

INTERNATIONAL DEVELOPMENT ASSOCIATION

INTERNATIONAL MONETARY FUND

**REPUBLIC OF MADAGASCAR**

**Joint Bank-Fund Debt Sustainability Analysis – 2018 Update<sup>1</sup>**

Prepared jointly by the staffs of the International Development Association (IDA) and the International Monetary Fund (IMF)

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*Madagascar's risk of external debt distress is assessed to be 'moderate,' in line with the last DSA of June 2017, since the dynamics of Madagascar's external public and publicly-guaranteed (PPG) debt remain sustainable under the baseline. The public DSA shows total (domestic and external) PPG debt is also sustainable under the baseline, so risks to domestic debt are not assessed as significant. However, stress tests breach the prudent benchmark for the public DSA (covering both domestic and external debt) and, in only some instances, for the external DSA. The analysis suggests that shocks to GDP growth are the main potential source of vulnerability, especially for the public DSA. A weaker currency, widened fiscal deficits, lower exports, or higher interest rates present additional risks. This DSA reflects updated and more detailed loan data, which include marginally less favorable financing conditions than in the last DSA.*

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<sup>1</sup> Prepared by IMF and the World Bank following the mission in March 2018. This DSA follows the IMF and World Bank Staff Guidance Note on the Application of the Joint Fund-Bank Debt Sustainability Framework for Low-Income Countries, November 5, 2013 (available at <http://www.imf.org/external/pp/longres.aspx?id=4827>)

## INTRODUCTION

1. **This joint DSA has been prepared by IMF and World Bank staff.** It is based on the framework for LICs approved by the respective Executive Boards. The framework takes into account indicative thresholds for debt burden indicators determined by the quality of the country's policies and institutions.<sup>2</sup> The assessment comprises a baseline scenario and a set of alternative scenarios.
2. **This DSA includes public external and domestic debt and guarantees of the central government.** The DSA does not include the debt of local government or state-owned enterprises (SOEs) other than through direct guarantees provided by the central government. The measure of debt is on a gross rather than net basis. And the residency criterion is used to determine the split between external and domestic debt.
3. **The December 2017 World Bank Debt Management Performance Assessment (DeMPA) records incremental progress starting from a low base.** Out of 33 indicators, 14 meet the minimum score for adequate performance. There are notable improvements since the previous DeMPA undertaken in 2013: there are high scores in managerial structure since borrowing is now steered by a published debt management strategy and the adoption in 2014 of the Law on Public Debt and Guarantees for the Central Government has strengthened the legal framework for government debt management. Staff capacity has improved. Inadequate scores reflect important weaknesses in audit, guarantees and on-lending (a topic of World Bank technical assistance), cash flow forecasting and cash balance management, debt administration and data security.
4. **Debt monitoring capacity has been upgraded.** Government debt recording appears to be sound and well-reported with a high quality biannual statistical bulletin that covers both domestic and external debt. Debt monitoring capacity scores 4.5 over 2014-16 according to the World Bank Country and Policy Institutional Assessment Index (CPIA), which merits an upgrade from 'weak' to 'adequate' debt monitoring capacity. In turn, this influences how external debt limits are specified in IMF programs and the proposed performance criterion on external debt would, therefore, be specified in present value (PV) terms from end-December 2018 onwards. The existing nominal limits on non-concessional borrowing would instead become indicative targets. Notwithstanding the improved monitoring capacity, Madagascar

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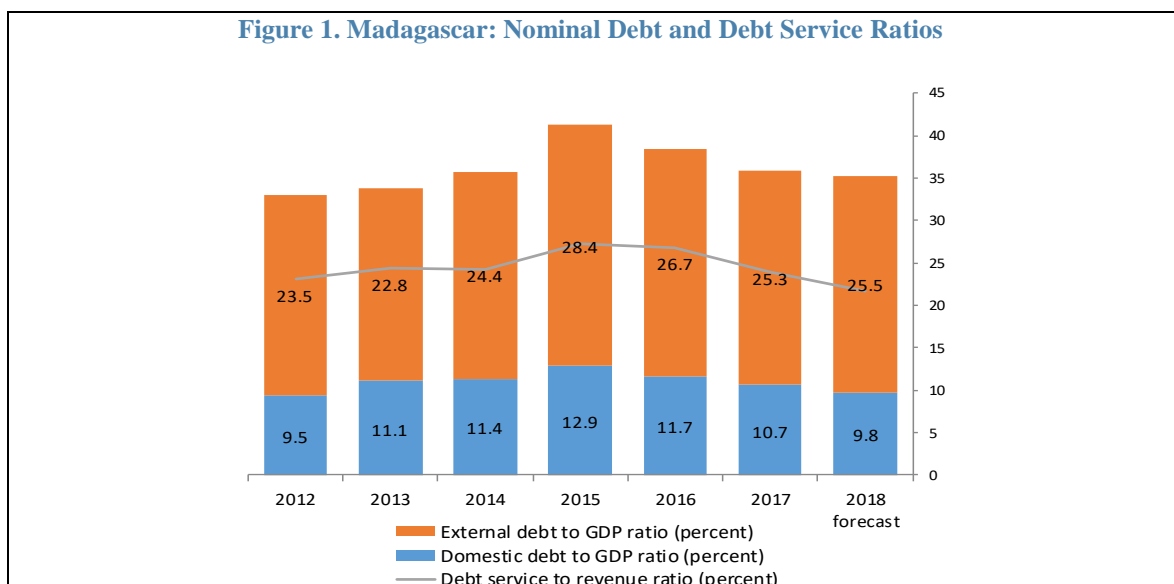
<sup>2</sup> The average CPIA in 2014-16 is 3.2, which is close to the average for sub-Saharan African International Development Association (IDA) countries. The indicative thresholds for external debt applicable for countries with weak overall CPIA scores are: (i) 30 percent for the PV of debt-to-GDP ratio; (ii) 100 percent for PV of debt-to-exports ratio; (iii) 200 percent for the PV of debt to fiscal revenues ratio; (iv) 15 percent for the debt service to exports ratio; and (v) 18 percent for the debt service to revenue ratio. The indicative threshold for the PV of total PPG debt is 38 percent of GDP.

continues to be classified as a weak performer according to the overall CPIA index and the thresholds for external debt used in this report remain as in the previous DSA.<sup>2</sup>

## RECENT DEVELOPMENTS AND CURRENT DEBT SITUATION

5. **Debt ratios have fallen recently, following an uptick before the ECF program** (Figure 1). Total public debt rose from 31 percent of GDP in 2008 to 41 percent of GDP in 2015, pushed up partly by depreciation of the official exchange rate. However, the ratio of debt to GDP fell by 2.9 per-cent in 2016 and by 2.4 percent in 2017 to 36 percent of GDP.<sup>3</sup> This follows smaller than expected fiscal deficits, thanks largely to stronger revenue collection, rising nominal GDP growth, and an appreciating real effective exchange rate. Accordingly, the debt service to revenue ratio ticked down to 24 percent in 2017 (from 27 percent in 2015). The reengagement of the government with the international donor community following the return to constitutional order in 2014, concurrent increases in aid, and lower recourse to domestic borrowing helped the decline.

6. **An appreciating real effective exchange rate and overperformance on the fiscal balance led to better-than-expected outcomes in 2017.** Actual debt levels at end-2017 stood about 5 percentage points lower than anticipated in the DSA for the first review, which projected a rise to above 41 percent. Half of this difference is accounted for by a stronger than anticipated Ariary. In addition, the primary fiscal deficit registered 1.8 percent of GDP less than projected in the first review owing to overperforming revenue collections and delayed spending (mostly investment). The authorities have largely refrained from borrowing externally on non-concessional terms, which helped support debt sustainability.



<sup>3</sup> Debt is far below the pre-HIPC peak of 95 percent of GDP.

7. **External sources account for 70 percent of debt** (Table 1). Multilateral creditors, in particular the World Bank and African Development Bank, account for more than half of all debt and offer loans on highly concessional terms. Within domestic debt, securities issuance edged up as a share of GDP.<sup>4</sup> The stock of domestic arrears was 1.3 percent of GDP, after substantial declines in 2016 and 2017. Debt owed to the Central Bank<sup>5</sup> rose in nominal terms and has remained constant at 3 percent of GDP since 2015, due in part to on-lending of part of IMF program disbursements to the government. Commercial and guaranteed loans increased their share of debt to 2 percent in 2017.

**Table 1. Madagascar: Break-down of Total PPG Debt 2015-17, (end of period)**

Creditor	Amount (US\$m)			Percent of GDP			Percent of total		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
<b>Domestic debt, of which:</b>	<b>1,153</b>	<b>1,109</b>	<b>1,185</b>	<b>12.9</b>	<b>11.7</b>	<b>10.7</b>	<b>31.3</b>	<b>30.4</b>	<b>29.7</b>
Securities inc. BTA, BTF, BTS	333	526	669	3.7	5.5	6.0	9.0	14.4	16.8
Debt to the Central Bank	269	283	330	3.0	3.0	3.0	7.3	7.8	8.3
Arrears	346	210	147	3.9	2.2	1.3	9.4	5.7	3.7
Other inc. loans	206	90	39	2.3	0.9	0.4	5.6	2.5	1.0
<b>External debt, of which:</b>	<b>2,534</b>	<b>2,535</b>	<b>2,808</b>	<b>28.4</b>	<b>26.7</b>	<b>25.3</b>	<b>68.7</b>	<b>69.6</b>	<b>70.3</b>
Multilateral	1,950	2,052	2,276	21.8	21.6	20.5	52.9	56.3	57.0
Paris Club	133	127	130	1.5	1.3	1.2	3.6	3.5	3.3
Non-Paris Club	356	333	324	4.0	3.5	2.9	9.7	9.2	8.1
Commercial & Gauranteed	94	23	78	1.1	0.2	0.7	2.6	0.6	2.0
<b>Total PPG debt</b>	<b>3,687</b>	<b>3,644</b>	<b>3,994</b>	<b>41.3</b>	<b>38.4</b>	<b>36.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

8. **The government may face some contingent liabilities with respect to SOEs including the nonbank financial sector, while the banking sector is less likely to generate direct fiscal costs.** The treatment of SOE debt<sup>6</sup> and contingent liabilities is as follows:

- The recapitalization of Air Madagascar is part of the baseline assumptions and reflected in projected debt dynamics. The strategic partnership with Air Austral concluded in November 2017 involved one-off government support to assume past arrears of 0.8 percent of GDP, paid partly in 2017 and partly in 2018, with both domestic financing (issuances of specific T-Bonds) and external financing (\$40 million from an international

<sup>4</sup> Although most securities are short-term Treasury bills (BTAs) with durations of up to one year, most of the increase came from longer-dated bonds (BTFs) with a maturity of up to three years.

<sup>5</sup> Much of the debt held by the central bank are in marketable debt instruments (*titre de credit negociable*), obligations that relate to irregular government financing before 2014 (that has been regularized in various conventions) and past central bank losses to be covered by the government. Statutory advances, about 30 percent of the debt owed to the central bank, are planned to be reduced. Consistent with this, excluding on-lending, debt to the central bank has been declining in nominal terms.

<sup>6</sup> SOE liabilities include sums owed to the government. Consisting mostly of tax arrears, they amount to 1¼ percent of GDP (of which more than half is accounted for by Jirama).

bank). While no future public support to the airline (such as government guarantees) is proposed, the government transfers could imply an implicit government guarantee of future airline obligations.

- Debt projections also include explicit government guarantees provided for the electricity utility JIRAMA's external borrowing, but amounts are limited to less than 0.5 percent of GDP. JIRAMA's total domestic and external liabilities are estimated at 4½ percent of GDP.
- Contingent liabilities from other SOEs are not included. Potential contingencies include future recapitalization of the postal savings scheme and the Madagascar Savings Fund (*Caisse d'Épargne de Madagascar, CEM*), which would likely amount to less than 1 percent of GDP.
- Most banks are financially solid with deposits exceeding loans and majority foreign shareholders. Dollarization of deposits and credits is not pronounced and banks' foreign assets generally exceed their foreign liabilities.

## UNDERLYING ASSUMPTIONS

9. **The DSA projections are consistent with the authorities' plan to scale up much needed infrastructure investment and social spending** (Table 2). In 2016-17, loans contracted were worth approximately \$1.3 billion in nominal terms and \$0.7 billion in PV terms. As per the authorities' plans, loans signed, being studied, or being negotiated amount to approximately \$1.4 billion (\$0.8 billion in PV terms) for 2018-19. The significant difference between the nominal value and PV terms indicates that concessional (external) borrowing and grants will remain an important source of financing. Loan contracting is expected to taper off over the medium term. Disbursements, worth about \$0.4 billion in nominal terms in 2016-7,<sup>7</sup> have been more gradual than signatures and grow more slowly than anticipated since project execution is slightly slower than previously assumed. This is consistent with slightly slower GDP growth than projected in the 2017 DSA. It is also consistent with more backloaded spending, which contributes to a lower deficit for 2018 but higher deficits in later years. Forecast improvements in GDP growth and revenue generation become more favorable to debt dynamics over the medium term, while the non-interest current account deficit and decreasing reliance on grants become less favorable to debt dynamics.

10. **Financing conditions are slightly less favorable than in the 2017 DSA.** Informed by a new debt strategy document provided by the authorities (*Strategie de La Dette a Moyen-Term, 2018-2020*) financing assumptions have been modified slightly. Average interest rates on new disbursements, at 1.6 percent, are ¼ percent higher than in the 2017 DSA, reflecting higher rates from some sources and lower from others. The average maturity remains broadly unchanged at 27½ years. Several grace periods have been shortened, resulting in an average decrease by 1 year

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<sup>7</sup> Disbursement figures for a given year can include those from loans signed in previous years.

to 4½ years. Staff also incorporated better information from the authorities on loans signed but not yet disbursed, which, other things equal, acts to reduce the estimated projected debt.

### Box 1. Baseline Macroeconomic Assumptions

Compared to the 2017 DSA, key changes in short-run assumptions are motivated by delayed project execution (reducing real GDP growth and the fiscal deficit) and higher vanilla prices (boosting the current account). Medium-run assumptions remain similar.

**Real GDP:** Growth is projected to peak at about 5½ percent in 2019. Short-term growth is slightly lower than in the 2017 DSA, reflecting slower project execution than previously assumed. Medium-term growth remains at about 5 percent, driven by improved confidence, scaling up of public investment, further re-engagement of development partners, and increasing mining exports.

**Current account:** Exports were higher than expected in 2017, as already high vanilla prices continued to rise and metal prices surpassed expectations. Accordingly, the current account deficit has been revised downward, especially for 2018. Vanilla prices are assumed to give up most of their gains over the medium term.

**Fiscal variables:** Owing to the delay in disbursements of externally-financed investment, fiscal expenditure and the primary deficit have been revised downward in 2018 and upward over the next few years.<sup>1</sup> Grant support has been revised down.

**Table 2. Madagascar: Baseline Macroeconomic Assumptions**

		2018	2019	2020	2021	2022	2023
Real GDP growth (percent)	2018 DSA	5.0	5.4	5.3	5.2	4.9	4.9
	2017 DSA	5.3	5.9	5.5	5.2	5.0	-
Non-interest CA deficit (percent GDP)	2018 DSA	1.1	2.4	3.4	3.7	3.9	3.6
	2017 DSA	4.9	4.6	3.8	3.7	3.5	-
Primary deficit (percent of GDP)	2018 DSA	1.4	3.5	4.4	4.2	3.7	3.1
	2017 DSA	3.6	3.4	2.8	2.5	2.4	-
Total revenues, excl grants (percent of GDP)	2018 DSA	12.2	12.5	13.0	13.4	13.6	13.9
	2017 DSA	11.8	12.2	12.7	13.1	13.5	-
Grants (percent of GDP)	2018 DSA	3.4	2.7	1.4	1.4	1.4	1.4
	2017 DSA	3.6	3.4	2.4	2.3	2.3	-
Non-Interest Expenditure (percent of GDP)	2018 DSA	17.1	18.8	18.8	19.0	18.8	18.5
	2017 DSA	19.0	19.1	17.8	17.9	18.1	-

Source: World Bank and IMF staff projections.

<sup>1</sup>The primary deficit in Table 2 includes foreign financed capital expenditure and grants, which are excluded from IMF program quantitative targets.

11. **Limited semi-concessional and very limited non-concessional borrowing is envisaged throughout the forecast horizon.** Cumulative semi-concessional borrowing (grant element between 20 and 35 percent) and non-concessional external borrowing (grant element of less than 20 percent) since the start of 2016 reached \$173 million at end-December 2017, compared to an IMF program ceiling of \$383 million. Of this amount, non-concessional borrowing was \$55 million, compared to the ceiling of \$100 million. Over the long term, the importance of semi-concessional borrowing relative to concessional loans (and grant financing) is assumed to increase, reducing the average grant element of new borrowing from over 40 percent in the short term to 26 percent in 2038.

12. **The main risks to these assumptions relate to revenue generation, the exchange rate, the persistence of donor grant support, and possible negative developments related to the elections later in 2018.** If revenue performance is not sustained, this could accelerate debt accumulation. Faster-than-expected depreciation of the Ariary would increase the real value of the existing debt stock. Tighter global financial conditions<sup>8</sup> could spill over to unexpectedly higher interest rates from some lenders. Additionally, although the outlook on donor grant support is positive, any lack of reform progress going forward could complicate engagement. The electoral period may lead to negative developments, such as challenges to expenditure restraint, leading to higher-than-intended borrowing. Possible political instability related to the elections could weaken economic confidence, with negative implications for key macroeconomic variables, such as growth, the exchange rate and donor support. Many of the negative risks are counterbalanced by positive risks. A stronger-than-projected exchange rate or revenue generation (with an upside potential given the low base) would boost the ability to service higher debt levels and structural fiscal reforms could stimulate additional donor support in the medium to long term. Risks from recurrent natural disasters are already incorporated in the baseline and additional risks are limited.<sup>9</sup>

## EXTERNAL DSA

### *Baseline Scenario*

13. **PPG external debt declined from 26.7 percent of GDP in 2016 to 25.3 percent of GDP in 2017.** An increase in nominal terms (from \$2.5 billion in 2016 to \$2.8 billion in 2017) was exceeded by nominal GDP growth in US dollar terms, which was boosted by growth in real activity as well as the real appreciation of the Ariary. The strength of the Ariary and a better-than-expected current account balance kept external debt at a level that was almost 5 percent

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<sup>8</sup> Against the backdrop of continued monetary policy normalization and stretched valuations across asset classes, an abrupt change in risk appetite could raise interest rates suddenly and sharply.

<sup>9</sup> Historical averages of key variables, which by construction include the medium-term impact of recurrent disasters, are an input into forecasts; estimates are adjusted for the impact of planned policy measures. See Box 2 of the 2017 DSA for a discussion of impacts on the macroeconomy.

lower than anticipated in the 2017 DSA. PPG external debt is anticipated to edge up to 25.5 percent of GDP in 2018 (Table 3) and reach 37 percent in 2023. Overall external debt including private debt is expected to rise moderately over the medium term. Inflows from transfers and FDI<sup>10</sup> are projected to almost match the trade deficit and other outflows, including from the mining sector.<sup>11</sup> Under the baseline, debt dynamics benefit from real GDP growth exceeding nominal interest rates. Looking further ahead, as reliance on foreign financing decreases, external PPG debt is expected to be 32 percent of GDP in 2038. In the 2017 DSA, external PPG debt was projected at 25 percent in 2037 due in part to more optimistic FDI as well as more favorable long-term grants and interest rates.<sup>12</sup>

**14. Under the baseline projection, all PPG external debt indicators in present value (PV) terms remain comfortably below the policy-dependent debt burden thresholds** (Figure 2). Because of the large concessional element of borrowing, the PV of external debt is substantially lower than the nominal debt stock. The PV of PPG external debt was 14 percent of GDP in 2017. It is projected to increase to 22½ percent of GDP by 2023 (21 percent in the 2017 DSA) and to remain broadly constant until 2038 (16 percent in 2017 DSA).

**15. Private sector debt is not assessed to pose a significant threat to external sustainability.** Private external debt is projected to decline as the loans related to a major mining project are repaid. Given the exceptional nature of the mining project, the DSA does not forecast substantial new external borrowing from the private sector. Furthermore, this debt is not assessed to pose a significant threat to external sustainability, as the ultimate liability for these loans is held by the multinational shareholders rather than resident entities (such as domestic banks or the government).

#### *Sensitivity Analysis*

**16. Two types of DSA stress tests are applied to the baseline external PPG debt and debt service projections.** First, the six standard bound tests apply pre-defined shocks to each of five macroeconomic variables that drive external debt (Table 4). The shock that leads to the highest values is shown in Figure 2 and indicated in Footnote 1 of the figure. Second, there are two alternative scenarios including one in which macroeconomic variables are set equal to their

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<sup>10</sup> FDI is assumed to remain substantially below the 2011 and 2012 levels, when major mining projects were being constructed.

<sup>11</sup> The large residual in Table 3 is partly related to mining activity. While mining exports are recorded in full in the balance of payment statistics, only a fraction of these receipts actually returns to Madagascar, with the remainder being repatriated to the parent companies.

<sup>12</sup> These factors also help explain why, although 2017 debt levels are 5 percent of GDP lower than in the 2017 DSA, they are forecast to be only ¼ percent of GDP lower than in the 2017 DSA for 2022.



average over 2008-17 (as a check against the realism of baseline assumptions) and one in which financing is less favorable.

17. **Nine out of 40 tests breach the external PPG debt thresholds.** Four shocks breach the debt-to-GDP threshold. First, a depreciation of 30 percent relative to the baseline in 2019 would result in the PV breaching the debt-to-GDP threshold of 30 percent in 2023 and heading back to it over the long term- this is considered the most severe test, and breach under this assumption is sufficient to yield an assessment of moderate risk of external debt distress for Madagascar. Second, less favorable financing would result in a breach in the longer term. Third, a combination of less severe shocks would also breach the debt-to-GDP threshold in 2023. Fourth, the historical scenario generates a breach.<sup>13</sup> The same four shocks, notably the combination of less severe shocks, would cause temporary breaches to the PV of debt-to-revenue threshold of 200. Finally, a shock to exports makes the PV of debt-to-exports ratio breach its threshold temporarily. Compared to the debt stock indicators, debt service indicators appear especially robust since the stress tests generate no breaches. The 2017 DSA results generated minor breaches in the bounds tests and more substantial breaches using the historical scenario. The difference is accounted for partly by a lower baseline in 2017 and partly because the default historical shock is more benign following the shift in the base year.

## **PUBLIC DSA**

### *Baseline Scenario*

18. **Total PPG debt (external plus domestic) is projected to rise moderately as a proportion to GDP over the medium term and remain broadly steady thereafter under baseline assumptions.** Estimated at 36 percent of GDP in 2017, domestic and external PPG debt is expected to rise to 44 percent over the medium term. Much of the medium-term increase is in external debt, as the authorities benefit from improved donor relations to seek external concessional financing and rely less on domestic sources. The primary deficit, which includes foreign-financed capital projects and grants in the DSA, is the main driver of debt dynamics. Real GDP growth that exceeds interest rates helps keep debt contained over the longer term under the baseline assumptions. Between 2023 and 2038, debt is expected to fall by 1 percent of GDP, but the composition is expected to change. As domestic debt markets deepen, the share of external debt is expected to decline slightly. The domestic component of PPG debt variables remains broadly the same as in the 2017 DSA.

19. **The PV of total PPG debt to GDP and to revenue, as well as debt service measures, rise slowly from low levels over the forecast horizon.** The baseline assumes that Madagascar will rely less on concessional financing over time. Therefore, when measured in PV terms, total PPG debt is projected to increase throughout the projection horizon and reach 34½ percent of

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<sup>13</sup> There are good reasons to place less weight on the historical scenario, in which large current account deficits in 2008 and 2009 are an important driver. As discussed in the 2017 DSA, the episode was atypical, related to investment in large mining projects, and did not increase PPG external debt.

GDP in 2038. Since debt is consistently below the threshold of 38 percent (Figure 3 and Table 5) and is not rising alarmingly, Madagascar's debt sustainability rating is not augmented by significant risks from domestic public debt. Less concessional financing causes the projected ratio of debt service to revenue including grants to rise for much of the forecast period. The PV of debt relative to revenue including grants is projected to reach 198 percent in 2023 and remain broadly stable thereafter.

### *Sensitivity Analysis*

20. **In six out of eight stress tests, the PV of total PPG debt as a share of GDP breaches the risk benchmark, albeit usually only in the long term** (Figure 3 and Table 6). The most extreme shock—a one standard deviation reduction in GDP growth in 2019-20 relative to its historical average—would breach the PV of debt-to-GDP threshold (38 percent) during 2023 and continue rising to 60 percent by 2038, if no corrective measures are taken. The PV of the debt-to-GDP benchmark is also breached by a smaller yet more persistent growth shock, or two alternative shocks yielding a smaller growth shock combined with a shock to the fiscal balance. However, such breaches only take place over the longer term. A one-time depreciation would of increase would also breach the threshold over the long term. Finally, a large increase in debt creating flows in 2019, which could for example arise from realizing an unexpectedly large unknown contingent liability, would also breach the threshold over the long term. Measured as a share of revenue rather than of GDP, shocks generally result in rising values over the longer term, although no thresholds are specified. In the most extreme shock, debt service would rise sharply but temporarily. The simulations suggest total PPG debt projections are more sensitive to shocks than the external debt projections. Policies promoting an environment conducive to stable GDP growth as well as further improvements in revenue generation and expenditure control and management are essential for PPG debt sustainability.

## **CONCLUSION**

21. **Breaches of debt thresholds only under stress scenarios result in a moderate risk rating.** Current external debt ratios are lower than in the 2017 DSA due in part to better-than-expected vanilla and other commodity exports, which contributed to a better-than-expected current account balance and a stronger-than-anticipated Ariary. The authorities are expected to be able to service current and future debt. Only some shocks challenge the sustainability of external debt stocks, while external debt service capacity appears robust. In comparison, total PPG debt remains more vulnerable to deviations from the baseline assumptions, especially slower GDP growth. A higher primary deficit (for example from disappointing revenue collection) or a one-off increase in debt-creating flows (for example materializing contingent liabilities related to SOEs) would also present risks.

22. **The authorities have initiated measures that can help address these vulnerabilities.** In 2017, revenue mobilization efforts continued to be fruitful, a new institution to manage public investment OCSIF became operational, and expenditure execution was satisfactory overall. Further measures aim to improve revenue collection and budgetary execution, strengthen project

implementation and debt monitoring capacity, and improve policy and institutional performance. Alongside initiatives to promote governance and build a sound financial sector, such measures should help to maintain favorable financing conditions and increase Madagascar's potential economic growth. It is also important to contain debt risks by strengthening the monitoring and management of SOEs, including the National Public Establishments.

23. **The DSA informed discussions with the authorities during the March 2018 mission.** Staff stressed that proposed IMF program limits and borrowing plans need to be consistent with debt sustainability and the overall macroeconomic framework. Staff will also continue to stress the importance of growth-friendly policies as well as measures to manage the fiscal balance for debt sustainability. Staff clarified the distinction between nominal debt ratios and those measured in PV terms and worked with technical staff to refine calculations of PVs for both IMF program monitoring and to inform broader debt management. The authorities broadly concurred with the overall assessment and the policy implications. While agreeing on the baseline projections, the authorities believed that scaling up public investment could have a stronger than projected impact on growth.

**Table 3. Madagascar: External Debt Sustainability Framework, Baseline Scenario, 2015-38<sup>1</sup>**  
(In percent of GDP; unless otherwise indicated)

	Actual			Historical Average	Standard Deviation	Projections							2018-2023		2024-2038	
	2015	2016	2017			2018	2019	2020	2021	2022	2023	Average	2028	2038	Average	
<b>External debt (nominal) 1/</b>	<b>47.4</b>	<b>44.3</b>	<b>38.7</b>			<b>37.0</b>	<b>37.5</b>	<b>38.8</b>	<b>40.0</b>	<b>41.0</b>	<b>41.5</b>	<b>39.3</b>	<b>36.9</b>	<b>33.9</b>		
<i>of which: public and publicly guaranteed (PPG)</i>	28.4	26.7	25.3			25.5	27.8	30.7	33.3	35.5	37.0	31.6	36.1	31.8		
Change in external debt	3.7	-3.1	-5.6			-1.7	0.4	1.3	1.3	1.0	0.5	0.5	-1.1	-0.1		
Identified net debt-creating flows	1.6	-6.2	-8.5			-2.7	-1.6	-0.8	-0.6	-0.5	-0.9	-1.2	-1.8	0.0		
<b>Non-interest current account deficit</b>	<b>0.4</b>	<b>-2.0</b>	<b>-0.9</b>	<b>5.9</b>	<b>7.7</b>	<b>1.1</b>	<b>2.4</b>	<b>3.4</b>	<b>3.7</b>	<b>3.9</b>	<b>3.6</b>	<b>3.0</b>	<b>2.8</b>	<b>4.2</b>		
Deficit in balance of goods and services	3.5	2.3	3.6			5.9	6.1	6.4	6.5	6.5	6.0	6.2	4.7	6.6		
Exports	32.1	33.5	35.4			34.7	34.0	33.6	33.4	33.2	33.0	33.6	35.2	38.8		
Imports	35.5	35.8	39.0			40.6	40.1	40.0	39.9	39.8	39.1	39.9	39.9	45.4		
Net current transfers (negative = inflow)	-5.4	-6.9	-6.4	-5.8	1.0	-6.9	-5.7	-5.1	-4.9	-4.7	-4.6	-5.3	-4.6	-4.6		
<i>of which: official</i>	-1.5	-3.5	-2.8			-3.4	-2.6	-1.4	-1.4	-1.4	-1.4	-1.9	-1.2	-1.1		
Other current account flows (negative = net inflow)	2.3	2.7	1.9			2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.6	2.1		
<b>Net FDI (negative = inflow)</b>	<b>-4.5</b>	<b>-4.5</b>	<b>-3.1</b>	<b>-5.5</b>	<b>2.0</b>	<b>-3.1</b>	<b>-3.2</b>	<b>-3.3</b>	<b>-3.4</b>	<b>-3.4</b>	<b>-3.5</b>	<b>-3.3</b>	<b>-3.5</b>	<b>-3.5</b>		
<b>Endogenous debt dynamics 2/</b>	<b>5.8</b>	<b>0.3</b>	<b>-4.6</b>	<b>0.0</b>	<b>3.4</b>	<b>-0.7</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-1.0</b>	<b>-0.9</b>	<b>-1.1</b>	<b>-0.7</b>		
Contribution from nominal interest rate	1.6	1.5	1.2			1.1	1.0	1.0	0.9	0.9	0.8	1.0	0.6	0.7		
Contribution from real GDP growth	-1.5	-1.9	-1.6			-1.8	-1.8	-1.8	-1.9	-1.8	-1.9	-1.8	-1.7	-1.4		
Contribution from price and exchange rate changes	5.7	0.7	-4.2			...	...	...	...	...	...	...	...	...		
<b>Residual (3-4) 3/</b>	<b>2.1</b>	<b>3.1</b>	<b>3.0</b>	<b>1.0</b>	<b>4.7</b>	<b>1.0</b>	<b>2.1</b>	<b>2.1</b>	<b>1.9</b>	<b>1.5</b>	<b>1.4</b>	<b>1.7</b>	<b>0.7</b>	<b>0.0</b>		
<i>of which: exceptional financing</i>	0.0	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/	...	...	27.6			26.1	25.7	26.0	26.4	26.8	27.0		24.2	24.3		
In percent of exports	...	...	77.9			75.2	75.7	77.5	79.1	80.6	81.8		68.8	62.7		
<b>PV of PPG external debt</b>	<b>...</b>	<b>...</b>	<b>14.2</b>			<b>14.6</b>	<b>16.1</b>	<b>17.9</b>	<b>19.7</b>	<b>21.3</b>	<b>22.5</b>		<b>23.4</b>	<b>22.3</b>		
<b>In percent of exports</b>	<b>...</b>	<b>...</b>	<b>40.0</b>			<b>42.0</b>	<b>47.3</b>	<b>53.5</b>	<b>59.1</b>	<b>64.0</b>	<b>68.2</b>		<b>66.5</b>	<b>57.4</b>		
<b>In percent of government revenues</b>	<b>...</b>	<b>...</b>	<b>119.7</b>			<b>119.1</b>	<b>128.4</b>	<b>137.9</b>	<b>147.1</b>	<b>156.0</b>	<b>161.4</b>		<b>154.0</b>	<b>136.0</b>		
<b>Debt service-to-exports ratio (in percent)</b>	<b>20.8</b>	<b>19.0</b>	<b>15.0</b>			<b>13.1</b>	<b>11.5</b>	<b>10.4</b>	<b>9.4</b>	<b>8.5</b>	<b>7.7</b>		<b>5.3</b>	<b>7.1</b>		
<b>PPG debt service-to-exports ratio (in percent)</b>	<b>1.9</b>	<b>2.6</b>	<b>2.6</b>			<b>2.3</b>	<b>2.2</b>	<b>2.5</b>	<b>2.8</b>	<b>3.0</b>	<b>3.1</b>		<b>4.3</b>	<b>4.8</b>		
<b>PPG debt service-to-revenue ratio (in percent)</b>	<b>5.8</b>	<b>7.8</b>	<b>7.7</b>			<b>6.6</b>	<b>6.0</b>	<b>6.5</b>	<b>7.0</b>	<b>7.2</b>	<b>7.4</b>		<b>9.9</b>	<b>11.3</b>		
Total gross financing need (Millions of U.S. dollars)	249.2	-12.1	155.2			318.5	420.5	517.4	539.5	547.3	465.9		279.6	1371.2		
Non-interest current account deficit that stabilizes debt ratio	-3.4	1.2	4.7			2.8	2.0	2.1	2.4	2.9	3.1		3.9	4.2		
<b>Key macroeconomic assumptions</b>																
Real GDP growth (in percent)	3.1	4.2	4.2	2.4	3.1	5.0	5.4	5.3	5.2	4.9	4.9	5.1	4.7	4.4		
GDP deflator in US dollar terms (change in percent)	-11.5	-1.5	10.4	2.5	9.2	3.5	2.9	2.3	1.6	1.4	1.1	2.1	1.0	1.0		
Effective interest rate (percent) 5/	3.3	3.2	3.1	3.8	0.7	3.0	3.0	2.8	2.6	2.3	2.2	2.7	1.5	2.2		
Growth of exports of G&S (US dollar terms, in percent)	-10.7	7.2	21.6	7.2	15.0	6.5	6.2	6.4	6.4	5.9	5.4	6.1	6.3	6.8		
Growth of imports of G&S (US dollar terms, in percent)	-12.7	3.3	25.5	4.1	18.0	13.0	7.1	7.5	6.7	6.0	4.1	7.4	6.7	7.2		
Grant element of new public sector borrowing (in percent)	...	...	...	...	...	40.0	42.3	41.4	40.2	40.1	39.2	40.5	35.9	31.5		
Government revenues (excluding grants, in percent of GDP)	10.4	11.2	11.8			12.2	12.5	13.0	13.4	13.6	13.9		15.2	16.4		
Aid flows (in Millions of US dollars) 7/	144.0	348.9	333.7			719.3	888.5	879.0	901.0	884.0	854.7		734.8	1090.4		
<i>of which: Grants</i>	144.0	348.9	333.7			430.5	372.1	207.3	220.6	230.9	245.6		282.8	436.4		
<i>of which: Concessional loans</i>	0.0	0.0	0.0			288.8	516.4	671.7	680.3	653.1	609.1		452.0	653.9		
Grant-equivalent financing (in percent of GDP) 8/	...	...	...			4.7	4.7	3.6	3.4	3.2	3.0		2.1	1.9		
Grant-equivalent financing (in percent of external financing) 8/	...	...	...			71.6	63.5	53.9	53.3	54.0	55.0		56.8	51.0		
<b>Memorandum items:</b>																
Nominal GDP (Millions of US dollars)	9744	10001	11500			12499	13553	14603	15609	16601	17607		23386	40227.1		
Nominal dollar GDP growth	-8.7	2.6	15.0			8.7	8.4	7.7	6.9	6.4	6.1	7.4	5.8	5.4		
PV of PPG external debt (in Millions of US dollars)	...	...	1571.6			1783.4	2140.0	2570.7	3023.0	3469.8	3888.0		5366.1	8799.9		
(PVt-PVt-1)/GDPT-1 (in percent)	...	...	...			1.8	2.9	3.2	3.1	2.9	2.5	2.7	1.2	1.1		
Gross workers' remittances (Millions of US dollars)	...	...	...			...	...	...	...	...	...		...	...		
PV of PPG external debt (in percent of GDP + remittances)	...	...	14.2			14.6	16.1	17.9	19.7	21.3	22.5		23.4	22.3		
PV of PPG external debt (in percent of exports + remittances)	...	...	40.0			42.0	47.3	53.5	59.1	64.0	68.2		66.5	57.4		
Debt service of PPG external debt (in percent of exports + remittances)	...	...	2.6			2.3	2.2	2.5	2.8	3.0	3.1		4.3	4.8		

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private sector external debt.

2/ Derived as  $[r - g - p(1+g)] / (1+g+p+g)$  times previous period debt ratio, with  $r$  = nominal interest rate;  $g$  = real GDP growth rate, and  $p$  = 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.

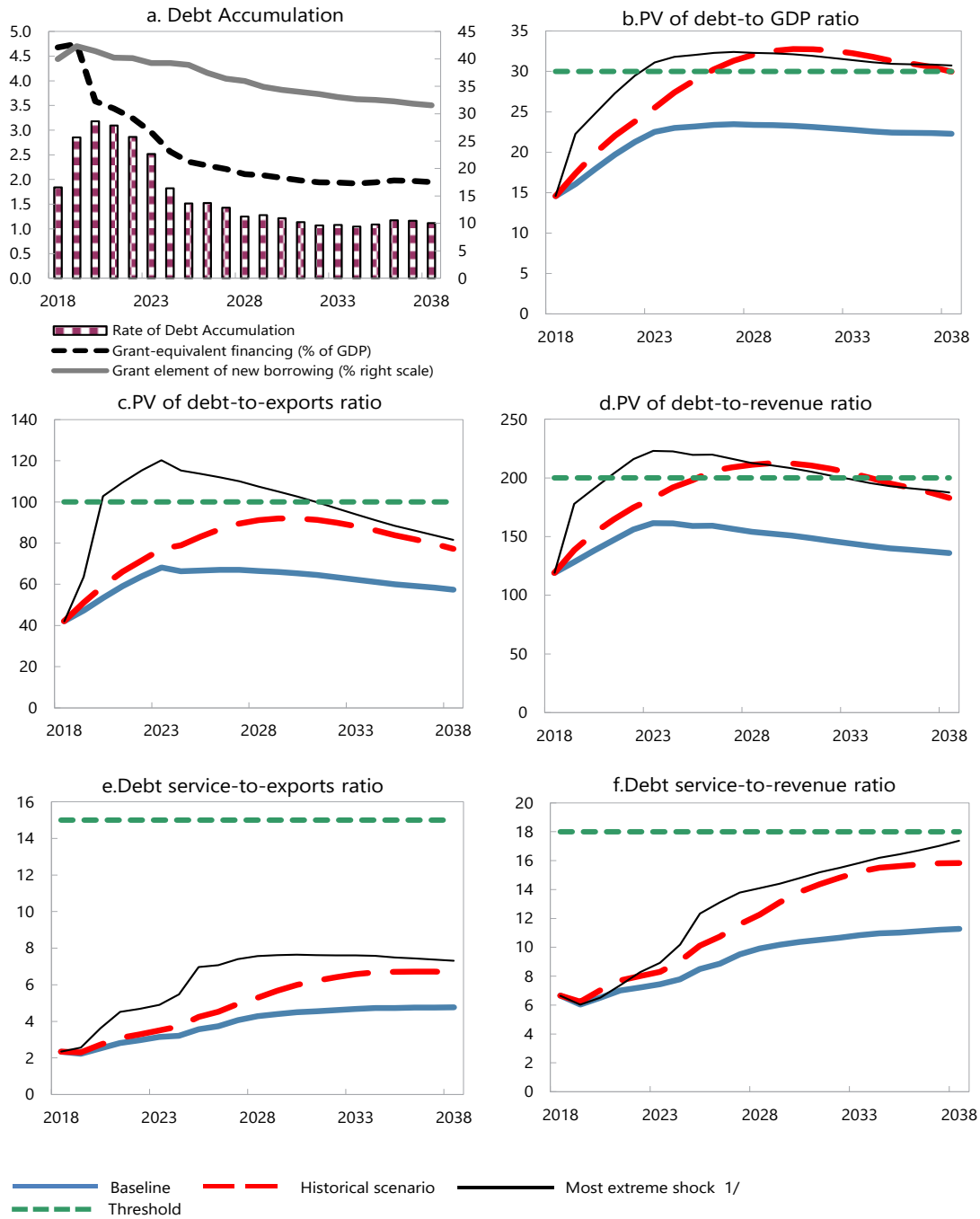
5/ Current-year interest payments divided by previous period debt stock.

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).

**Figure 2. Madagascar: Indicators of Public and Publicly Guaranteed External Debt Under Alternative Scenarios, 2018-2038<sup>1</sup>**



Sources: Country authorities; and staff estimates and projections.

<sup>1/</sup> The most extreme stress test is the test that yields the highest ratio on or before 2028. In figure b. it corresponds to a One-time depreciation shock; in c. to a Exports shock; in d. to a One-time depreciation shock; in e. to a Exports shock and in figure f. to a Terms shock

**Table 4. Madagascar: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2018-38**  
(In percent)

	Projections							
	2018	2019	2020	2021	2022	2023	2028	2038
<b>PV of debt-to GDP ratio</b>								
<b>Baseline</b>	15	16	18	20	21	23	<b>23</b>	22
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2018-2038 1/	15	17	20	22	24	25	<b>32</b>	30
A2. New public sector loans on less favorable terms in 2018-2038 2	15	17	20	23	26	28	<b>31</b>	34
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2019-2020	15	17	20	22	23	25	<b>26</b>	25
B2. Export value growth at historical average minus one standard deviation in 2019-2020 3/	15	19	26	27	29	30	<b>28</b>	24
B3. US dollar GDP deflator at historical average minus one standard deviation in 2019-2020	15	17	21	23	25	27	<b>28</b>	26
B4. Net non-debt creating flows at historical average minus one standard deviation in 2019-2020 4/	15	16	18	20	21	22	<b>23</b>	22
B5. Combination of B1-B4 using one-half standard deviation shocks	15	19	26	28	30	31	<b>31</b>	27
B6. One-time 30 percent nominal depreciation relative to the baseline in 2019 5/	15	22	25	27	29	31	<b>32</b>	31
<b>PV of debt-to-exports ratio</b>								
<b>Baseline</b>	42	47	53	59	64	68	<b>66</b>	57
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2018-2038 1/	42	51	59	66	72	77	<b>91</b>	77
A2. New public sector loans on less favorable terms in 2018-2038 2	42	50	60	69	77	84	<b>88</b>	88
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2019-2020	42	46	52	58	63	67	<b>65</b>	56
B2. Export value growth at historical average minus one standard deviation in 2019-2020 3/	42	64	103	109	115	120	<b>107</b>	82
B3. US dollar GDP deflator at historical average minus one standard deviation in 2019-2020	42	46	52	58	63	67	<b>65</b>	56
B4. Net non-debt creating flows at historical average minus one standard deviation in 2019-2020 4/	42	48	54	59	64	68	<b>66</b>	56
B5. Combination of B1-B4 using one-half standard deviation shocks	42	54	74	80	85	89	<b>83</b>	67
B6. One-time 30 percent nominal depreciation relative to the baseline in 2019 5/	42	46	52	58	63	67	<b>65</b>	56
<b>PV of debt-to-revenue ratio</b>								
<b>Baseline</b>	119	128	138	147	156	161	<b>154</b>	136
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2018-2038 1/	119	139	153	165	175	183	<b>211</b>	183
A2. New public sector loans on less favorable terms in 2018-2038 2	119	136	155	172	188	199	<b>205</b>	209
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2019-2020	119	134	152	162	172	178	<b>169</b>	149
B2. Export value growth at historical average minus one standard deviation in 2019-2020 3/	119	150	200	205	212	214	<b>187</b>	145
B3. US dollar GDP deflator at historical average minus one standard deviation in 2019-2020	119	139	163	174	185	191	<b>182</b>	160
B4. Net non-debt creating flows at historical average minus one standard deviation in 2019-2020 4/	119	129	139	148	156	161	<b>153</b>	134
B5. Combination of B1-B4 using one-half standard deviation shocks	119	150	200	209	218	223	<b>202</b>	167
B6. One-time 30 percent nominal depreciation relative to the baseline in 2019 5/	119	178	191	204	216	223	<b>213</b>	188

**Table 4. Madagascar: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2018-38 (concluded)**  
(In percent)

	2018	2019	2020	Projections			2028	2038
				2021	2022	2023		
<b>Debt service-to-exports ratio</b>								
<b>Baseline</b>	2.3	2.2	2.5	2.8	3.0	3.1	<b>4.3</b>	4.8
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2018-2038 1/	2.3	2.3	2.7	3.1	3.3	3.5	<b>5.3</b>	6.7
A2. New public sector loans on less favorable terms in 2018-2038 2	2.3	2.2	2.5	3.0	3.4	3.8	<b>6.1</b>	7.3
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2019-2020	2.3	2.2	2.5	2.8	3.0	3.1	<b>4.3</b>	4.7
B2. Export value growth at historical average minus one standard deviation in 2019-2020 3/	2.3	2.6	3.6	4.5	4.7	4.9	<b>7.6</b>	7.3
B3. US dollar GDP deflator at historical average minus one standard deviation in 2019-2020	2.3	2.2	2.5	2.8	3.0	3.1	<b>4.3</b>	4.7
B4. Net non-debt creating flows at historical average minus one standard deviation in 2019-2020 4/	2.3	2.2	2.5	2.8	3.0	3.2	<b>4.4</b>	4.8
B5. Combination of B1-B4 using one-half standard deviation shocks	2.3	2.4	3.0	3.5	3.7	3.9	<b>5.7</b>	5.8
B6. One-time 30 percent nominal depreciation relative to the baseline in 2019 5/	2.3	2.2	2.5	2.8	3.0	3.1	<b>4.3</b>	4.7
<b>Debt service-to-revenue ratio</b>								
<b>Baseline</b>	6.6	6.0	6.5	7.0	7.2	7.4	<b>9.9</b>	11.3
<b>A. Alternative Scenarios</b>								
A1. Key variables at their historical averages in 2018-2038 1/	6.6	6.2	7.0	7.7	8.0	8.3	<b>12.3</b>	15.8
A2. New public sector loans on less favorable terms in 2018-2038 2	6.6	6.0	6.5	7.4	8.3	8.9	<b>14.1</b>	17.4
<b>B. Bound Tests</b>								
B1. Real GDP growth at historical average minus one standard deviation in 2019-2020	6.6	6.4	7.3	7.9	8.1	8.4	<b>11.1</b>	12.6
B2. Export value growth at historical average minus one standard deviation in 2019-2020 3/	6.6	6.0	7.0	8.5	8.6	8.7	<b>13.2</b>	13.0
B3. US dollar GDP deflator at historical average minus one standard deviation in 2019-2020	6.6	6.7	7.9	8.5	8.7	9.0	<b>11.9</b>	13.6
B4. Net non-debt creating flows at historical average minus one standard deviation in 2019-2020 4/	6.6	6.0	6.6	7.1	7.3	7.5	<b>10.1</b>	11.3
B5. Combination of B1-B4 using one-half standard deviation shocks	6.6	6.6	8.1	9.3	9.5	9.7	<b>13.8</b>	14.5
B6. One-time 30 percent nominal depreciation relative to the baseline in 2019 5/	6.6	8.5	9.2	9.9	10.2	10.5	<b>14.0</b>	15.9
<i>Memorandum item:</i>								
Grant element assumed on residual financing (i.e., financing required above baseline) 6/	34	34	34	34	34	34	<b>34</b>	34

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.

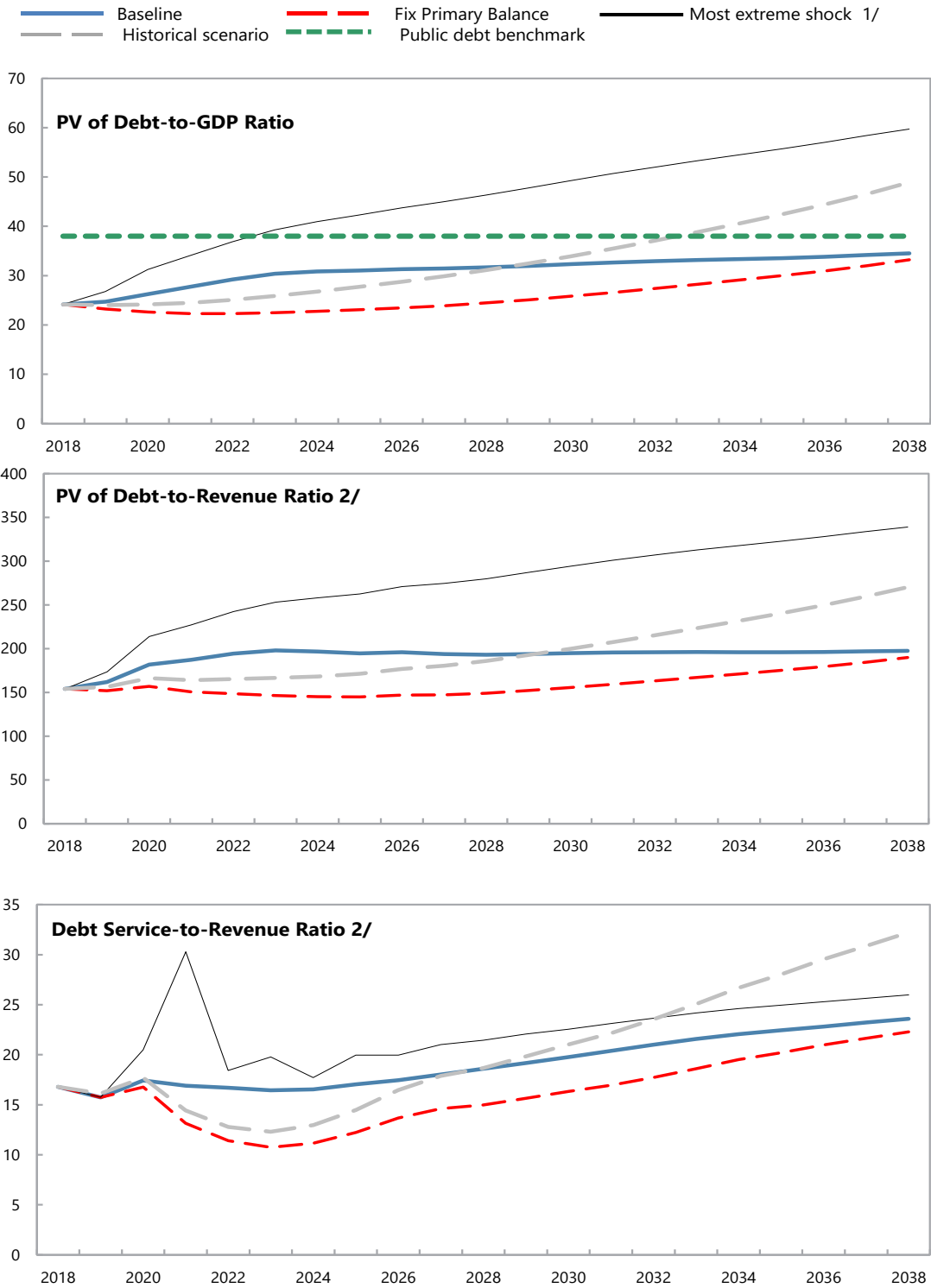
3/ Exports values are assumed to remain permanently at the lower level, but the current account as a share of GDP is assumed to return to its baseline level after the shock (implicitly assuming an offsetting adjustment in import levels).

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.

**Figure 3. Madagascar: Indicators of Public Debt Under Alternative Scenarios, 2018-2038**



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 2028.

2/ Revenues are defined inclusive of grants.



**Table 5. Madagascar: Public Sector Debt Sustainability Framework, Baseline Scenario, 2015-38**  
(In percent of GDP; unless otherwise indicated)

	Actual			Average <sup>5/</sup>	Standard Deviation <sup>5/</sup>	Estimate						Projections		
	2015	2016	2017			2018	2019	2020	2021	2022	2023	2018-23 Average	2028	2038
<b>Public sector debt 1/</b>	41.3	38.4	36.0			35.1	36.5	39.0	41.3	43.4	44.9		44.3	44.0
<i>of which: foreign-currency denominated</i>	28.4	26.7	25.3			25.5	27.8	30.7	33.3	35.5	37.0		36.1	31.8
Change in public sector debt	5.5	-2.9	-2.4			-0.9	1.4	2.5	2.4	2.1	1.5		-0.2	0.1
Identified debt-creating flows	4.4	-2.9	-3.4			-1.9	1.0	2.4	2.3	1.9	1.4		-0.6	-1.1
Primary deficit	2.5	0.4	1.6	1.6	0.9	1.4	3.5	4.4	4.2	3.7	3.1	3.4	1.2	0.4
Revenue and grants	11.8	14.7	14.7			15.7	15.3	14.4	14.8	15.0	15.3		16.4	17.5
<i>of which: grants</i>	1.5	3.5	2.9			3.4	2.7	1.4	1.4	1.4	1.4		1.2	1.1
Primary (noninterest) expenditure	14.3	15.2	16.3			17.1	18.8	18.8	19.0	18.8	18.5		17.6	17.8
Automatic debt dynamics	2.4	-2.1	-4.4			-2.7	-2.3	-1.9	-1.8	-1.7	-1.7	-2.0	-1.8	-1.4
Contribution from interest rate/growth differential	-1.3	-1.9	-2.0			-2.0	-2.0	-1.8	-1.9	-1.9	-2.0		-2.1	-1.7
<i>of which: contribution from average real interest rate</i>	-0.2	-0.2	-0.5			-0.3	-0.2	0.0	0.0	0.0	0.0		-0.1	0.1
<i>of which: contribution from real GDP growth</i>	-1.1	-1.7	-1.5			-1.7	-1.8	-1.8	-1.9	-1.9	-2.0		-2.0	-1.8
Contribution from real exchange rate depreciation	3.7	-0.2	-2.4			-0.7	-0.3	-0.1	0.1	0.2	0.3		...	...
Other identified debt-creating flows	-0.5	-1.2	-0.6			-0.6	-0.2	-0.1	-0.1	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
Reduction of domestic arrears	-0.5	-1.2	-0.6			-0.6	-0.2	-0.1	-0.1	0.0	0.0		0.0	0.0
Residual, including asset changes	1.1	0.0	1.0			1.0	0.3	0.1	0.0	0.1	0.1		0.3	1.2
0.6														
<b>Other Sustainability Indicators</b>														
<b>PV of public sector debt</b>	...	...	24.8			24.2	24.7	26.2	27.7	29.2	30.4		31.7	34.5
<i>of which: foreign-currency denominated</i>	...	...	14.2			14.6	16.1	17.9	19.7	21.3	22.5		23.4	22.3
<i>of which: external</i>	...	...	14.2			14.6	16.1	17.9	19.7	21.3	22.5		23.4	22.3
PV of contingent liabilities (not included in public sector debt)	...	...	...			...	...	...	...	...	...		...	...
Gross financing need 2/	10.5	9.3	9.6			8.8	10.2	10.8	10.4	9.9	9.2		7.8	9.9
PV of public sector debt-to-revenue and grants ratio (in percent)	...	...	168.5			154.0	161.9	181.8	187.2	194.3	198.0		193.1	197.5
PV of public sector debt-to-revenue ratio (in percent)	...	...	209.8			197.3	197.3	201.7	207.0	214.1	217.8		208.4	210.5
<i>of which: external 3/</i>	...	...	119.7			119.1	128.4	137.9	147.1	156.0	161.4		154.0	136.0
Debt service-to-revenue and grants ratio (in percent) 4/	23.8	20.4	19.3			16.8	15.7	17.4	16.9	16.7	16.5		18.6	23.6
Debt service-to-revenue ratio (in percent) 4/	27.2	26.8	24.0			21.5	19.2	19.3	18.7	18.4	18.1		20.1	25.2
Primary deficit that stabilizes the debt-to-GDP ratio	-3.0	3.3	4.0			2.3	2.2	1.9	1.8	1.7	1.6		1.4	0.2
<b>Key macroeconomic and fiscal assumptions</b>														
Real GDP growth (in percent)	3.1	4.2	4.2	2.4	3.1	5.0	5.4	5.3	5.2	4.9	4.9	5.1	4.7	4.4
Average nominal interest rate on forex debt (in percent)	0.8	0.8	0.9	0.8	0.1	1.0	1.3	1.6	1.5	1.5	1.5	1.4	1.3	1.6
Average real interest rate on domestic debt (in percent)	-1.5	-0.8	-2.3	-0.5	1.4	-1.1	-0.4	1.8	2.0	2.0	1.9	1.0	1.9	1.8
Real exchange rate depreciation (in percent, + indicates depreciation)	15.8	-0.7	-9.3	0.5	7.5	-2.9	...	...	...	...	...	...	...	...
Inflation rate (GDP deflator, in percent)	7.6	6.7	8.3	7.5	1.5	7.8	7.2	6.3	5.5	5.2	5.0	6.1	5.0	5.0
Growth of real primary spending (deflated by GDP deflator, in percent)	4.2	10.3	12.2	2.7	4.7	9.9	15.9	5.4	6.3	3.4	3.2	7.3	4.8	4.1
Grant element of new external borrowing (in percent)	...	...	...	...	...	40.0	42.3	41.4	40.2	40.1	39.2	40.5	35.9	31.5

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 6. Madagascar: Sensitivity Analysis for Key Indicators of Public Debt 2018-38

	Projections							
	2018	2019	2020	2021	2022	2023	2028	2038
<b>PV of Debt-to-GDP Ratio</b>								
<b>Baseline</b>	24	25	26	28	29	30	32	35
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	24	24	24	24	25	26	31	49
A2. Primary balance is unchanged from 2018	24	23	23	22	22	22	24	33
A3. Permanently lower GDP growth 1/	24	25	27	29	31	32	37	53
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2019-2020	24	27	31	34	37	39	46	60
B2. Primary balance is at historical average minus one standard deviations in 2019-2020	24	24	24	26	27	29	30	33
B3. Combination of B1-B2 using one half standard deviation shocks	24	25	26	28	31	33	39	50
B4. One-time 30 percent real depreciation in 2019	24	30	31	31	32	33	35	40
B5. 10 percent of GDP increase in other debt-creating flows in 2019	24	32	33	34	36	37	37	38
<b>PV of Debt-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	154	162	182	187	194	198	193	197
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	154	156	166	164	165	167	186	270
A2. Primary balance is unchanged from 2018	154	152	157	151	148	147	149	190
A3. Permanently lower GDP growth 1/	154	163	185	193	203	210	227	303
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2019-2020	154	173	214	227	242	253	280	339
B2. Primary balance is at historical average minus one standard deviations in 2019-2020	154	157	168	174	182	186	183	191
B3. Combination of B1-B2 using one half standard deviation shocks	154	160	175	188	203	213	235	286
B4. One-time 30 percent real depreciation in 2019	154	198	212	211	214	216	213	227
B5. 10 percent of GDP increase in other debt-creating flows in 2019	154	209	231	231	237	238	226	220
<b>Debt Service-to-Revenue Ratio 2/</b>								
<b>Baseline</b>	17	16	17	17	17	16	19	24
<b>A. Alternative scenarios</b>								
A1. Real GDP growth and primary balance are at historical averages	17	16	18	14	13	12	19	32
A2. Primary balance is unchanged from 2018	17	16	17	13	11	11	15	22
A3. Permanently lower GDP growth 1/	17	16	18	17	17	17	22	34
<b>B. Bound tests</b>								
B1. Real GDP growth is at historical average minus one standard deviations in 2019-2020	17	17	20	20	21	22	26	37
B2. Primary balance is at historical average minus one standard deviations in 2019-2020	17	16	17	15	14	16	18	23
B3. Combination of B1-B2 using one half standard deviation shocks	17	16	18	15	14	19	22	32
B4. One-time 30 percent real depreciation in 2019	17	17	20	20	20	20	24	32
B5. 10 percent of GDP increase in other debt-creating flows in 2019	17	16	20	30	18	20	21	26

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.