New public sector loans on less favorable terms in 2017-2037 2	37	23	27	21	10	6	**2**	67
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	37	25	30	24	12	6	**2**	45
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	37	26	36	31	19	14	**9**	43
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	37	27	35	28	13	7	**2**	52
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	37	37	76	70	58	50	**41**	57
B5. Combination of B1-B4 using one-half standard deviation shocks	37	41	98	91	75	65	**53**	72
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	37	32	37	29	14	8	**3**	56

Table 3. Tuvalu: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2017-2037 (concluded) (In percent)

Debt service-to-exports ratio

Baseline	53	54	43	39	71	29	**13**	0
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	53	57	48	46	84	35	**16**	6
A2. New public sector loans on less favorable terms in 2017-2037 2	53	54	43	39	71	29	**13**	12
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	53	54	43	39	71	29	**13**	4
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	53	91	121	113	204	85	**41**	19
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	53	54	43	39	71	29	**13**	4
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	53	54	46	47	79	37	**20**	20
B5. Combination of B1-B4 using one-half standard deviation shocks	53	61	58	60	101	47	**26**	27
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	53	54	43	39	71	29	**13**	4

Debt service-to-revenue ratio

Baseline	7	5	6	6	10	4	**2**	0
A. Alternative Scenarios								
A1. Key variables at their historical averages in 2017-2037 1/	7	6	7	7	12	5	**2**	1
A2. New public sector loans on less favorable terms in 2017-2037 2	7	5	6	6	10	4	**2**	2
B. Bound Tests								
B1. Real GDP growth at historical average minus one standard deviation in 2018-2019	7	6	7	6	12	5	**2**	1
B2. Export value growth at historical average minus one standard deviation in 2018-2019 3/	7	5	6	6	11	4	**2**	1
B3. US dollar GDP deflator at historical average minus one standard deviation in 2018-2019	7	6	8	7	13	5	**2**	1
B4. Net non-debt creating flows at historical average minus one standard deviation in 2018-2019 4/	7	5	7	7	12	5	**2**	3
B5. Combination of B1-B4 using one-half standard deviation shocks	7	6	8	9	15	6	**3**	4
B6. One-time 30 percent nominal depreciation relative to the baseline in 2018 5/	7	8	8	8	14	6	**2**	1
Memorandum item:								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	37	37	37	37	37	37	**37**	37

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 b
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 th
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 4. Tuvalu: Sensitivity Analysis for Key Indicators of Public Debt, 2017-2037
(In percent)

	Projections							
	2017	2018	2019	2020	2021	2022	2027	2037
PV of Debt-to-GDP Ratio								
Baseline	36	27	22	17	8	5	2	34
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	36	23	18	14	6	4	7	60
A2. Primary balance is unchanged from 2017	36	33	26	20	10	6	-3	-9
A3. Permanently lower GDP growth 1/	36	27	23	19	12	12	35	189
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	36	33	35	35	32	34	67	176
B2. Primary balance is at historical average minus one standard deviations in 2018-201	36	43	46	40	30	26	23	52
B3. Combination of B1-B2 using one half standard deviation shocks	36	39	37	35	29	28	46	122
B4. One-time 30 percent real depreciation in 2018	36	40	33	26	16	12	9	24
B5. 10 percent of GDP increase in other debt-creating flows in 2018	36	33	26	21	12	9	6	39
PV of Debt-to-Revenue Ratio 2/								
Baseline	29	17	19	16	8	5	2	40
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	29	14	16	13	6	4	7	70
A2. Primary balance is unchanged from 2017	29	20	23	19	10	6	-3	-10
A3. Permanently lower GDP growth 1/	29	17	20	18	12	11	35	219
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	29	20	30	32	30	32	67	204
B2. Primary balance is at historical average minus one standard deviations in 2018-201	29	27	41	37	29	25	23	60
B3. Combination of B1-B2 using one half standard deviation shocks	29	24	32	32	27	27	46	141
B4. One-time 30 percent real depreciation in 2018	29	25	29	25	15	12	9	28
B5. 10 percent of GDP increase in other debt-creating flows in 2018	29	20	23	20	12	8	6	45
Debt Service-to-Revenue Ratio 2/								
Baseline	5	3	4	3	7	3	1	0
A. Alternative scenarios								
A1. Real GDP growth and primary balance are at historical averages	7	4	5	5	8	3	1	-2
A2. Primary balance is unchanged from 2017	7	4	5	4	8	3	1	-1
A3. Permanently lower GDP growth 1/	7	4	5	4	8	4	2	7
B. Bound tests								
B1. Real GDP growth is at historical average minus one standard deviations in 2018-20	7	4	5	5	9	4	3	8
B2. Primary balance is at historical average minus one standard deviations in 2018-201	7	4	5	5	9	4	2	2
B3. Combination of B1-B2 using one half standard deviation shocks	7	4	5	5	9	4	3	6
k655	7	5	6	6	11	5	2	1
B5. 10 percent of GDP increase in other debt-creating flows in 2018	7	4	5	4	8	3	2	1

Sources: Country authorities; and staff estimates and projections.
1/ Assumes that real GDP growth is at baseline minus one standard deviation divided by the square root of the length of the projection period.
2/ Revenues are defined inclusive of grants.