



REPUBLIC OF MADAGASCAR

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STAFF REPORT FOR THE 2019 ARTICLE IV CONSULTATION AND SIXTH REVIEW UNDER THE EXTENDED CREDIT FACILITY ARRANGEMENT—DEBT SUSTAINABILITY ANALYSIS

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<i>Madagascar: Joint Bank-Fund Debt Sustainability Analysis</i>	
Risk of external debt distress	Low
Overall risk of debt distress	Moderate
Granularity in the risk rating	n/a
Application of judgment	No

Madagascar, classified as having a medium level of debt carrying capacity, is assessed at low risk of external debt distress, in line with the July 2019 DSA.² Under the baseline, external public and publicly guaranteed (PPG) debt is well below applicable thresholds and stress tests do not breach the thresholds. Overall (external plus domestic) risk of debt distress remains moderate, consistent with the July 2019 DSA. Total public debt is below the benchmark under the baseline, but a growth shock drives the present value of debt to GDP above the benchmark at the end of the projection period and it is on a persistent upward trajectory. Moreover, shocks could introduce liquidity problems, as the debt-service to revenue ratio could exceed 75 percent over the long term under the growth shock. These assessments continue to be supportive of Madagascar's plans to scale up its borrowing to meet its investment needs; however, several factors—a faster execution of the government's ambitious medium-term borrowing, poorly selected public investment projects, and less favorable financing terms—may lead to a faster than expected deterioration in external and public debt indicators.

¹ Prepared by the IMF and the World Bank. This DSA follows the [Guidance Note of the Joint Bank-Fund Debt Sustainability Framework for Low Income Countries](#), February 2018. This new framework builds on the 2019 framework used for the previous Madagascar DSA, which was published in July 2019 (IMF Country Report No. 19/262).

² Madagascar has a Composite Indicator score of 2.82 and is classed as having medium debt-carrying capacity.

PUBLIC DEBT COVERAGE

1. This DSA includes debt coverage of public and publicly guaranteed external and domestic debt, including State-owned Enterprises' domestic debt as well as central bank external liabilities (Text Table 1). This is in line with coverage under the July 2019 DSA (Text Table 1). PPG debt includes all external liabilities held by the central bank, including all borrowing from the IMF; debts owed by state-owned enterprises (SOEs) in cases where the government has at least 50 percent of the shares; and direct guarantees provided by the central government. Borrowing by local governments requires the authorization from the Ministry of Finance and no request of such authorization has been submitted to date. The measure of debt is on a gross basis and the currency criterion is used to distinguish between domestic and external debt.³

Text Table 1. Madagascar: Public Debt Coverage Under the Baseline Scenario

Subsectors of the public sector		Sub-sectors covered
1	Central government	X
2	State and local government	X
3	Other elements in the general government	
4	o/w: Social security fund	
5	o/w: Extra budgetary funds (EBFs)	
6	Guarantees (to other entities in the public and private sector, including to SOEs)	X
7	Central bank (borrowed on behalf of the government)	X
8	Non-guaranteed SOE debt	X

Text Table 2. Madagascar: Coverage of the Contingent Liabilities' Stress Test

1 The country's coverage of public debt	The central, state, and local governments, central bank, government-guaranteed debt, non-guaranteed SOE debt		
	Default	Used for the analysis	Reasons for deviations from the default settings
2 Other elements of the general government not captured in 1.	0 percent of GDP	0.0	
3 SoE's debt (guaranteed and not guaranteed by the government) 1/	2 percent of GDP	2.0	Captures potential additional contingent liabilities not captured in the available data from SOEs.
4 PPP	35 percent of PPP stock	0.0	Exposures through PPPs are set to zero since, as per the World Bank's PPP database, PPPs comprise less than 1/2 percent of GDP.
5 Financial market (the default value of 5 percent of GDP is the minimum value)	5 percent of GDP	5.0	
Total (2+3+4+5) (in percent of GDP)		7.0	

1/ The default shock of 2% of GDP will be triggered for countries whose government-guaranteed debt is not fully captured under the country's public debt definition (1.). If it is already included in the government debt (1.) and risks associated with SoE's debt not guaranteed by the government is assessed to be negligible, a country team may reduce this to 0%.

2. The coverage assumed for contingent liabilities is a shock of 7 percent of GDP. This reflects the default setting for SOEs, PPPs, and financial markets (Text Table 2).

- Following guidance, we include estimated debt for SOEs in which the government has a majority stake in the baseline; this debt is exclusively domestic. However, government recognition of some other SOE liabilities could require external financing. Other potential contingencies include future recapitalization of the postal savings scheme and the Madagascar Savings Fund (*Caisse d'Epargne de Madagascar, CEM*), which would likely amount to less than 1 percent of GDP.

³ Locally-issued debt denominated in local currency held by non-residents and/or locally-issued debt denominated in foreign currency held by residents is likely insignificant. Owing to limitations in available data, the results would likely be the same if selecting the residency criterion.

- Exposures to PPPs are set to zero since, as per the World Bank’s PPP database, PPPs comprise less than ½ percent of GDP. The authorities plan to develop more PPPs in future and the potential vulnerabilities associated with such PPPs could increase rapidly.
- The default value of 5 percent is programmed for financial markets. 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.

BACKGROUND

A. Recent Debt Revisions and Developments

3. Madagascar’s historical debt to GDP ratios have fallen due to a rebasing of GDP. In close coordination with Fund staff and through technical assistance, the authorities have rebased their GDP, leading to upward revisions of about 16 percent on average. The revision, relatively minor compared to other countries’ rebasing experiences, resulted in a drop in Madagascar’s debt ratios. For instance, 2018’s debt/GDP ratio now stands at 40 percent instead of 46 percent (see Text Table 3).

Text Table 3. Madagascar: Total PPG Debt/GDP Revisions (2015-18)				
(Percent of GDP)	2015	2016	2017	2018
Old GDP	48.4	47.1	46.0	45.7
New GDP	43.4	40.3	40.0	39.9

4. The 2019 PPG debt ratio will reach 40.1 percent, rising by less than 1 percent of GDP relative to 2018. The debt ratio increased from 39.9 percent in 2018 to 40.1 percent in 2019, owing to a primary deficit and lower than initially forecasted nominal GDP growth (mainly due to lower vanilla and cobalt prices and under-execution of capital investment). The ratio of domestic debt fell slightly with external PPG debt rising by slightly less than ½ a percent of GDP (Text Table 4). The level of 2019 PPG debt is lower than previously forecast for the July 2019 DSA, reaching \$5,572 million instead of \$5,649 million.⁴

5. External sources continue to account for two-thirds of PPG debt (Text Table 4). The contribution of external debt continues to rise following Madagascar’s re-engagement with the international community. At end-2019, roughly two-thirds of external debt is owed to multilateral creditors, in particular to the World Bank and African Development Bank, on highly concessional terms, including long maturities. Non-Paris club creditors account for 5.9 percent of PPG debt, which is a lower share than at the start of the program. Domestic debt increased slightly in absolute terms in 2019 but fell as a percent of GDP. Government securities are the largest category, followed by estimated debts of SOEs in which the government has a majority stake. JIRAMA accounts for the majority of SOE debt and reflects arrears to suppliers, not contracted loans. Projections of SOE debts assume they will remain at a level consistent with their current share of GDP (~4.5 percent) through the full projection period. There are current efforts to

⁴ If the July 2019 forecast for total PPG debt had materialized, this would have amounted to 40.6 percent of GDP using current estimates of 2019 GDP.

restructure and reduce in the near-term. By including these projected SOE debts in our baseline, we are adopting a particularly conservative approach for the DSA.

Text Table 4. Madagascar: Breakdown of Total PPG Debt (2015-19)

Creditor	2015	2016	2017	2018	2019 (Est)
Amount (US\$m)					
Domestic debt, of which:	1,689	1,682	1,827	1,763	1,784
Securities inc. BTA, BTF, BTS ¹	370	526	719	726	833
Debt to the Central Bank	386	337	297	272	282
Arrears	346	210	146	71	42
Other inc. SOE debt	587	610	665	693	628
External debt, of which:	2,816	2,845	3,262	3,549	3,788
Multilateral	2,006	2,052	2,276	2,368	2,493
Paris Club	146	137	165	189	219
Non-Paris Club	356	324	290	308	329
Commercial & Guaranteed	25	23	83	204	192
External debt of the Central Bank	282	310	449	480	556
Total PPG debt	4,505	4,528	5,089	5,312	5,572
Percent of GDP					
Domestic debt, of which:	16.3	15.0	14.4	13.2	12.8
Securities inc. BTA, BTF, BTS	3.6	4.7	5.7	5.5	6.0
Debt to the Central Bank	3.7	3.0	2.3	2.0	2.0
Arrears	3.3	1.9	1.2	0.5	0.3
Other inc. SOE debt	5.7	5.4	5.2	5.2	4.5
External debt, of which:	27.1	25.3	25.7	26.7	27.2
Multilateral	19.3	18.3	17.9	17.8	17.9
Paris Club	1.4	1.2	1.3	1.4	1.6
Non-Paris Club	3.4	2.9	2.3	2.3	2.4
Commercial & Guaranteed	0.2	0.2	0.7	1.5	1.4
External debt of the Central Bank	2.7	2.8	3.5	3.6	4.0
Total PPG debt	43.4	40.3	40.0	39.9	40.1
Percent of total					
Domestic debt, of which:	37.5	37.2	35.9	33.2	32.0
Securities inc. BTA, BTF, BTS	8.2	11.6	14.1	13.7	14.9
Debt to the Central Bank	8.6	7.4	5.8	5.1	5.1
Arrears	7.7	4.6	2.9	1.3	0.7
Other inc. SOE debt	13.0	13.5	13.1	13.0	11.3
External debt, of which:	62.5	62.8	64.1	66.8	68.0
Multilateral	44.5	45.3	44.7	44.6	44.7
Paris Club	3.3	3.0	3.2	3.6	3.9
Non-Paris Club	7.9	7.1	5.7	5.8	5.9
Commercial & Guaranteed	0.5	0.5	1.6	3.8	3.4
External debt of the Central Bank	6.3	6.8	8.8	9.0	10.0
Total PPG debt	100.0	100.0	100.0	100.0	100.0

Sources: Malagasy authorities; and staff estimates.

¹BTA are Treasury bills with less than one year maturity; BTF and BTS are Treasury bonds with maturity ranging from 1 to 3 years.

B. Macroeconomic Assumptions

6. DSA projections remain consistent with the authorities' plan to scale up much needed infrastructure investment, albeit from a lower base than assumed in the previous DSA due to ongoing under-execution.

- GDP growth projections for 2019 have been revised down from 5.2 to 4.8 reflecting a downward revision of 0.4 percentage points due to the rebasing and the net effect of several other factors.

These include under-execution of capital investment (especially in the first half of the year), a wait-and-see attitude by the private sector during the election cycle, a fall in vanilla prices, a reduction in clove export volumes associated with cyclical production factors, and positive developments in mining, textiles, and tourism. Relative to July 2019 DSA, government investment is expected to scale up over the medium-term, but from a lower base.⁵ Meanwhile, private investment is still expected to remain stable through the medium-term, but off of a higher base. Growth is expected to peak over the medium-term at 5.6 percent in 2024, with some deceleration in growth thereafter. In 2029, growth is expected to hit 5.2 percent relative to the July 2019 projection of 4.6 percent.

- Inflation expectations are lower than earlier estimates for 2019 but are revised up beyond the medium-term.
- The non-interest current account deficit has been revised down over the short term behind under-execution of capital projects, despite a fall in vanilla prices from their peak. Over the next 5 years, vanilla prices are expected to fall by 30 percent, contributing to a decline in the current account balance together with an expected rise in capital spending that will boost construction-related imports (e.g., equipment and primary materials).
- We project lower primary deficits over the medium term, reaching 0.6 and 3.5 percent of GDP in 2019 and 2024, respectively, behind ongoing gains in revenue mobilization and PFM reforms (for more detail on these measures, see the AIV Staff Report).

Text Table 5. Madagascar: Baseline Macroeconomic Assumptions for DSA

(In percent of GDP, unless otherwise indicated)	2019		2020		2024		2029	
	5th Review	Current	5th Review	Current	5th Review	Current	5th Review	Current
Real GDP growth (percent)	5.2	4.8	5.3	5.2	4.8	5.6	4.6	5.2
Inflation, end of period (percent)	6.7	6.0	6.3	6.2	5.0	5.6	5.0	5.3
Non-interest CA deficit	1.3	-0.5	2.8	0.9	3.8	1.7	2.9	1.7
Primary deficit	1.3	0.6	3.5	1.9	4.5	3.5	2.4	2.8

Sources: Malagasy authorities, World Bank and IMF.

7. Financing assumptions are broadly consistent with the 2019-21 and 2020-2022 debt strategy documents, as well as the July 2019 DSA. For domestic financing, short-term local currency treasury bills will remain the main source of financing over the medium and longer-term. While medium-term local currency bond issuance is expected to scale up over time, this is off a low base (5 percent of the entire portfolio in the near-term) and reflects the shallow nature of Madagascar's financial market. We expect medium-term issuance to increase based on feedback from both the authorities and banking sector. However, there are currently no plans to issue long-term domestic securities. For external financing, the share of external to total debt will not exceed the upper limit of 85 percent; use of concessional loans will be maximized (over 90 percent of near-term external borrowing through 2022 is expected to be on concessional terms); and the portfolio of new external financing is expected to shift towards a more balanced distribution of concessional and non-concessional debt beyond the medium-term. As part of the

⁵ The authorities recently released the Emergence Plan (PEM), which outlines ambitious increases in investment, revenues, and growth. However, the implementation details of this plan have yet to be fully developed and therefore our baseline assumptions do not reflect the PEM. For more details on the PEM, see the AIV and 6th Review Staff Report.

drafting for the Finance Act 2020, an external debt borrowing ceiling of \$1,952 million is being included to ensure external debt levels remain sustainable. Broadly, the assumption is that Madagascar will continue to borrow over the long run for development but at a slower pace than the scaled-up pace envisaged for the medium-term. To be conservative, we exclude budget support that has not been finalized by donors from the baseline.

8. Realism tools suggest our assumptions are in line with reasonable bounds. Across a range of realism checks (see Figure 4) that include examining potential growth paths under various fiscal multipliers, the projected adjustment for the primary balance, and investment plans, our underlying assumptions appear to not raise any flags.

9. The favorable outlook remains subject to both domestic and external risks. Growth could be lower than forecast if under-execution of investment continues and unexpectedly large transfers to state-owned enterprises (e.g., JIRAMA) crowd out investment and social protection spending. Moreover, stalls in governance and corruption-related reforms place Madagascar at risk of a slow down or delay donor support plans, reducing private investment (including the development of PPPs), and related-structural reforms (e.g., fuel pricing). Turning to external risks, Madagascar remains highly vulnerable to terms-of-trade shocks and natural disasters, as well as a synchronized slowdown in global growth and trade.

C. Drivers of Debt Dynamics

10. Over the medium term, scaling up of foreign-financed public investment drives an increase in debt compared with the 5-year historical average (Figure 3). Relative to the period between 2013 to 2018, external and total public debt to GDP ratios are expected to rise faster (by an additional 0.6 and 0.2 percentage points, respectively) over the medium term, reflecting a gradual increase in borrowing costs and higher capital investments, accompanied by increasing deficits. A shift away from grant financing towards more concessional lending due to Madagascar's prior low external debt distress rating is also a contributing factor. Higher growth and an expected appreciation in the exchange rate help offset such factors. A residual that includes unrepatriated mining receipts and reserve accumulation remains broadly similar to recent history (and is of a similar magnitude under the July 2019 DSA).

11. Government capital spending has been revised downward, but average 5-year real growth is nonetheless expected to rise (see Figure 4). Relative to the July 2019 DSA, government investment as a share of GDP is expected to be roughly 3 percentage points lower in 2019. From this lower base, it is expected to rise as public capital investments scale up from 5 percent to 9 percent of GDP over 2019-24. This downward revision reflects ongoing and expected under-execution of government-financed capital projects. Private investment is broadly in line with prior estimates for 2019 and is expected to increase from 14 to 16 percent of GDP between 2019 and 2024. The authorities are pivoting towards scaling up PPPs in energy and infrastructure (for more detail, see AIV Staff Report). Given Madagascar's large infrastructure needs, the conservative assumed baseline fiscal multiplier suggests a significant upside risk to growth. However, the current average for the projected contribution of public investment to real GDP growth over the next 5 years is expected to be slightly lower than suggested by the previous DSA, largely due to 2019's unexpectedly low outturn for public investment; the contribution of government capital to growth in 2021 and beyond is higher than in the previous DSA. Continued under execution of government-led capital projects may warrant further downward revisions to government investment rates.

D. Country Classification and Determination of Stress Test Scenarios

12. Madagascar's debt carrying capacity continues to be classified as medium. Based on a calculation of a composite indicator score based on factors such as the CPIA index, real growth rates, reserve coverage, remittances, and world growth, Madagascar continues to be rated as having medium debt-carrying capacity (Text Table 6). The 10 year-average values are based on an average over 2014-23, where latest macroeconomic data and projections are based on the October 2019 *World Economic Outlook*. Text Figure 1 highlights the differences in composite indicator cut-off values and the corresponding external debt burden thresholds and public debt benchmarks at different debt-carrying capacities.

Text Table 6. Madagascar: Calculation of Debt-Carrying Capacity

Components	Coefficients (A)	10-year average values (B)	Current		July 2019		June 2018
			CI Score components (A*B) = (C)	Contribution of components	CI Score components	Contribution of components	
CPIA 1/	0.385	3.246	1.25	44%	1.24	44%	1.22
Real growth rate (in percent)	2.719	4.540	0.12	4%	0.12	4%	
Import coverage of reserves (in percent)	4.052	34.431	1.40	50%	1.35	48%	
Import coverage of reserves ² (in percent)	-3.990	11.855	-0.47	-17%	-0.44	-16%	
Remittances (in percent)	2.022	2.357	0.05	2%	0.05	2%	
World economic growth (in percent)	13.520	3.500	0.47	17%	0.48	17%	
CI Score 2/			2.82	100%	2.80	100%	
Debt Carrying Capacity			Medium		Medium		Weak

1/ The 10-year average scores for the current period are based on an average over 2014-2023.

2/ Composite Indicator Score Threshold for medium capacity is 2.69.

Text Figure 1. Composite Indicator Cut-off Values and Respective Debt Burden Thresholds & Benchmarks

Cut-off values			
Weak	CI <	2.69	
Medium	2.69	≤ CI ≤	3.05
Strong	CI >	3.05	

EXTERNAL debt burden thresholds	Weak	Medium	Strong
PV of debt in % of			
Exports	140	180	240
GDP	30	40	55
Debt service in % of			
Exports	10	15	21
Revenue	14	18	23
TOTAL public debt benchmark			
PV of total public debt in percent of GDP	35	55	70

13. Stress tests generally follow standardized settings and include shocks for natural disasters and commodity export prices. The contingent liability stress test is based on the quantification of potential contingent liabilities discussed above (including SOE-related concerns that extend beyond the

baseline SOE debt coverage), and the standardized stress tests apply the default settings. In addition, Madagascar remains exposed and vulnerable to natural disaster shocks, like cyclones, and hence qualifies for the natural disaster shock.⁶ Since commodities (e.g., vanilla, nickel, cobalt, etc.) comprise about half of goods and services exports, we also include a commodity shock stress test. The standardized settings of this stress test are customized to better reflect Madagascar's country-specific circumstances. In particular, we assume an illustrative fall in prices equivalent to 10 percent of commodity exports, with no mitigating effect on imports, alongside declines in real GDP growth of 0.5 percent and in fiscal revenue of 0.25 percent of GDP. The shock occurs in 2020 and unwinds gradually by 2029. Residual financing for external debt stress tests is assumed to be from external sources with rates 25 percent above current concessional rates and with lower average maturities (75 percent of current average maturity periods). For overall public debt stress tests, limited recourse to domestic sources in the short run prompts us to assume 65 percent of additional financing would come from external sources and that the remaining domestic financing would be more expensive than under the baseline.⁷

DEBT SUSTAINABILITY RESULTS

A. External Debt Sustainability

14. Under the baseline, rising external PPG debt remains well below thresholds (Table 1, Figure 1). External PPG debt is projected to rise from 27 percent of GDP in 2019 to 37 percent of GDP in 2029 before reaching 40 percent of GDP in 2039. The July 2019 DSA projected an increase in external PPG debt ratios of 7.5 percent of GDP from 2019 to 2039; this DSA projects an increase of 13.0 over the same period. Debt-creating flows include a steadily rising current account deficit over the medium term (owing to declines in the trade balance and falling inflows from official transfers) and weaker endogenous debt dynamics (higher interest rates).⁸ In present value terms, external PPG debt is projected to rise from 16 percent of GDP in 2019 to 25 percent of GDP in 2029 and 29 percent in 2030. The long-term rise in PV terms is the result of our assumption that borrowing will become less concessional over the long term, with increases in borrowing costs. Together with expiring grace periods for some loans, this explains why debt service indicators rise substantially off their low base. For example, the projected debt service to exports ratio rises from 3 in 2019 to 5 in 2029. Nonetheless, all indicators remain well below the applicable thresholds for Madagascar (see Figure 1).

15. None of the shock scenarios breach the external medium-carrying capacity thresholds applied for Madagascar by 2029 (Table 3; Figure 1). The most serious shocks are to export growth, which is set to one standard deviation of the projection or historical average (whichever yields lower

⁶ We apply the default settings for this one-off shock in the template, namely a 10 percentage-point rise in the debt-to-GDP ratio alongside a fall in real GDP growth (1.5 percent) and exports (3.5 percent), in 2020.

⁷ We view this as reasonable given the continued underdevelopment of Madagascar's domestic bond market and its re-engagement with international donors and investors. The authorities have also communicated that there is significant international appetite for lending to Madagascar.

⁸ The residual, which includes reserve accumulation, unrepatriated mining receipts, and potentially other misclassified BOP entries, is assumed to decline steadily over time as the share of mining exports declines and reserve accumulation slows.

exports) in 2020 and 2021 and to a combined shock (which applies shocks to GDP, exports, the primary balance, current transfers, and depreciation at half their standard magnitudes). Using the applicable thresholds for Madagascar's medium debt-carrying capacity, the most extreme shocks do not breach any of the four thresholds.⁹ Under the combined shock, the PV of debt to GDP rises to 30 percent of GDP in 2024 and 32 in 2029, below the indicated threshold of 40.¹⁰

16. The historical scenarios and granularity of assessment are less applicable to Madagascar. The historical scenario shows the PV of debt to GDP approaching 46 by 2029 but, as discussed in prior DSAs, is currently not a useful stress test or measure of realism since it includes data with atypically high current account deficits related to private mining investment. For countries that breach external debt thresholds, further granularity can be provided by assessing the gap between baseline debt projections and the threshold between moderate and high debt distress. This is not the case for Madagascar given its low risk of debt distress.

17. Private sector debt is not assessed to pose a significant threat to external sustainability (see Table 1). Private external debt is projected to decline as the loans related to a major mining project are repaid. Using information on financial plans, including on mining, the share of private external debt in GDP is anticipated to fall by half within the next decade. Given the exceptional nature of the mining projects, the DSA does not forecast substantial new external borrowing from the private sector over the corresponding period. However, in line with the July 2019 DSA, we have conservatively assumed more borrowing would be needed to sustain mining exports towards the end of the DSA horizon, contributing to private debt equivalent to about 7 percent of GDP in 2039. Such debt is not assessed to pose a significant threat to external sustainability. Consistent with recent experience leading to slower amortization, the ultimate liability for these loans is held by the multinational shareholders rather than resident entities (such as domestic banks or the government).

B. Total Public Debt Sustainability

18. Under the baseline, total public debt levels are projected to remain well below benchmarks (Table 2). Total public debt (both external and domestic) is projected to rise from 40 percent of GDP in 2019 to 47 percent of GDP in 2029, before reaching 51 percent by 2039. In the July 2019 DSA, total public debt was projected at 57 percent of GDP in 2029 and 2039. In PV terms, total public debt/GDP is expected to rise from 29 percent in 2019 to 36 percent in 2029 and 40 percent in 2039; the projected level in 2039 is below the expected level from the July 2019 DSA and below the benchmark of 55 percent for medium-capacity countries. Projected primary deficits are also lower than previously assumed; for example, the 2019 and 2020 primary deficits were previously projected to reach 1.3 and 3.5 percent, respectively; they are now expected to reach 0.6 and 1.9 percent behind strong revenue mobilization and ongoing PFM reforms.¹¹ This is also reflected by the more gradual increase in the PV of debt to revenue and grants compared to the PV of debt to GDP since the share of tax revenue in GDP is projected to rise in the medium to long term.

⁹ However, the debt-service-to-revenue ratio peaks at about 15, which is above the threshold of 14 for weak capacity countries. Madagascar was previously classified as having weak debt-carrying capacity in June 2018.

¹⁰ The PV of debt-to-GDP would breach the threshold of 30 for countries with weak debt-carrying capacity.

¹¹ Of course, the re-basing of GDP (e.g., 2018 PV debt to GDP is now 5 percentage points lower than previously calculated) is also a contributing factor.

Despite this, and consistent with a shift to less concessional financing sources, the rise in debt service to revenue and grants increases slightly towards the end of the projection horizon.

19. Total public debt is vulnerable to growth shocks over the long term (Figure 2; Table 4). The most severe test is the simulated GDP shock, where growth in 2020 and 2021 is one standard deviation lower than its historical average or the forecast (whichever yields lower GDP) with interacting effects on the primary balance and inflation. Under this shock, the PV of debt to GDP exceeds 55 percent of GDP at the end of the period and is on a persistent upward trajectory. The benchmark for medium capacity countries like Madagascar is 55. Moreover, such a shock would also result in a debt service to revenue ratio above 75 percent before 2029 and a PV of debt to revenue above 400 in 2029. Although no explicit benchmark exists for these ratios, the projections point to potentially severe debt service and liquidity difficulties in the long run if no action to contain borrowing is taken soon after the shock. An export shock, a natural disaster shock, a commodity price shock, or the contingent liability shock would also increase total public debt burdens.

RISK RATING AND VULNERABILITIES

20. Madagascar is classified as being at low risk of external debt distress. Under the baseline, no thresholds are breached. Stress tests produce no breaches of the higher thresholds that apply to Madagascar's medium capacity to carry debt.

21. The overall assessment is that Madagascar is at moderate risk of overall debt distress. The overall PPG debt stress test that applies to GDP growth leads to a breach of the applicable benchmark in the final years of the projection period and is on a persistent upward trajectory. Moreover, shocks could introduce liquidity problems as the debt-service to revenue ratio could exceed 75 percent over the long term. Together with potentially high debt service burdens, the breach classifies Madagascar's overall risk of debt distress as moderate.

22. These assessments continue to be supportive of Madagascar's current plans to scale up its borrowing to meet its investment needs, however several factors may lead to increased vulnerability. A steeper-than-expected increase in borrowing in line with a rapid execution of the government's ambitious medium-term borrowing plan would carry significant risks. Also, poorly selected public investments and less favorable financing terms could affect debt vulnerability. *There are countries in the region that have experienced sharp deterioration in their external debt distress rating from low to high within a short period of time.* As relayed in the July 2019 DSA, in addition to debt sustainability, other crucial considerations for the pace of borrowing include the economy's vulnerability to terms-of-trade shocks, natural disasters, general absorptive capacity, public financial management, and public investment management.

23. Relevant factors that could affect future assessments include data revisions and the speed of realization of borrowing plans. Staff have assumed a slightly slower pace of project disbursement than the authorities. Further shortfalls in disbursements on borrowing or alternatively more ambitious borrowing plans beyond the medium term would affect the debt profile. The state of SOE liabilities could also influence future assessments. Less grant financing and a switch to a less concessional mix of borrowing

would raise the debt burden, especially when measured in PV terms, as well as debt service risks. Efforts to enhance external statistics could improve private debt coverage. Finally, Madagascar's ability to preserve and build on its debt-carrying capacity, including by strengthening the capacity and quality of its institutions, remains important.

Table 1. Madagascar: External Debt Sustainability Framework, Baseline Scenario, 2016-2039
(In percent of GDP; unless otherwise indicated)

	Actual			Projections							Average 8/ Historical Projections		
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2029	2039	Historical	Projections
External debt (nominal) 1/	51.0	50.2	50.6	49.1	46.7	46.0	45.8	46.2	46.4	45.7	47.4	39.3	46.3
<i>of which: public and publicly guaranteed (PPG)</i>	25.3	25.7	26.7	27.2	27.6	29.1	30.8	32.7	34.1	37.0	40.3	24.8	32.8
Change in external debt	-1.9	-0.8	0.5	-1.6	-2.4	-0.7	-0.2	0.4	0.2	0.0	-0.3		
Identified net debt-creating flows	-6.6	-7.4	-5.7	-4.9	-3.6	-3.5	-3.4	-3.1	-2.8	-2.4	-3.6	-0.4	-3.1
Non-interest current account deficit	-0.8	0.0	-1.2	-0.5	0.9	1.0	1.2	1.5	1.7	1.7	0.2	4.6	1.3
Deficit in balance of goods and services	1.9	3.3	3.4	3.6	4.7	4.2	4.5	4.9	5.1	5.4	4.0	7.7	4.8
Exports	28.3	30.9	31.5	29.9	29.2	30.2	29.9	29.1	28.8	28.1	27.7		
Imports	30.2	34.2	34.9	33.5	33.9	34.4	34.4	34.1	33.9	33.4	31.7		
Net current transfers (negative = inflow)	-5.8	-5.6	-7.0	-6.1	-5.9	-5.1	-5.1	-5.1	-5.0	-4.8	-4.4	-5.3	-5.2
<i>of which: official</i>	-2.9	-2.5	-2.6	-2.5	-2.5	-1.4	-1.2	-0.6	-0.4	-0.1	0.0		
Other current account flows (negative = net inflow)	3.1	2.3	2.4	2.0	2.1	2.0	1.8	1.6	1.5	1.2	0.6	2.2	1.6
Net FDI (negative = inflow)	-3.8	-2.7	-2.6	-2.6	-2.7	-2.7	-2.8	-2.8	-2.8	-2.8	-2.8	-4.4	-2.8
Endogenous debt dynamics 2/	-2.0	-4.8	-1.9	-1.8	-1.7	-1.8	-1.8	-1.7	-1.6	-1.3	-0.9		
Contribution from nominal interest rate	0.4	0.4	0.5	0.6	0.6	0.5	0.6	0.6	0.7	0.9	1.2		
Contribution from real GDP growth	-2.0	-1.8	-2.2	-2.4	-2.4	-2.3	-2.4	-2.3	-2.4	-2.2	-2.1		
Contribution from price and exchange rate changes	-0.3	-3.3	-0.3	...	...	...	...	...	...	...	...
Residual 3/	4.7	6.6	6.2	3.3	1.2	2.8	3.2	3.4	3.0	2.4	3.2	3.0	2.6
<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		
Sustainability indicators													
PV of PPG external debt-to-GDP ratio	...	...	15.3	16.4	16.6	17.8	19.1	20.4	21.6	25.0	28.9		
PV of PPG external debt-to-exports ratio	...	...	48.7	54.7	56.8	59.1	63.8	70.2	75.0	88.9	104.4		
PPG debt service-to-exports ratio	3.1	5.6	2.6	2.7	3.2	3.1	3.5	4.3	4.6	5.0	7.1		
PPG debt service-to-revenue ratio	9.3	16.7	7.9	7.6	8.2	8.1	8.8	10.1	10.1	10.1	12.8		
Gross external financing need (Million of U.S. dollars)	-425.0	12.5	-349.7	104.0	294.6	302.5	352.8	409.8	435.2	511.8	221.3		
Key macroeconomic assumptions													
Real GDP growth (in percent)	4.0	3.9	4.6	4.8	5.2	5.4	5.6	5.6	5.6	5.2	4.7	2.2	5.4
GDP deflator in US dollar terms (change in percent)	0.6	7.0	0.5	-2.8	3.5	2.7	2.7	2.8	2.7	2.7	2.8	0.6	2.3
Effective interest rate (percent) 4/	0.7	0.8	1.1	1.1	1.4	1.2	1.4	1.5	1.7	2.2	2.6	0.7	1.7
Growth of exports of G&S (US dollar terms, in percent)	7.2	21.6	7.0	-3.1	6.3	12.0	7.3	5.8	7.1	7.7	6.5	6.3	6.7
Growth of imports of G&S (US dollar terms, in percent)	3.3	26.2	7.1	-2.1	10.1	9.8	8.5	7.5	7.9	7.9	4.2	0.9	7.4
Grant element of new public sector borrowing (in percent)	...	...	...	38.3	40.5	38.6	38.6	36.9	36.0	34.6	33.9	...	36.7
Government revenues (excluding grants, in percent of GDP)	9.5	10.3	10.5	10.6	11.2	11.7	12.0	12.5	13.0	14.0	15.3	9.1	12.6
Aid flows (in Million of US dollars) 5/	606.2	606.6	634.9	511.6	715.1	843.6	948.6	1032.9	1030.8	1114.2	1912.0		
Grant-equivalent financing (in percent of GDP) 6/	...	...	...	3.3	3.7	3.0	2.9	2.5	2.1	1.6	1.3	...	2.4
Grant-equivalent financing (in percent of external financing) 6/	...	...	...	70.4	68.0	53.2	50.8	43.5	40.5	36.8	33.9	...	47.1
Nominal GDP (Million of US dollars)	11,849	13,176	13,851	14,106	15,365	16,639	18,045	19,575	21,221	31,487	66,858		
Nominal dollar GDP growth	4.6	11.2	5.1	1.8	8.9	8.3	8.5	8.5	8.4	8.1	7.6	2.9	7.8
	17%	15%	15%	12%	12%	13%	13%	14%	15%	18% #	23%		
Memorandum items:													
PV of external debt 7/	...	...	39.3	38.2	35.7	34.7	34.1	34.0	33.9	33.6	36.0		
In percent of exports	...	...	124.9	127.6	122.2	114.8	114.2	116.7	117.9	119.7	130.0		
Total external debt service-to-exports ratio	3.8	9.0	4.1	12.8	12.8	11.7	11.8	11.8	11.2	9.6	10.8		
PV of PPG external debt (in Million of US dollars)	...	...	2122.0	2308.0	2549.5	2967.0	3438.7	3999.9	4580.1	7859.2	19335.8		
(PVt-PVt-1)/GDPt-1 (in percent)	...	...	1.3	1.7	2.7	2.8	3.1	3.0	2.7	2.1	2.1		
Non-interest current account deficit that stabilizes debt ratio	1.1	0.9	-1.7	1.1	3.3	1.7	1.3	1.1	1.4	1.8	0.5		

Sources: Country authorities; and staff estimates and projections.

1/ Includes both public and private sector external debt.

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

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

6/ 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).

7/ Assumes that PV of private sector debt is equivalent to its face value.

8/ Historical averages are generally derived over the past 10 years, subject to data availability, whereas projections averages are over the first year of projection and the next 10 years.

Definition of external/domestic debt	Currency-based
Is there a material difference between the two criteria?	No

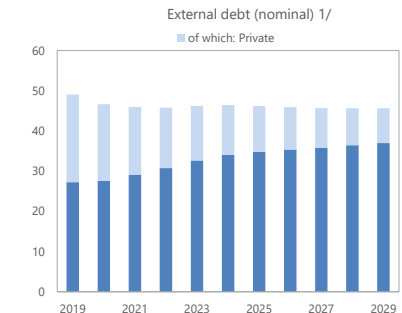
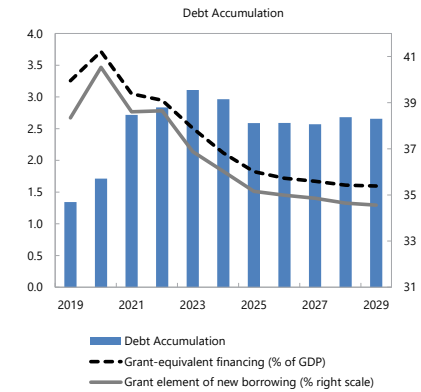
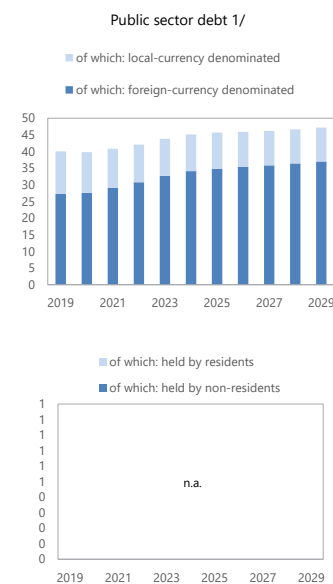


Table 2. Madagascar: Public Sector Debt Sustainability Framework, Baseline Scenario, 2016-2039
(In percent of GDP; unless otherwise indicated)

	Actual			Projections								Average 6/	
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2029	2039	Historical	Projections
Public sector debt 1/	40.3	40.0	39.9	40.1	39.8	40.8	42.1	43.8	45.1	47.2	51.1	36.6	43.9
of which: external debt	25.3	25.7	26.7	27.2	27.6	29.1	30.8	32.7	34.1	37.0	40.3	24.8	32.8
Change in public sector debt	-3.8	-0.2	-0.1	0.2	-0.2	1.0	1.3	1.7	1.3	0.5	-0.2		
Identified debt-creating flows	-3.5	-2.6	-1.9	-1.2	-0.1	1.0	1.3	1.9	1.5	0.5	-0.2	-0.3	0.7
Primary deficit	0.4	1.4	0.6	0.6	1.9	3.6	3.8	4.1	3.5	2.8	2.0	1.3	2.8
Revenue and grants	12.4	12.8	12.9	13.0	13.8	13.0	13.2	13.1	13.3	14.1	15.3	10.9	13.5
of which: grants	2.9	2.5	2.5	2.4	2.5	1.4	1.2	0.6	0.4	0.1	0.0		
Primary (noninterest) expenditure	12.8	14.2	13.5	13.5	15.7	16.6	16.9	17.2	16.8	16.9	17.3	12.3	16.4
Automatic debt dynamics	-3.9	-4.0	-2.5	-1.8	-2.5	-3.0	-2.9	-2.6	-2.4	-2.7	-2.6		
Contribution from interest rate/growth differential	-3.1	-2.4	-3.0	-2.3	-2.3	-2.7	-2.6	-2.4	-2.2	-2.5	-2.3		
of which: contribution from average real interest rate	-1.4	-0.9	-1.3	-0.5	-0.3	-0.7	-0.5	-0.2	0.1	-0.1	-0.1		
of which: contribution from real GDP growth	-1.7	-1.5	-1.7	-1.8	-2.0	-2.0	-2.2	-2.2	-2.3	-2.3	-2.3		
Contribution from real exchange rate depreciation	-0.8	-1.5	0.6	...	...	...	...	...	...	...	...
Other identified debt-creating flows	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.0	0.4
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 contingent liabilities (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		
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 debt creating or reducing flow (please specify)	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.4	0.4		
Residual	-0.3	2.3	1.8	1.9	-0.4	-0.3	-0.3	-0.4	-0.5	-0.2	-0.3	1.8	-0.1
Sustainability indicators													
PV of public debt-to-GDP ratio 2/	...	...	29.2	29.4	29.2	29.8	30.6	31.8	32.9	35.5	40.1		
PV of public debt-to-revenue and grants ratio	...	...	225.7	226.2	212.0	228.9	232.1	243.6	246.6	251.2	261.4		
Debt service-to-revenue and grants ratio 3/	7.0	7.0	6.4	43.9	48.2	55.3	57.0	62.2	65.8	62.5	62.8		
Gross financing need 4/	1.2	2.3	1.4	6.6	9.1	11.3	11.8	12.7	12.7	12.1	12.0		
										1.12	1.36		
										1.09	1.16		
Key macroeconomic and fiscal assumptions													
Real GDP growth (in percent)	4.0	3.9	4.6	4.8	5.2	5.4	5.6	5.6	5.6	5.2	4.7	2.2	5.4
Average nominal interest rate on external debt (in percent)	0.8	0.9	1.1	1.2	1.4	1.2	1.3	1.3	1.3	1.4	1.6	0.6	1.3
Average real interest rate on domestic debt (in percent)	-8.2	-4.7	-7.0	-3.0	-1.2	-4.1	-2.3	0.2	3.4	0.8	1.3	-6.8	-0.1
Real exchange rate depreciation (in percent, + indicates depreciation)	-3.0	-6.3	2.3	...	...	...	...	...	...	...	...	1.0	...
Inflation rate (GDP deflator, in percent)	9.0	5.0	7.6	5.9	7.2	6.5	5.6	5.5	5.4	5.2	5.0	7.3	5.7
Growth of real primary spending (deflated by GDP deflator, in percent)	8.0	15.6	-1.0	5.2	21.6	11.6	8.0	6.8	3.3	5.9	3.8	1.7	7.6
Primary deficit that stabilizes the debt-to-GDP ratio 5/	4.1	1.7	0.7	0.4	2.1	2.6	2.5	2.4	2.2	2.3	2.2	2.2	2.2
PV of contingent liabilities (not included in public sector debt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Definition of external/domestic debt	Currency-based
Is there a material difference between the two criteria?	No



Sources: Country authorities; and staff estimates and projections.

1/ Coverage of debt: The central, state, and local governments, central bank, government-guaranteed debt, non-guaranteed SOE debt. Definition of external debt is Currency-based.

2/ The underlying PV of external debt-to-GDP ratio under the public DSA differs from the external DSA with the size of differences depending on exchange rates projections.

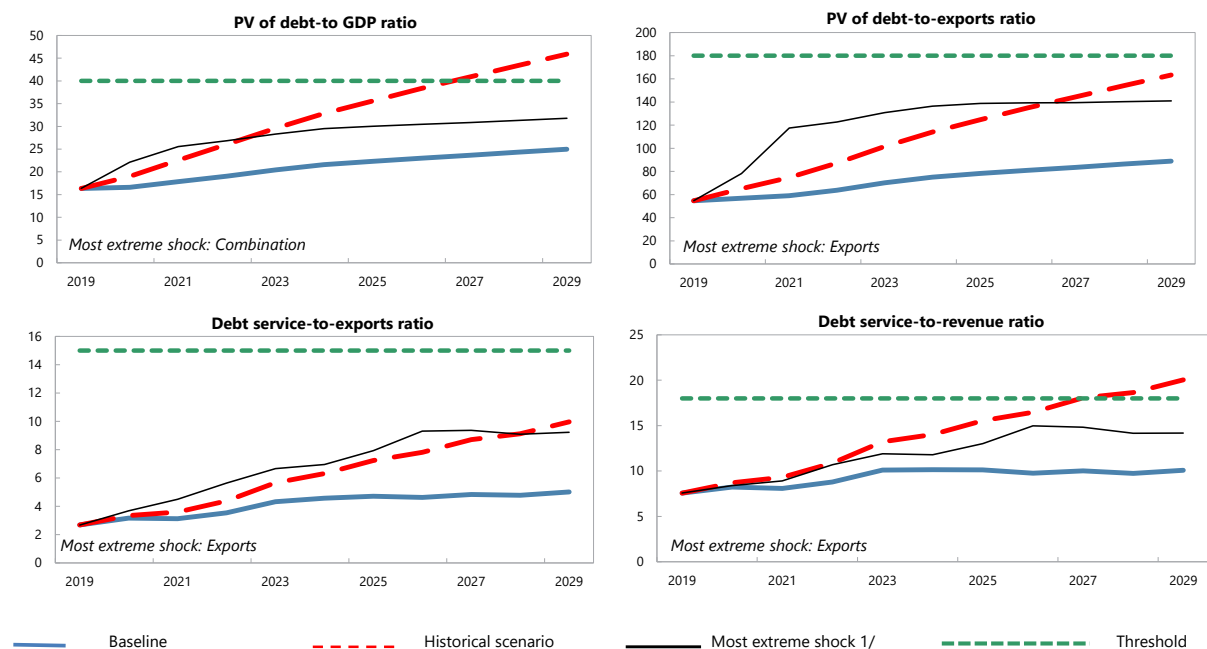
3/ Debt service is defined as the sum of interest and amortization of medium and long-term, and short-term debt.

4/ 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 and other debt creating/reducing flows.

5/ Defined as a primary deficit minus a change in the public debt-to-GDP ratio (-): a primary surplus, which would stabilize the debt ratio only in the year in question.

6/ Historical averages are generally derived over the past 10 years, subject to data availability, whereas projections averages are over the first year of projection and the next 10 years.

Figure 1. Madagascar: Indicators of Public and Publicly Guaranteed External Debt Under Alternatives Scenarios, 2019-2029



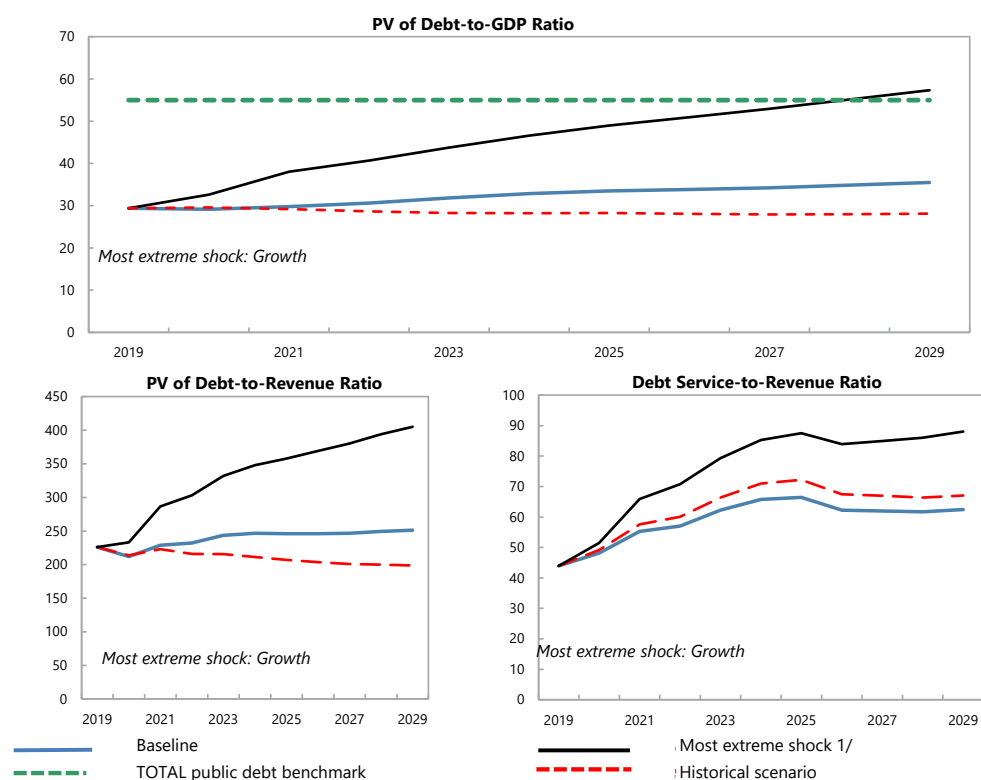
Customization of Default Settings			Borrowing assumptions on additional financing needs resulting from the stress tests*		
	Size	Interactions		Default	User defined
Tailored Stress			Shares of marginal debt		
Combined CL	No		External PPG MLT debt	100%	
Natural disaster	No	No	Terms of marginal debt		
Commodity price	Yes	Yes	Avg. nominal interest rate on new borrowing in USD	1.5%	1.8%
Market financing	n.a.	n.a.	USD Discount rate	5.0%	5.0%
			Avg. maturity (incl. grace period)	26	20
			Avg. grace period	4	4

Note: "Yes" indicates any change to the size or interactions of the default settings for the stress tests. "n.a." indicates that the stress test does not apply.

* Note: All the additional financing needs generated by the shocks under the stress tests are assumed to be covered by PPG external MLT debt in the external DSA. Default terms of marginal debt are based on baseline 10-year projections.

Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in or before 2029. The stress test with a one-off breach is also presented (if any), while the one-off breach is deemed away for mechanical signals. When a stress test with a one-off breach happens to be the most extreme shock even after disregarding the one-off breach, only that stress test (with a one-off breach) would be presented.

Figure 2. Madagascar: Indicators of Public Debt Under Alternative Scenarios, 2019-2029


Borrowing assumptions on additional financing needs resulting from the stress tests*	Default	User defined
Shares of marginal debt		
External PPG medium and long-term	36%	65%
Domestic medium and long-term	5%	15%
Domestic short-term	59%	20%
Terms of marginal debt		
External MLT debt		
Avg. nominal interest rate on new borrowing in USD	1.5%	1.8%
Avg. maturity (incl. grace period)	26	20
Avg. grace period	4	4
Domestic MLT debt		
Avg. real interest rate on new borrowing	3.0%	4.0%
Avg. maturity (incl. grace period)	2	4
Avg. grace period	1	1
Domestic short-term debt		
Avg. real interest rate	2.7%	3.5%

* Note: The public DSA allows for domestic financing to cover the additional financing needs generated by the shocks under the stress tests in the public DSA. Default terms of marginal debt are based on baseline 10-year projections.

Sources: Country authorities; and staff estimates and projections.

1/ The most extreme stress test is the test that yields the highest ratio in or before 2029. The stress test with a one-off breach is also presented (if any), while the one-off breach is deemed away for mechanical signals. When a stress test with a one-off breach happens to be the most extreme shock even after disregarding the one-off breach, only that stress test (with a one-off breach) would be presented.

Table 3. Madagascar: Sensitivity Analysis for Key Indicators of Public and Publicly Guaranteed External Debt, 2019-2029
(In percent)

	Projections 1/										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
PV of debt-to GDP ratio											
Baseline	16	17	18	19	20	22	22	23	24	24	25
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	16	19	23	26	30	33	36	38	41	43	46
B. Bound Tests											
B1. Real GDP growth	16	18	21	23	24	26	27	27	28	29	30
B2. Primary balance	16	17	19	20	21	22	23	24	24	25	26
B3. Exports	16	20	27	28	29	30	30	30	30	30	30
B4. Other flows 3/	16	19	22	23	24	25	26	26	26	27	27
B5. Depreciation	16	21	20	22	23	25	26	27	28	29	30
B6. Combination of B1-B5	16	22	26	27	28	30	30	30	31	31	32
C. Tailored Tests											
C1. Combined contingent liabilities	16	20	22	23	24	26	26	27	27	28	28
C2. Natural disaster	16	22	24	25	27	28	29	30	30	31	31
C3. Commodity price	16	17	19	20	22	23	24	24	25	25	26
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Threshold	40	40	40	40	40	40	40	40	40	40	40
PV of debt-to-exports ratio											
Baseline	55	57	59	64	70	75	78	81	84	86	89
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	55	65	75	87	102	114	125	135	144	154	163
B. Bound Tests											
B1. Real GDP growth	55	57	59	64	70	75	78	81	84	86	89
B2. Primary balance	55	58	61	66	73	78	81	84	86	89	91
B3. Exports	55	78	117	123	131	136	139	139	140	140	141
B4. Other flows 3/	55	65	73	77	84	88	90	92	93	95	97
B5. Depreciation	55	57	53	58	64	69	73	76	79	82	85
B6. Combination of B1-B5	55	74	71	88	95	100	102	104	106	108	110
C. Tailored Tests											
C1. Combined contingent liabilities	55	68	71	77	84	89	92	95	97	99	101
C2. Natural disaster	55	75	80	86	94	100	103	106	109	112	114
C3. Commodity price	55	60	64	69	76	80	83	85	87	90	92
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Threshold	180	180	180	180	180	180	180	180	180	180	180
Debt service-to-exports ratio											
Baseline	3	3	3	4	4	5	5	5	5	5	5
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	3	3	4	4	6	6	7	8	9	9	10
B. Bound Tests											
B1. Real GDP growth	3	3	3	4	4	5	5	5	5	5	5
B2. Primary balance	3	3	3	4	4	5	5	5	5	5	5
B3. Exports	3	4	5	6	7	7	8	9	9	9	9
B4. Other flows 3/	3	3	3	4	5	5	5	6	6	6	6
B5. Depreciation	3	3	3	3	4	4	5	4	4	4	5
B6. Combination of B1-B5	3	3	4	4	5	6	7	6	7	6	7
C. Tailored Tests											
C1. Combined contingent liabilities	3	3	3	4	5	5	5	5	5	5	5
C2. Natural disaster	3	3	4	4	5	5	5	5	5	5	6
C3. Commodity price	3	3	3	4	5	5	5	5	5	5	5
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Threshold	15	15	15	15	15	15	15	15	15	15	15
Debt service-to-revenue ratio											
Baseline	8	8	8	9	10	10	10	10	10	10	10
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	8	9	9	11	13	14	16	16	18	19	20
B. Bound Tests											
B1. Real GDP growth	8	9	10	10	12	12	12	12	12	12	12
B2. Primary balance	8	8	8	9	10	10	10	10	10	10	11
B3. Exports	8	8	9	11	12	12	13	15	15	14	14
B4. Other flows 3/	8	8	9	10	11	11	12	12	12	12	12
B5. Depreciation	8	10	10	11	12	12	12	11	11	11	12
B6. Combination of B1-B5	8	9	10	11	13	13	14	14	14	14	14
C. Tailored Tests											
C1. Combined contingent liabilities	8	8	9	9	11	11	11	10	11	10	11
C2. Natural disaster	8	8	9	10	11	11	11	11	11	11	11
C3. Commodity price	8	8	8	9	11	11	11	11	11	10	11
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Threshold	18	18	18	18	18	18	18	18	18	18	18

Sources: Country authorities; and staff estimates and projections.

1/ A bold value indicates a breach of the threshold.

2/ Variables include real GDP growth, GDP deflator (in U.S. dollar terms), non-interest current account in percent of GDP, and non-debt creating flows.

3/ Includes official and private transfers and FDI.

Table 4. Madagascar: Sensitivity Analysis for Key Indicators of Public Debt, 2019-2029

	Projections 1/										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
PV of Debt-to-GDP Ratio											
Baseline	29	29	30	31	32	33	33	34	34	35	35
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	29	30	29	29	28	28	28	28	28	28	28
B. Bound Tests											
B1. Real GDP growth	29	33	38	41	44	47	49	51	53	55	57
B2. Primary balance	29	30	31	32	33	34	35	35	35	36	36
B3. Exports	29	32	38	39	40	41	41	40	40	40	40
B4. Other flows 3/	29	32	34	35	36	37	37	37	37	37	38
B5. Depreciation	29	32	31	30	30	30	29	29	29	28	28
B6. Combination of B1-B5	29	30	32	33	34	35	36	36	37	38	38
C. Tailored Tests											
C1. Combined contingent liabilities	29	35	35	36	37	37	38	38	38	39	39
C2. Natural disaster	29	38	38	39	40	40	41	41	41	42	43
C3. Commodity price	29	31	34	37	41	44	47	49	51	53	56
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
TOTAL public debt benchmark	55	55	55	55	55	55	55	55	55	55	55
PV of Debt-to-Revenue Ratio											
Baseline	226	212	229	232	244	247	246	246	247	249	251
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	226	214	223	216	216	211	207	204	201	200	199
B. Bound Tests											
B1. Real GDP growth	226	233	286	303	332	348	358	369	380	394	405
B2. Primary balance	226	217	239	242	253	255	254	253	253	256	257
B3. Exports	226	234	296	295	305	305	299	293	288	286	283
B4. Other flows 3/	226	230	262	263	274	275	272	269	267	267	267
B5. Depreciation	226	232	237	230	230	224	217	211	206	203	201
B6. Combination of B1-B5	226	216	241	247	261	265	264	265	266	269	270
C. Tailored Tests											
C1. Combined contingent liabilities	226	254	270	270	280	281	278	276	276	277	278
C2. Natural disaster	226	275	292	293	303	304	301	299	299	301	301
C3. Commodity price	226	227	266	288	318	336	347	356	368	383	395
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Debt Service-to-Revenue Ratio											
Baseline	44	48	55	57	62	66	66	62	62	62	62
A. Alternative Scenarios											
A1. Key variables at their historical averages in 2019-2029 2/	44	49	58	60	66	71	72	67	67	66	67
B. Bound Tests											
B1. Real GDP growth	44	51	66	71	79	85	87	84	85	86	88
B2. Primary balance	44	48	56	59	63	67	67	63	63	62	63
B3. Exports	44	48	56	59	64	67	69	67	66	66	66
B4. Other flows 3/	44	48	56	58	63	66	68	65	64	64	64
B5. Depreciation	44	46	54	54	60	63	64	60	59	59	59
B6. Combination of B1-B5	44	48	57	59	65	70	71	67	67	66	67
C. Tailored Tests											
C1. Combined contingent liabilities	44	48	67	63	67	70	69	64	63	63	63
C2. Natural disaster	44	49	73	66	70	73	71	66	66	65	66
C3. Commodity price	44	49	59	65	73	79	81	77	78	79	81
C4. Market Financing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

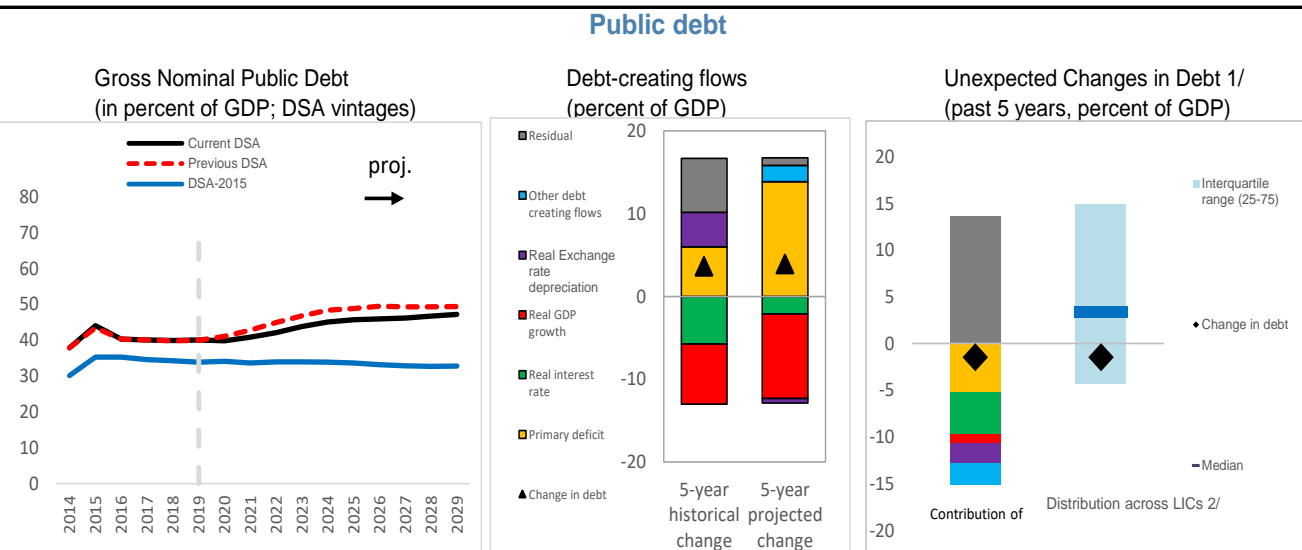
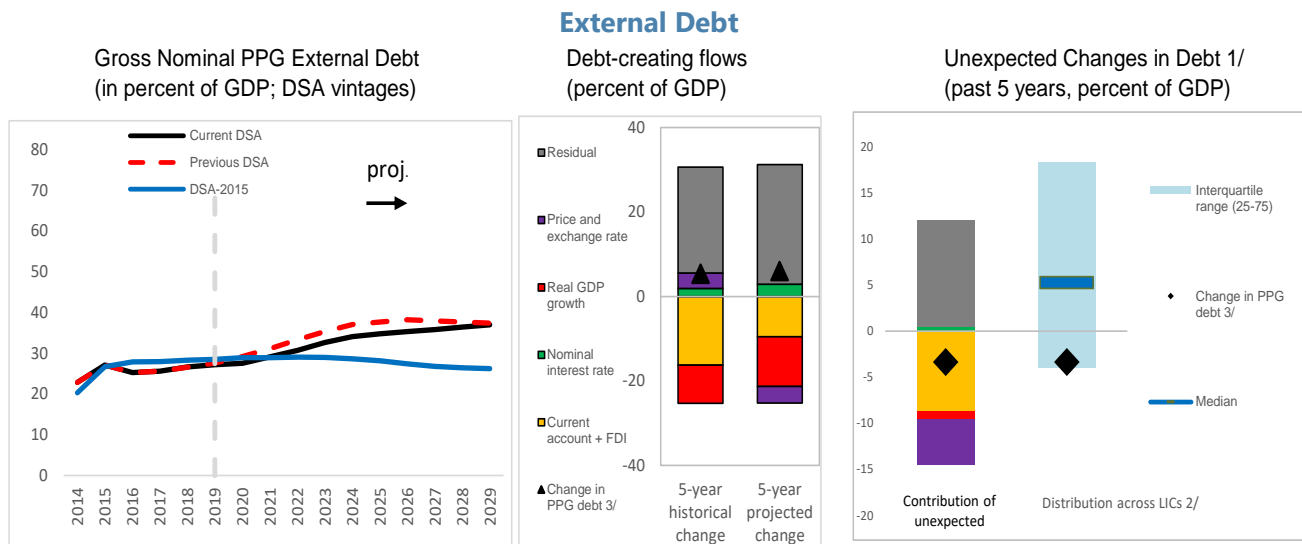
Sources: Country authorities; and staff estimates and projections.

1/ A bold value indicates a breach of the benchmark.

2/ Variables include real GDP growth, GDP deflator and primary deficit in percent of GDP.

3/ Includes official and private transfers and FDI.

Figure 3. Madagascar Debt Dynamics - Baseline Scenario: Drivers of External Debt



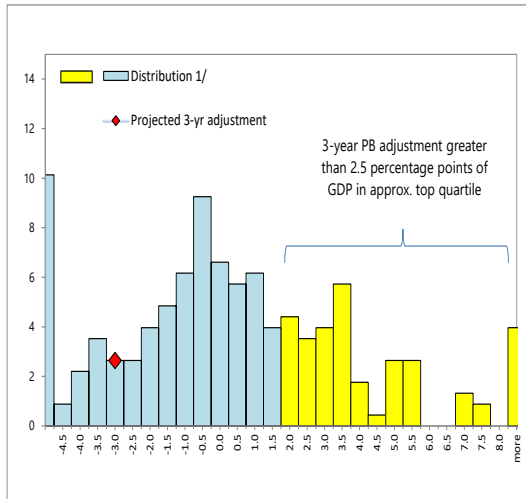
1/ Difference between anticipated and actual contributions on debt ratios.

2/ Distribution across LICs for which LIC DSAs were produced.

3/ Given the relatively low private external debt for average low-income countries, a ppt change in PPG external debt should be largely explained by the drivers of the external debt dynamics equation.

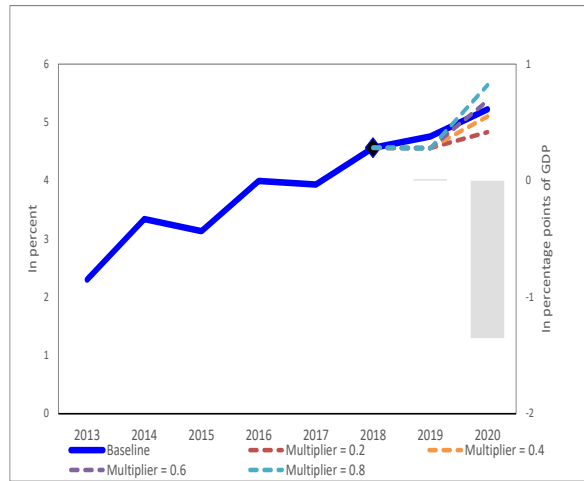
Figure 4. Madagascar: Realism Tools

3-Year Adjustment in Primary Balance
(Percentage points of GDP)



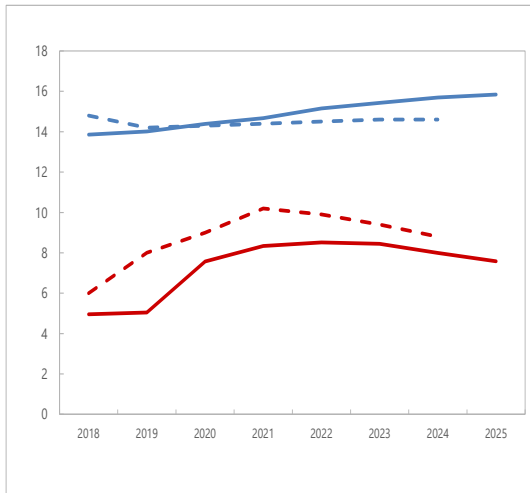
1/ Data cover Fund-supported programs for LICs (excluding emergency financing) approved since 1990. The size of 3-year adjustment from program inception is found on the horizontal axis; the percent of sample is found on the vertical axis.

Fiscal Adjustment and Possible Growth Paths 1/



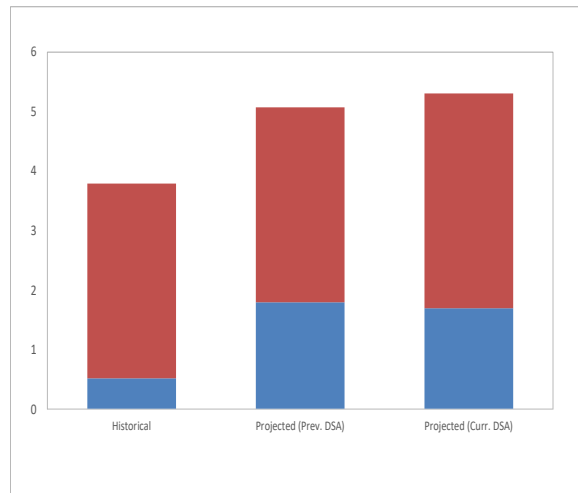
1/ Bars refer to annual projected fiscal adjustment (right-hand side scale) and lines show possible real GDP growth paths under different fiscal multipliers (left-hand side scale).

Public and Private Investment Rates1/
(percent of GDP)



— Private Investment (Current DSA) — Public Investment (Current DSA)
- - - Private Investment (Previous DSA) - - - Public Investment (Previous DSA)

Contribution to Real GDP growth
(percent, 5-year average)



■ Contribution of other factors
■ Contribution of government capital

1/ The previous DSA was completed prior to the rebasing of GDP. The shares are calculated using nominal data.