



TECHNICAL ASSISTANCE REPORT

ISLAMIC REPUBLIC OF MAURITANIA

Technical Assistance in Public Debt Projections and Analysis

MAY 2026

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ACRONYMS AND ABBREVIATIONS

BCM	Central Bank of Mauritania
DSA	Debt Sustainability Analysis
LIC DSA	Debt Sustainability Analysis for Low-Income Countries
TA	Technical assistance
CD	Capacity Development
CNDP	National Public Debt Committee
CT	Technical Committee
DCCGT	Centralized Accounting and Cash Management Directorate
DDE	Directorate of External Debt
DDT	Public Debt Dynamics Tool (DDT)
DDTx	Public Debt Dynamics Tool (online course offered by IMF and EDx)
DDT GFN	Public debt dynamics and gross financing needs projection tool
DDT RRC	Public Debt Dynamics Tool (DDT) for Resource Rich Countries
DPAE	Directorate of Economic Forecasting and Analysis
FAD	Fiscal Affairs Department
ICD	Institute for Capacity Development
IMF	International Monetary Fund
MEF	Ministry of Economy and Finance
MF	Ministry of Finance
MEDD	Ministry of Economy and Sustainable Development
MCM	Monetary and Capital Markets Department
MTDS	Medium-term Debt Strategy
ND_DDT	Natural Disaster Module of the Public Debt Dynamics Project Tool
SPR	Strategy, Policy, and Review Department
WB	World Bank

PREFACE

This report concludes the technical assistance project to develop a Public Debt Dynamics Tool (DDT) to be used in the public debt projections and analyses of the National Public Debt Committee (CNDP) of the Islamic Republic of Mauritania. Initiated in January 2024, this project included three missions; this report presents the main progress made and recommendations for integrating the tool into CNDP policies.

The last project mission, conducted from January 9 to 15, 2025, as well as the preparatory work in November and December 2024, focused on two key pillars for effective integration of the tool into policy decisions: (i) strengthening the capacity of the CNDP technical team to use the DDT and (ii) developing a manual on how to use the tool in collaboration with the authorities. The mission was led by Marie Pierre Aquino Coste (Head of Mission and Project Manager) and included Naomitsu Yashiro (Senior Economist) and Ha Minh Nguyen (Economist).

During the mission, the team worked closely with the staff of the CNDP technical committee, providing hands-on sessions to build capacity to operate the tool independently and facilitate coordination across institutions. These sessions allowed the participants to master the tool, especially its operational mechanisms. They also helped strengthen their skills to perform the routine tasks associated with public debt projections.

The mission team expresses its sincere gratitude to the Mauritanian authorities for their warm hospitality and productive collaboration. We would especially like to thank Director General Niang Idrissa of the Directorate General of Public Debt of the Ministry of Finance for his exceptional support, Deputy Director Houcein Mejdoub for the logistics, as well as the members of the CNDP for their committed participation in the workshops.

The team also benefited from close collaboration with the MCD Mission Chief for Mauritania, Mr. Felix Fisher, and his team, as well as with Mr. Oumar Dissou, FAD resident advisor for AFRITAC West. The team would like to thank Ms. Riham Yousif (ICDMF) for her outstanding administrative support and for her excellent technical contributions. The mission would also like to thank the IMF Resident Representative, Mr. Younes Zuhar, and staff from his office for their assistance, as well as the former IMF Resident Representative, Ms. Anta Ndoeye, for their collaboration. The team is also deeply grateful to colleagues in the Fiscal Affairs Department (FAD) for their invaluable and constant collaboration throughout the project.

SUMMARY

In response to a request by the Ministry of Finance (MoF) of Mauritania, the Institute for Capacity Development (ICD) of the International Monetary Fund (IMF) conducted a technical assistance (TA) project to strengthen the country's capacity in public debt analysis and projections. The initiative aimed to strengthen the analytical capacity of the National Public Debt Committee (CNDP), an inter-agency body in charge of debt policymaking, sustainability assessments, and inter-institutional coordination. A scoping mission conducted in January 2024 assessed the authorities' CD needs and led to the implementation of a TA plan based on the adoption and customization of the DDT.

The CNDP, which includes representatives from the Ministry of Finance, the Ministry of Economy and Sustainable Development (MEDD), and the Central Bank of Mauritania (BCM), plays a crucial role in shaping public debt policy but lacked the necessary tools to produce consistent debt projections and assess macroeconomic impacts. To address these gaps, the TA project introduced the Debt Dynamics Tool, a framework to project debt trajectories under different scenarios, and developed a customized version for resource-rich countries (DDT RRC) to account for Mauritania's dependence on extractive revenues. In addition, the Natural Disasters Public Debt Dynamics Tool (ND DDT) was integrated to assess the impact of climate shocks and commodity price fluctuations on debt sustainability.

The project revolved around three missions, supported by remote training sessions, in-person workshops, and continuous technical exchanges. By the end of the TA, the Mauritanian authorities have successfully implemented the DDT and produced a comprehensive report on public debt that incorporates baseline projections, risk scenarios, and policy recommendations. The core technical team demonstrated the ability to conduct independent assessments of debt sustainability, which now allows for the systematic integration of public debt analyses into policy making. In addition, user manuals have been developed to ensure the continued use of these tools, thus ensuring the retention and continuity of knowledge within the CNDP.

The TA project improved Mauritania's public debt projection and analytical capacity, equipping fiscal policymakers with tools to deal with economic and environmental uncertainties. By strengthening inter-institutional collaboration and analytical capacity, the project has laid the foundation for more resilient public debt management in Mauritania.

Summary of Final Project Recommendations

	Recommendation	Indicative horizon
1	Integrate public debt projections and analyses using the DDT into CNDP policymaking on a regular and more comprehensive basis.	December 2026
2	Establish a clear division of tasks and deadlines, congruent with the overall policy planning process, among the public stakeholders involved in the projection of public debt and the drafting of the report on public debt.	December 2026
3	Provide regular training to new technical team members on the public debt projection tool.	Twice a year

SECTION I. GENERAL INFORMATION

A. Mauritania's Macroeconomic Background

1. Mauritania is highly exposed to commodity price fluctuations and natural disasters, which have significant impacts on its economic and social stability. The country's vulnerability has recently been exacerbated after the war in Ukraine, which has led to a surge in food prices and increased food insecurity for 20 percent of the population. Higher global food and energy prices, combined with lower iron ore prices, contributed to a widening trade deficit and declining external reserves in 2022. Since then, commodity prices have partially stabilized, though Mauritania's fiscal position and external buffers remain under pressure, as recurrent droughts and floods, which pose risks to macroeconomic stability and growth, while also requiring significant adaptation measures.

2. These external and climate shocks weighed on the fiscal balance and contributed to a rise in fiscal risks. To address these challenges, Mauritania secured the Extended Credit Facility (ECF) and the Extended Fund Facility (EFF) from the International Monetary Fund (IMF), for a total amount of US\$ 86.9 million, in February 2022 to support a program to maintain macroeconomic stability and improve the fiscal and monetary policy frameworks. A key objective of the program is to strengthen medium-term fiscal policy to ensure long-term fiscal sustainability. Furthermore, Mauritania obtained in December 2023 US\$258.21 million under the Resilience and Sustainability Facility (RSF) to finance climate adaptation investments and promote the green transition.

B. Authorities' request for technical assistance from ICD

3. The Ministry of Finance requested technical assistance from the Institute for Capacity Development (ICD) to strengthen the capacity of the National Public Debt Committee (CNDP) in public debt projection and analysis.¹ The main objective of the request was to improve coordination and communication between the institutions responsible for formulating and monitoring the country's debt policy.

4. At the request of the Ministry of Finance (MoF), an exploratory TA mission visited Nouakchott from January 8 to January 19, 2024. The mission assessed the authorities' capacity to project public debt and identified the capacity development needs of institutions involved in debt projections.

5. A second technical assistance mission, which took place from August 26 to September 4, 2024, focused on strengthening Mauritania's capacity to project and analyze public debt. The main

¹ The CNDP is an inter-agency group consisting of six General Directors of the Ministry of Finance, the Ministry of Economy and Sustainable Development (MEDD), and the Central Bank of Mauritania (BCM), all of whom are involved in debt management. The committee is responsible for coordinating the formulation and implementation of debt policy, advising the Minister of Finance on debt sustainability and restructuring, and facilitating the exchange of information between institutions. Supported by a technical committee, the CNDP also supervises the publication of debt statistics and the production of public debt projections and sustainability analyses.

objective was to implement the Public Debt Dynamics Tool (DDT) within the CNDP technical support committee. The adoption of the DDT represents an important milestone in improving Mauritania's macroeconomic management, especially in addressing challenges to develop consistent debt projections and MTDS.

6. Given Mauritania's status as a resource-rich country, a customized version of the DDT was developed during the second mission to better capture the country's economic characteristics.

This customization incorporated the non-extractive primary balance — the fiscal policy instrument used by the Mauritanian authorities — enabling the CNDP to analyze debt sustainability in a way that reflects the country's resource-dependent fiscal structure.

7. The mission also presented alternative scenarios modelling the impact of commodity price shocks and natural disaster shocks on public debt sustainability using the Natural Disaster-based Public Debt Dynamics Tool (ND_DDT).

Given Mauritania's high dependence on commodities such as iron ore, gas, and gold, the economy is highly exposed to global commodity price fluctuations and environmental risks. In addition, the country is frequently hit by natural disasters, including droughts and floods, which can have a severe impact on economic stability and debt levels. This ND_DDT enables policymakers to design scenarios in which these adverse shocks affect those variables that define public debt trajectories. These shock scenarios provide valuable information for planning fiscal adjustment paths to restore debt sustainability after such events.

8. To complement these efforts, the CNDP technical team has prepared a public debt report that presents baseline public debt projections and alternative scenarios.

The report presents fiscal paths congruent with the achievement of debt objectives, while considering the impact of natural disasters and commodity price shocks, which are particularly relevant given Mauritania's economic vulnerability. These alternative scenarios provide a critical analysis of how such shocks might affect public debt sustainability and lay the ground for the analysis of measures to reduce these vulnerabilities.

9. The most recent technical assistance mission took place in Nouakchott from January 9 to 15, 2025, and helped strengthen the technical capacities and the ownership of the DDT by the Mauritanian authorities.

Representatives from various institutions collaborated on an exercise to produce a revised report on public debt. First, they defined roles and responsibilities for timely data provision and improved coordination among agencies. They then worked across institutions to harmonize data assumptions and reconcile inputs. Finally, the participants collaborated to complete the structure of the public debt report, integrating baseline projections and alternative scenarios using the most recent data.

10. The mission also conducted an exhaustive review of all project documents, tools, and customizations, thereby strengthening the understanding and capacity to make effective use of the tools developed.

Participants were provided with a set of user manuals on how to calibrate natural disaster shocks and commodity price shocks using the ND_DDT, the public debt dynamics tool corresponding to a natural disaster. In addition, the team will also provide the user manual of the Public Debt Dynamics Tool for RRCs.

11. The mission helped enhance the knowledge and skills acquired by the Mauritanian authorities in the institutions concerned.

A key priority is to integrate the DDT and Public Debt Report

into the country's public debt policies. The mission encouraged the CNDP technical committee to conduct independent debt sustainability analyses and effectively manage public debt. This last phase also involved creating protocols and procedures for consistent use of these tools, as well as training additional staff to ensure continuity. Over the medium term, these efforts will focus on strengthening Mauritania's capacity to manage public debt by producing periodic public debt projections as part of its macroeconomic policy formulation and to more strongly adapt to future economic challenges.

12. The CNDP continued to deepen its use of the DDT in its policymaking process, with the mission providing technical support throughout. At the closing meeting, the CNDP expressed its intention to use the tool for the next committee meeting. By fostering inter-institutional collaboration and incorporating best practices, the mission significantly strengthened Mauritania's capacity to project and analyze public debt, which will enable it to be better prepared against economic uncertainties.

SECTION II. PROJECT ACHIEVEMENTS

A. Public Debt Dynamics Tool (DDT)

13. The DDT projects public debt as a percentage of GDP, computes fiscal paths to achieve a user-defined debt target, performs pre-defined and customized stress tests, produces fan charts, and presents the results in standardized output tables. Developed by ICD as part of its capacity development work on macroeconomic frameworks, the DDT can be integrated into a country's broader macroeconomic framework. The DDT requires only 10 macro-fiscal variables, often publicly available, to perform a rich analysis of public debt dynamics (see Figure 1), allowing users to project debt without detailed information on issuances and amortizations.

Figure 1: List of DDT variables

Variable
d_t (debt including uncalled guarantees) : stock of total gross public debt, percent of GDP
o/w stock of local-currency guarantees (uncalled) : stock of uncalled guarantees in local currency included in total debt, percent of GDP
o/w stock of foreign-currency guarantees (uncalled) : stock of uncalled guarantees in foreign currency included in total debt, percent of GDP
α_t (share excl. guarantees) : share of foreign currency denominated debt in total debt, percent of total debt
e_t (LCU/FCU, avg) : nominal average exchange rate, local currency per unit of foreign currency
e_t (LCU/FCU, eop) : nominal end of period exchange rate, local currency per unit of foreign currency
i_t^d : nominal effective interest rate on local currency denominated debt, percent
i_t^f : nominal effective interest rate on foreign currency denominated debt, percent
π_t : GDP deflator inflation, percent
g_t : Real GDP growth, percent
pb_t : Primary balance, percent of GDP
of_t (other net debt-creating flows) : Other net debt creating flows, percent of GDP
π_t^f : Foreign GDP deflator inflation, percent (used in fan chart)

14. The DDT can present multiple scenarios of public debt projections.

- a. *The baseline scenario* presents public debt projections based on macroeconomic and fiscal inputs provided by the authorities (typically drawn from the latest program or budget projections) including nominal effective interest rates in local and foreign currency, GDP growth, inflation, nominal exchange rate depreciation, the primary balance, and other net debt-creating flows. The DDT takes these inputs as given and does not generate the baseline forecasts itself.
- b. *The historical scenario* sets each macroeconomic and fiscal variable to its historical average, held constant at that value throughout the entire projection horizon. This scenario is indicative of the debt path that would result if key variables — growth, inflation, the primary balance, interest rates, and the exchange rate — were to remain at their past averages, rather than following the baseline projections. The historical scenario can therefore be usefully used as a realism check: if debt under the historical scenario is significantly higher than under the baseline, this signals that the baseline may embed optimistic assumptions about macroeconomic or fiscal variables, for instance, an assumed primary balance improvement or growth rebound that exceeds what historical

performance would suggest. Conversely, lower debt under the historical scenario would indicate that the baseline is relatively conservative.

- c. *The constant primary balance scenario* sets all key inputs as in the baseline, except for the primary balance which, starting in the second year of projection, is set at the level of the first year of projection. A significant difference between the debt levels in this scenario and the baseline suggests potential optimism or pessimism about the magnitude of fiscal adjustments included in the baseline assumptions.
- d. *The shock scenarios* examine public debt projections in the face of adverse shocks to the primary balance, GDP growth, local and foreign currency effective nominal interest rates, and average and end-of-period nominal exchange rates, respectively. For each of these variables, between the years in which the shock starts and ends, the shocked variable is equal to its baseline value plus a multiple of its historical standard deviations.
- e. *A customized scenario* allows users to calibrate a combination of shocks that capture the impact of a specific event on the economy. Events that can be modeled in this scenario include natural disasters or commodity price shocks.

B. Public Debt Dynamics Tool for Resource-Rich Countries (DDT RRC)

15. Given Mauritania's status as a resource-rich country (RRC), a customized version of the DDT was developed to account for its unique economic characteristics. This new customization, called the DRR DDT, incorporates the non-extractive revenue primary balance as a policy instrument, allowing the Mauritanian authorities to better manage debt sustainability under uncertainty and strengthen their policy decisions. In the DDT, the regular primary balance is now further disaggregated into the primary balance excluding extractive revenue and extractive revenue (see

16.

17.

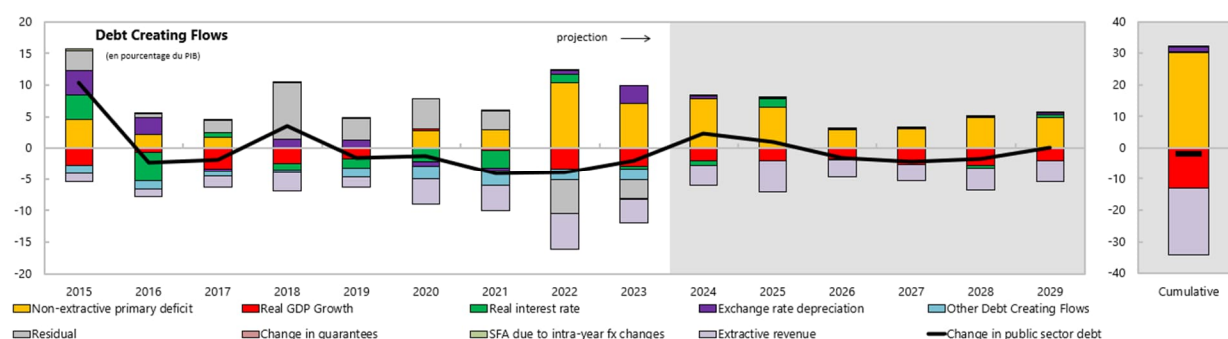
18. Figure 2). Extractive revenues tend to be volatile and are usually determined by international prices and are thus not under the control of the state. Thus, as defined by the current IMF Program, the non-extractive primary balance is an appropriate policy instrument in Mauritania, as well as in other resource-intensive countries. In addition, the tool allows policymakers to simulate various fiscal adjustment scenarios, assess the long-term impact of different choices, and gain a better understanding of how non-extractive revenues can support sustainable debt levels. With this more comprehensive and tailored approach, Mauritania can develop a more resilient fiscal strategy that reduces its reliance on extractive sectors while ensuring that public debt remains manageable. It also supports the broader objective of improving policy coordination and aligning the debt strategy with the country's long-term economic objectives. The DDT has great potential to be applied more broadly to other resource-rich countries.

Figure 2 : List of variables under DDT RRC

Year/Variable
<i>dt</i> (debt including uncalled guarantees): stock of total gross public debt, in percent of GDP
<i>Of which stock of local currency guarantees (uncalled)</i> : Stock of uncalled local currency guarantees included in total debt, in percent of GDP
<i>Of which stock of (uncalled) guarantees in foreign currency</i> : Stock of uncalled guarantees in foreign currency included in total debt, as a percentage of GDP.
<i>at</i> (non-collateralized portion): The share of foreign-currency denominated debt in total debt, as percent of total debt.
<i>et</i> (LCU/EMU, avg): nominal average exchange rate, local currency per unit of foreign currency.
<i>et</i> (LMU/EMU, FDP): end-of-period nominal exchange rate, local currency per unit of foreign currency
<i>itd</i> : nominal effective interest rate on local currency debt, in percent
<i>itf</i> : Nominal Effective Interest Rate on Foreign Currency Denominated Debt, Percent
<i>πt</i> : GDP deflator inflation, percent
<i>gt</i> : Real GDP growth, percent
<i>bpnet</i> : Non-extractive primary balance, in percent of GDP
<i>bpnet</i> : extractive revenue, in percent of GDP
<i>oft</i> : Other net debt creating flows, percent of GDP
<i>πft</i> : Foreign GDP deflator inflation, in percent (used in fanchart)

19. Figure 3 presents the factors contributing to the evolution of public debt projections under Mauritania's illustrative baseline scenario using the DDT. Public debt is projected to increase in 2024 and 2025, driven by high non-extractive primary deficits relative to extractive revenues. From 2026 to 2028, public debt is projected to decline as the contribution of non-extractive primary deficits to debt increase is less than the contribution to debt reduction from a higher share of GDP growth and extractive revenues.

Figure 3: Contributors to Changes in Public Debt



Note: The projections presented in this figure are for illustrative purposes only.

C. Natural Disasters Public Debt Dynamics Tools (ND DDT)

20. The mission also presented the Natural Disasters Debt Dynamics Tool (ND_DDT) calibrating shocks that can be used to construct natural disaster scenarios. This ND_DDT has

been developed by ICD for its training and technical assistance on macroeconomic frameworks for forecasting and policy analysis. In addition, the ND_DDT automatically imports from the public debt projection scenario from the DDT and exports the natural disaster scenario developed with the ND_DDT.

21. Different approaches can be used to construct a natural disaster scenario. The first approach observes a past disaster and compares the values of relevant variables before and after the disaster. Pre-disaster values can be World Economic Outlook (WEO) forecasts just before the disaster. Post-disaster values can be forecasts from the WEO vintage just after the disaster. The difference between the two forecasts provides a rough estimate of the disaster's macroeconomic impact, though it may also reflect other changes that occurred in the intervening period, including shifts in the global economic environment, data revisions, or domestic developments unrelated to the disaster. The gap between the two WEO vintages used in the analysis is one year, which should be borne in mind when interpreting the results.. Alternatively, pre-disaster values can be averages of values over a number of years before the disaster, while post-disaster values can be the values published after the disaster. The limitation of the latter approach is that many other events can occur at the same time as a disaster (e.g., changes in the international economic climate, commodity price shocks, or domestic recessions unrelated to a natural disaster). These factors can make it difficult to isolate the impacts of a natural disaster.

22. Applying the event study approach, the 1969 drought in Mauritania is analyzed to assess its macroeconomic impact. The drought was one of the most important droughts that took place in the country. Figure 4 shows the differences in outcomes with respect to three-year averages prior to 1969. The study of the event suggests that the 1969 drought caused a drop in GDP growth in 1969 of 3.4 percentage points.

Figure 4: Deviations of macroeconomic outcomes from pre-drought averages, 1969 drought event

	T(1969)	T+1	T+2	T+3
GDP growth (annual %)	-3.4	7.3	-2.8	-5.4

Note: Each number shows the deviation of the outcome variable from its three-year average prior to 1969. A positive value indicates that the outcome exceeded its pre-drought average; a negative value indicates a shortfall. Based on World Bank World Development Indicators.

23. The second approach uses econometrics and international historical data to estimate the average impacts of natural disasters on different variables relevant for debt dynamics, controlling for country and disaster characteristics. Local projections and quantile regressions are two commonly used methods. The local projection method focuses on the mean estimate, while the quantile regression approach focuses on the median and the two extreme estimates.

24. To generate empirical estimates of impacts, users must provide information on country and disaster characteristics that will be used for the econometric specification.

- Pre-disaster primary fiscal balance: pre-disaster primary fiscal balance (% of GDP).
- Income group: the country category (advanced economies, emerging market and middle-income economies, low-income countries, and developing economies).
- Small island: if the country is a small island.
- Adaptive capacity: the Notre-Dame ND Gain index, which measures the country's capacity to adapt to climate change.

- Damages: property damage caused by the disaster (% of GDP).
- Type of disaster: The user can select "storm", "flood", "drought", or "other disaster".

25. Figure 5 presents the inputs of the econometric approach for a hypothetical drought in Mauritania in 2025. For Mauritania, the pre-disaster primary balance is -0.58 percent of GDP (projected level in 2024). Income groups correspond to the IMF classification of "Low-Income and Developing Countries." Mauritania is not a small island. The adaptation capacity is set at 0.7585, which is the average value for Mauritania between 1995 and 2020. The adaptation capacity index is between 0 and 1, with 1 being the lowest capacity and 0 the highest. The size of the damage is set at 11.5 percent of GDP, which is equivalent to the damage caused by the 1969 drought. The type of disaster is selected as "Drought".

Figure 5: Inputs for country characteristics and disasters using the econometric approach

Shocks from local projections			
Pre-ND fiscal primary balance (% GDP)	-0.58	ND adaptive ability	0.7578
Income group (AE, EMMIEs, LIDC)	Low Income and Developing Country	Damage (% GDP)	11.5
Small Island	No	Disaster Type	Drought

26. Figure 6 presents the impacts predicted by the econometric approach. These projected impacts are then selected subject to judgement and knowledge of the country.

Figure 6: Impacts over a three-year horizon obtained

Econometric approach	t	t+1	t+2
αt (share excl. guarantees)	13.7	13.4	9.6
Δet (percent, avg)	1.8	2.3	0.9
Δet (percent, eop)	5.2	-2.5	2.5
itd	-2.6	0.3	4.0
itf	0.1	0.3	-0.2
πt	-2.5	-1.8	0.1
gt	-0.1	1.3	1.1
pbt	-0.9	0.7	1.2
Exports growth (LIC-DSF)	7.8	4.5	5.8

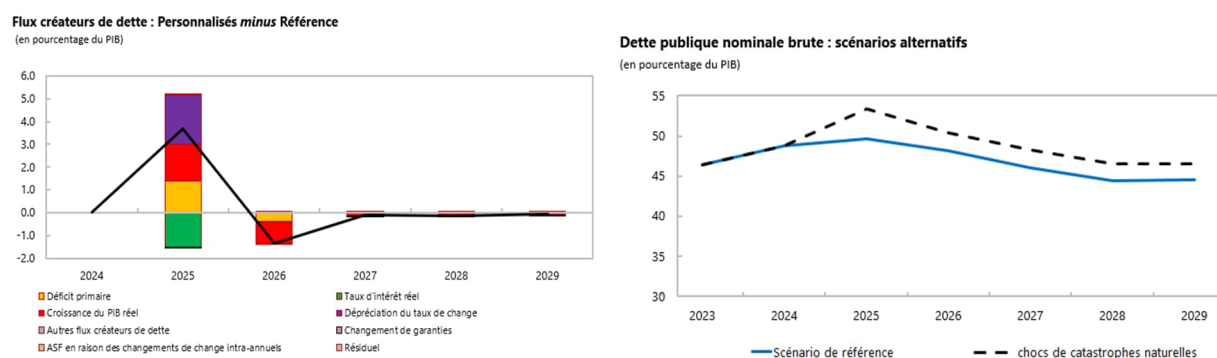
27. Finally, the third approach uses country-specific knowledge and judgment to produce own estimates of the impact of a natural disaster. Figure 7 presents the final shocks using that knowledge and judgment. Following a drought, average and end-of-year nominal exchange rates are calibrated to depreciate by 5.4 percent relative to the baseline. This is close to the forecast obtained using the econometric approach (5.2 percent). Inflation is calibrated to increase by 3.2 percentage points. Output growth is calibrated to decline by 3.4 percentage points relative to the baseline (consistent with the event study methodology). The primary balance is calibrated to deteriorate by 1.4 percent of GDP. The impacts of the natural disaster are calibrated over a period of two years.

Figure 7: Calibrated final shocks of a natural disaster

Final shocks	t	t+1
at (share excluding guarantees)	0.0	0.0
Δand (percent, avg)	5.4	0.0
ΔET (Percent, FDP)	5.4	0.0
itd	0.0	0.0
itf	0.0	0.0
π_t	3.2	0.0
gt	-3.4	1.7
bpnet (non-extractive primary balance)	-0.9	0.7
bpet (extractive revenues)	0.0	0.0
Other net debt creating flows (AFT)	0.0	0.0
Export Growth (LIC-DSF)	0.0	0.0

28. In this example, it is estimated that the natural disaster will hit the economy in 2025. As a result of the calibrated impacts, public debt is projected to increase by about 4 percent of GDP in 2025, compared to the baseline scenario (Figure 8, right panel). The increase in 2025 is due to lower GDP growth, a deterioration in the primary balance and exchange rate depreciation. By 2026, the pick-up in growth helps reduce the rise in public debt (Figure 8, left panel).

Figure 8: Calibrated Post-disaster Debt Projections

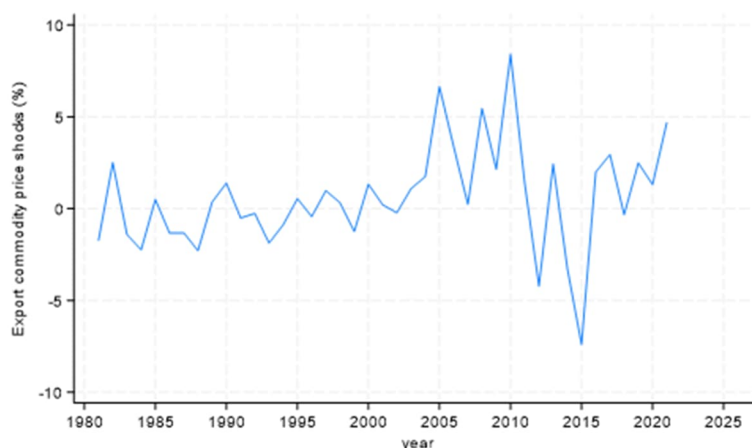


Note: The projections presented in this figure are for illustrative purposes only.

D. Apply the DDT for public debt projections after a commodity price shock

29. The mission also customized the assessments to assess the impact of commodity price and natural disaster shocks, using ND_DDT calibrated to Mauritania's specific economic situation. Mauritania's economy relies largely on exports of commodities such as iron ore, fish, and gold, and is highly exposed to global price fluctuations and environmental risks. Figure 9 shows the commodity price shocks experienced by Mauritania (calculated as percentage change of the commodity price index) in the past as calculated by IMF commodity terms of trade data.

Figure 9: Previous commodity shocks in Mauritania.



30. Based on empirical estimation of the impacts of past commodity price shocks on macro-fiscal outcomes, the technical team constructed the shocks for the scenario following a hypothetical negative 5 percent commodity price shock. The negative commodity shock is calibrated to cause a 1 percent reduction in output growth relative to the baseline in the year of the shock. Based on empirical estimates using Mauritania's data, the shock is calibrated to cause a 1 percent of GDP decrease in the primary balance in the year of the shock and a 0.5 percent of GDP decrease in the primary balance one year after the shock (see Figure 10).

Figure 10: Final calibrated shocks after -5% commodity shock

Final shocks	t	t+1
α (share excluding guarantees)	0.0	0.0
Δ and (percent, avg)	0.0	0.0
Δ ET (Percent, FDP)	0.0	0.0
itd	0.0	0.0
itf	0.0	0.0
π_t	0.0	0.0
gt	-1.0	0.0
bpnet (non-extractive primary balance)	0.0	0.0
bpet (extractive revenues)	-1.0	-0.5
Other net debt creating flows (AFT)	0.0	0.0
Export Growth (LIC-DSF)	0.0	0.0

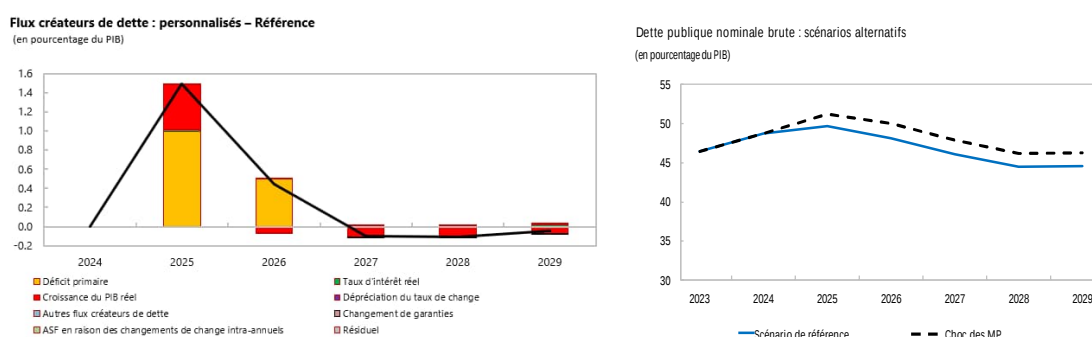
31. After a hypothetical negative commodity price shock of 5 percent, public debt is projected to increase by about 1.5 percent of GDP in 2025 (

32.

33.

34. Figure 11). The increase reflects lower growth and a deterioration in the primary balance. In 2026, public debt is projected to increase by another 0.5 percent of GDP due to the continued deterioration of the primary balance.

Figure 11: Debt projections after calibrated commodity shock

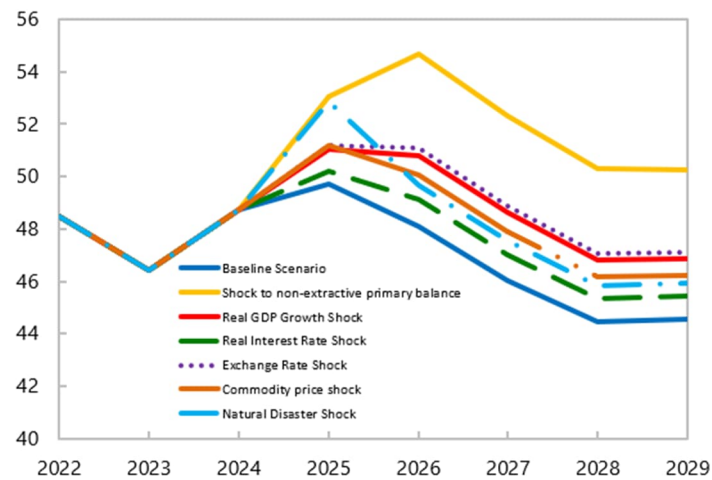


Note: The projections presented in this figure are for illustrative purposes only.

35. The projections of public debt under alternative scenarios are presented in Figure 12. It presents the baseline scenario, one-standard-deviation shocks to the non-extractive primary balance, the real interest rate, the exchange rate, and finally, commodity price shocks and natural disasters. None of the debt levels in the alternative scenarios converge to that in the baseline during the forecast period. However, the most important shock that results in a significant deviation from the baseline is the one-standard-deviation shock to the non-extractive primary deficit. This shock increases public debt by almost 6 percent of GDP in 2026. This observation makes it possible to deduce the most important risks for the baseline projection of public debt, even if the shock scenarios related to natural disasters and commodity prices are not directly comparable to the macroeconomic shock scenarios due to the different construction approaches.

Figure 12: Public debt projections under alternative scenarios.

Gross Nominal Public Debt: Stress Tests (Percent of GDP)



Note: The projections presented in this figure are for illustrative purposes only.

SECTION III. PROJECT RESULTS AND FUTURE CHALLENGES

36. With the final mission, the project has achieved the main objectives defined in the action plan. The main objectives of the project are to: (A) improve the capacity of Mauritanian civil servants to make public debt projections and analyses by adapting, documenting, updating, modifying, and exploiting ICD's Public Debt Dynamics Tool to enable the technical subcommittee's support to the CNDP by producing a debt report that provides analyses of debt dynamics under baseline scenarios, so that the authorities can define fiscal paths to achieve a certain target debt-to-GDP ratio; (B) customize the DDT by adding features that account for the current macroeconomic context and risks relevant to Mauritania (e.g., debt-stabilizing non-extractive primary balance, natural disaster scenarios such as droughts and floods); C) Further improve macroeconomic policy decision-making by increasing the analytical capacity.

A. Understanding the DDT and ND DDT tools

37. Given the initial capacity constraints, the mission introduced the Public Debt Dynamics Tool (DDT) and its version with natural disasters. Prior to the first mission, the CNDP technical team, composed of members from different institutions, completed an online course on public debt projections using the DDT (Projecting Public Debt – Public Debt Dynamics Tool (DDTx)), which is available in French on the edX platform. This course focused on the foundation of public debt dynamics (the evolution of debt over time). To ensure continuous learning, the mission team held weekly virtual meetings to monitor participants' progress, answer questions and provide further guidance. Additional materials, including the technical note and manual for the DDT, the full calculation of the debt dynamics equation, and explanations of key debt drivers, were shared to further understanding. During the first mission, the team provided in-person training on public debt projections, specifically tailored to the Mauritanian economy. Between the first and second missions, six virtual meetings were held to exchange views on the data required for baseline public debt projections, introduce the concept of non-extractive primary balance, and provide an overview of climate change considerations for debt sustainability. The second mission included a comprehensive study of the DDT and an introduction to ND_DDT, which equipped participants with the tools needed to assess the impact of commodity price fluctuations and natural disasters on debt sustainability. The third mission strengthened the skills of the technical team on ND-DDT by establishing its capacity to incorporate climate risks into debt projections.

38. The technical team had made remarkable progress. By the end of the second mission, the team had succeeded in producing a comprehensive public debt report, covering baseline public debt projections and alternative scenarios. In particular, the team was given only two days to prepare the documents and draft the report, which demonstrates the strengthening of its analytical and technical capacities. The report not only describes the baseline debt path and fiscal paths congruent to achieve the debt objectives but also incorporates scenario analyses of natural disasters and commodity price shocks, taking into account Mauritania's specific vulnerabilities. These alternative scenarios provide vital information about the potential impact of adverse shocks on public debt sustainability and identify the size of aggregate fiscal adjustments needed to restore debt stability. The technical team presented this comprehensive report to the General Directors who chair the CNDP to ensure that senior officials

understand the country's prospects with debt under different debt conditions. By integrating baseline and shock scenarios, the report helps establish a robust framework for proactive debt management, enabling policymakers to anticipate risks and make informed policy decisions to support Mauritania's macroeconomic stability.

39. By the end of the mission, committee members demonstrated their proficiency in the use of the DDT, including both its purpose and the technical details. Participants also had the opportunity to define roles and responsibilities of each institution in data updates and sharing, and further improve coordination between institutions. As a result, the technical committee has successfully produced a revised report on public debt and presented it to the CNDP.

Challenges

40. Retaining the technical team, in the context of departmental reorganization and future changes, supports maintaining the analytical capacity. Retaining the technical team is critically important to avoid the loss of capacity developed using the DDT. To this end, the mission team jointly prepared a process document with the authorities. The document aims to create protocols and procedures for the consistent use of these tools, so that future members of the CNDP technical committee can follow to ensure continuity.

41. Consolidating and expanding the technical skills acquired over the course of the project will require frequent exposure to the projection tool. The knowledge and techniques acquired can be rapidly reduced if not accompanied by constant and frequent use of the tool. While the learning gains in these areas have been impressive, knowledge can be weakened quickly if the relevant skills are not practiced regularly, even when there is a user manual. It is therefore very important to integrate these tools into the country's regular debt management and analysis processes.

B. DDT Customization

42. In response to Mauritania's status as a resource-rich country (RRC), the mission team customized a version of the debt dynamics tool (DDT) to account for its economic characteristics. This adjustment considers the non-extractive primary balance as a policy instrument. In the DDT, the standard primary balance is now divided into the primary balance excluding extractive revenue and extractive revenue. Extractive revenues tend to be volatile and usually depend on international prices and are not under the control of the state. This tool allows policymakers to simulate various fiscal adjustment scenarios, assess the long-term impact of different choices, and gain a better understanding of how non-extractive revenue sources can support sustainable debt levels. This adjustment is highly relevant for resource rich countries, thus broadening the range of tools for analyzing debt dynamics. In addition, the mission took advantage of the flexibility of the ND_DDT tool to calibrate the impact of commodity price shocks on Mauritania's public debt.

C. Integration of tools into CNDP policies

43. The authorities have initiated efforts to ensure continuity in the use of the DDT and the ND_DDT. At the end of the second mission, the CNDP technical team, with the support of the IMF team

and the encouragement of Mr. Niang Idrissa, Director of External Debt at the Ministry of Finance, produced an independent debt report using the knowledge gained on the DDT and the ND_DDT. The technical team presented this detailed report to the General Directors who chair the CNDP. At the end of the third mission, the CNDP and the IMF team developed user manuals to document important procedures for public debt projections and analyses.

Challenges

44. A key challenge is to better integrate these tools into the CNDP policymaking framework. The CNDP leadership and its technical committee all expressed a desire to integrate the analyses generated with the help of the tool into their policymaking processes. With the CNDP's commitment to make regular use of the tool's analyses, the technical committee can regularly update the data and perform analyses using the DDT tool.

D. Results from the perspective of the project objectives framework

45. The project was successful in terms of the objective's framework. As shown in the framework (Annex 1), almost all the project's interim milestones were considered fully achieved by the IMF team (with a score of 4 on a scale of 1 to 4). Relevant milestones include the development, discussion, and adoption of an action plan early in the project, as well as full completion of the tool and sufficient use of the tool both for public debt forecasting and for scenario design and sensitivity analysis.

46. The main objective of this project, i.e., to improve public debt forecasting and analysis capacities to support economic policy decisions, has been fully achieved. As for the development of the team's capacity, the objective has been achieved. In addition, the CNDP technical team has become familiar with the use of DDT and the ND_DDT. However, the integration of these tools into CNDP policies can only be successful if these tools are successfully used in debt projections by the CNDP.

E. Authorities' Views

47. The technical assistance provided by the ICD team for this project significantly strengthened the CNDP technical committee's capacities in analyzing public debt projections. The technical knowledge gained through the use of the three modules covered by this training enables the team (members of the CNDP technical committee, expanded to include two academics) to independently produce a comprehensive report on public debt that provides detailed information on the various determinants of debt changes over time and includes projections consistent with the data. The DDT tool calculates public debt ratios (actual and projections) and makes it possible, among other things, to construct debt trajectories according to the objectives set in terms of debt ratio, and performs analyses of the impact of shocks, particularly those related to the natural shock and commodities, on the various variables of debt dynamics.

48. However, the relevance and quality of the results obtained with the DDT depend very much on the availability and reliability of data. The use of this data during the DDT exercises helped to indicate several data issues, which led the ICD management team to take them into account as part of a capacity-building program with staff from the Ministry of Economy and Finance. We also noted that the

DDT tool does not cover all the aspects of debt dynamics analysis, specifically with respect to external debt, because for our country the current account of the balance of payments, which shows a structural deficit, is a factor in debt accumulation. The current DDT does not link the current account balance to the debt rate and targeted debt trajectories.

49. In addition, we would like to point out that the roadmap that was explained by the ICD technical assistance mission was to first train us in the DDT debt projection tool and then to lead us to other, more integrated exercises in debt sustainability analysis, using the macroeconomic frameworks tool. For this reason, it is essential for the macroeconomic and fiscal frameworks tool to be combined with the DDT tool to make a complete assessment of public debt sustainability. By combining these two tools, we can obtain a more in-depth and accurate analysis, allowing for better analysis of debt-related risks and ensuring sustainable financial management.

50. Even so, the DDT tool is extremely useful for us to identify and understand the determinants that influence the evolution of our debt, such as growth, interest rate, primary balance. It provides us with a solid basis for evaluating the underlying factors that affect the debt trajectory. This requires complementary approaches. We would like to take ownership of the debt sustainability analysis (DSA) tool to form a national team capable of performing in-depth analyses of public debt sustainability. This approach aims to strengthen our ability to assess and anticipate the financial issues involved in debt management with the aim of ensuring more sustainable and informed economic policy. This ownership will enable us to strengthen in-house skills to better manage public debt through a systematic, structured analysis.

F. Country team views

51. The Mauritania country team welcomes the progress made by the CNDP in improving its debt sustainability analysis through the introduction of the debt dynamics tool. In addition to ensuring that the CNDP has all the necessary tools to formulate public debt policy, these tools will also support the country team in discussions with the authorities. Implementing the report's recommendations will be essential to ensure the continuity and sustainability of the use of these tools.

SECTION IV. RECOMMENDATIONS

A. Recommendations to strengthen the integration of tools into CNDP policies

Recommendation 1

- **Move towards regular and more comprehensive integration of DDT debt analyses into the CNDP policymaking process.** To efficiently integrate the Public Debt Dynamics Tool (DDT) and the Public Debt Dynamics Tool related to ND_DDT Natural Disasters in the formulation of the CNDP policy, we recommend the establishment of a formal system. This system should specify: 1) Regular use of the DDT (a pre-defined schedule for conducting regular DSAs so that the information from the tool consistently feeds into key fiscal and debt policy decisions (Annex II provides an indicative timetable)). (2) Standardized data inputs (clear definition of needs and data sources for running projections, ensuring consistent application of the tool in different policy discussions). (3) Institutional responsibilities (Assign specific roles within the CNDP and its technical committee to oversee the use of the tool, maintain updates and ensure smooth integration of results in debt management strategy discussions). (4) Integration of decision-making (Establishment of a workflow in which DDT and ND_DDT outputs are formally discussed and incorporated into CNDP recommendations to the Minister of Finance and other key stakeholders). (5) Documentation and reporting (Require periodic reports that document the findings of the tool and their impact on policy decisions, improve transparency and institutional memory).

Recommendation 2

- **Formalize the division of tasks and provision of data among stakeholders participating in public debt projection and the public debt report.** To facilitate the timely production of a high-quality public debt report, we recommend that those departments involved in this process establish a clear assignment of duties and ensure that the data is provided in a timely manner. The process should include the data collection cycle, the timing of discussions and agreements on assumptions. It will also detail the contribution of each organization regarding data and analysis, as well as the timelines for such inputs. To enhance the exchange of essential information within the CNDP and to guarantee the availability of timely data, we recommend the development of a set of Excel files that specify the quantitative and/or qualitative information requested from each organization, as well as the corresponding deadlines congruent with the overall fiscal planning process. These files should be submitted to CNDP management to agree on a timetable for transmission and deadlines throughout the year, which could be coordinated by the technical committee.

Recommendation 3

- **Train new technical team members on the tool regularly.** Retention of the technical capacity and continuity in the team is critical to preserve the capacity built with the DDT and ND_DDT tools. To this end, the mission team prepared user manuals (Annex III, IV and V). These

documents explain the procedures for consistent use of these tools and allow future members of the CNDP technical committee to familiarize themselves with the tool. We recommend that experienced staff provide regular training to new members to ensure continuity.

ANNEX I. GUIDE TO PUBLIC DEBT REPORT

The guide provides standardized instructions for producing a consistent, accurate, and comprehensive public debt report. It describes the key elements of the report, the sources of data, and the desirable analytical approach.

The Public Debt Report is an essential document that serves as a basis for policymakers, economic analysts, international financial institutions and other stakeholders to make informed decisions. It presents a structured debt assessment that provides a detailed examination of historical debt trends, debt projections and risks that could undermine fiscal stability.

Given the changing economic environment, the public debt report should incorporate the latest macroeconomic and fiscal data, which constitutes a robust framework for assessing debt sustainability. The report should analyze the interaction between debt accumulation, economic growth, interest rate developments, and external shocks, ensuring that policy recommendations are grounded in robust empirical evidence.

A well-prepared public debt report enhances transparency, promotes fiscal responsibility, and may strengthen investors' confidence. It should stress key drivers that affect debt dynamics, assess debt vulnerabilities, and provide clarity on the implications of various fiscal scenarios. It should also align with international best practices for reporting public debt, following guidelines such as those of the International Monetary Fund (IMF) or the World Bank.

The guide provides a step-by-step approach to structure the report, detailing methodologies for data collection, scenario analysis, and policy evaluation. By adhering to established standards, institutions involved in debt reporting can ensure a high degree of accuracy, reliability, and comparability over time.

The public debt report aims to assist with sustainable debt management strategies, ensuring that fiscal policies remain prudent and consistent with national development objectives. The document serves as a model for a report that not only informs government authorities but also facilitates a constructive dialogue with development partners and financial markets.

Structure of the report

The format of each public debt report should follow a standardized format to ensure that the report is clear, consistent, and comprehensive. The detailed structure of the report, including the key points that each section should cover, is described below:

- I. Cover page: This section provides essential details about the report and its official status. It must include:
 - a. Report Title: Clearly state the topic and scope.
 - b. Reporting period: The period covered by the report.
 - c. Issuing authority: institutions responsible (Ministry of Economy and Finance, Central Bank, etc.).
 - d. Release date: The official release date.

- II. Executive Summary: A concise summary of the report, providing a quick overview of its findings and key messages. This section should include:
 - a. Main findings and recommendations: A summary of the report's findings.
 - b. Key figures on debt levels and projections: highlight key statistics related to public debt trends.
 - c. Summary of risk analysis and possible implications for fiscal policies: it offers insight into potential vulnerabilities and analyzes several policy responses.
- III. Introduction: This section provides context for the report and describes its objectives. This should include:
 - a. Overview of the current public debt situation: A brief explanation of the country's current debt position.
 - b. Historical trends in debt, a chronology of debt trends, major milestones, and policy changes.
 - c. Background and objectives of the report: Clarify the purpose of the analysis and the main issues addressed by the report.
- IV. Debt projection and dynamics: This section provides detailed analysis of debt trends and expectations using macroeconomic and fiscal analyses. This should include:
 - a. Assumptions: this sub-section analyzes the variables that will define debt projections. This should include:
 - i. Assumptions on GDP growth, inflation rate, interest rates and exchange rates on which debt sustainability analyses are based.
 - ii. Fiscal projections, including the primary balance and other debt creating flows: an assessment of revenues and expenditures projected by the government.
 - iii. Data sources: Information provided by institutions such as the Directorate of Economic Forecasting and Analysis (DPAE) and the Central Bank of Mauritania (BCM).
 - b. Debt-to-GDP Ratio Projections: This sub-section presents the evolution of debt. This should include:
 - i. Baseline scenario and projected evolution: the debt path under current policies.
 - ii. The impact of fiscal variables on debt sustainability: How do announced expenditure and revenue paths affect debt?
 - iii. Changes in the Share of External Debt: Debt Composition and Changes in Borrowing Strategies
 - c. Main Drivers of Debt Developments
 - The main drivers of changes in debt levels are discussed in this subsection. This should include:
 - i. Contribution of primary balance to changes in debt: the effect of fiscal surpluses or deficits.
 - ii. Effects of exchange rate and interest rate fluctuations: how currency depreciation and borrowing costs affect debt dynamics.
 - iii. The impact of stock-flow adjustments: role of other financial adjustments in debt accumulation.
- V. Stress testing and risk scenarios: This section examines potential risks to debt sustainability through scenario analysis. This should include:
 - a. Macroeconomic shock scenarios: This sub-section analyses the impact of various macroeconomic shocks on debt projections. This should include:
 - i. Sensitivity analysis of debt projections: tests the extent to which small variations in assumptions affect debt sustainability.

- ii. Impact of economic slowdowns, interest rate increases, and currency devaluation: gauge risks associated with adverse macroeconomic conditions.
- b. Analysis of external shocks: This subsection aims to assess the extent to which external risks affect debt sustainability. This should include:
 - i. Commodity price fluctuations and their impact on debt levels: assessing the effects of changes in export earnings.
 - ii. Exposure to natural disasters and climate risks: analyze the extent to which environmental factors contribute to fiscal vulnerabilities.
 - iii. Data sources: Insights from the Centralized Accounting and Cash Management Directorate (DCCGT) and the Central Bank of Mauritania (BCM).
- c. Conclusion and Policy Implications: This section summarizes the findings and describes the actions taken. This could include a recap of key takeaways from the report.

Writing and Data Guidelines

To maintain consistency and accuracy, use the following standards for compilation and presentation of data:

- I. Formatting & Styling
 - a. Use clear and precise language to convey the findings.
 - b. Maintain consistent structure across all reports.
 - c. Include charts, figures and tables to illustrate key figures.
 - d. Use footnotes and citations for data sources.
- II. Data sources: All data used for the DDT should be sourced from the Medium-Term Macroeconomic Framework. However, due to the lack of a standardized macroeconomic framework, data sources and responsibilities have been assigned based on respective institutions currently responsible for producing the projections independently.

Indicator		Institution in charge	
		Historical data	Medium-term assumptions
Debt stock indicators	Total Public Debt Stock	DDE	
	Stock of public debt denominated in local currency	DDE	DDE
	Stock of public debt denominated in foreign currency	DDE	DDE
	Stock of collateralized debt denominated in local currency	DDE	DDE

	Stock of collateralized debt denominated in foreign currency	DDE	DDE
Debt service indicators	Interest payments on domestic currency public debt	DDE	DDE
	Interest payments on public debt denominated in foreign currency	DDE	DDE
Fiscal Indicators	Non-extractive revenue, excl. grants	DCCGT	MTFF
	Extractive revenue	DCCGT	MTFF
	Grants	DCCGT	MTFF
	Primary expenditure (excl. interest)	DCCGT	MTFF
Real sector indicators	Real GDP	ANSADE	MTFF
	Nominal GDP	ANSADE	MTFF
	GDP deflator	ANSADE	MTFF
External Sector Indicators	U.S. GDP deflator	IMF, World Economic Outlook	IMF, World Economic Outlook
	Average exchange rate	BCM	BCM
	Exchange rate at end of period	BCM	BCM

III. Review and Validation

- a. Internal review by participating institutions.
- b. Final validation by the National Public Debt Committee (CNDP).
- c. Approval and publication.

Review and Approval Process

To ensure data accuracy and consistency:

- **The DDE** coordinates the preparation and consolidation of the report.
- **The CNDP** validates macroeconomic assumptions and main findings.
- **The MEF** approves and finalizes the document.

Each institution needs to adhere to agreed deadlines to facilitate timely publication.

Dissemination of report

Once finalized, the report should be:

- Submitted to the Minister of Economy and Finance.
- Distributed to relevant stakeholders, including financial institutions and policy advisors.
- Published on the official website of the Ministry of Economy and Finance

ANNEX II. INDICATIVE SCHEDULE FOR PUBLIC DEBT PROJECTION

The objective of this calendar is to establish a structured schedule of public debt projections, ensuring consistent data collection, validation, and analysis for effective macroeconomic planning. The proposed timeline is indicative and should be discussed internally among all relevant stakeholders, to ensure its alignment with the budget cycle and avoid putting undue pressure on existing human resources.

Phase	Tasks	Responsible institutions	Indicative duration
Assembling data	Assemble macroeconomic and fiscal data and assumptions.	DDE, DPAE, DOB, DCCGT, BCM	1 week
Data Validation	Review and validate historical data and assumptions.	CNDP	5 days
Analysis of debt projections	Prepare projections and baseline analysis.	DDE	2 weeks
Risk assessment	Simulate economic and fiscal shocks.	DDE	1 week
Draft report	Compile findings and recommendations	DDE	1 week
Validation and approval	Review and finalize the report.	CNDP	1 week
Publication	Official publication of the report.	MEF, CNDP	

ANNEX III. USER MANUAL: PUBLIC DEBT DYNAMICS TOOL FOR RESOURCE RICH COUNTRIES

The guide explains how to project public debt and compute the fiscal adjustment paths needed to achieve a public debt target, using the non-extractive primary balance or the overall balance, while estimating the associated interest costs. It also provides a practical guide on implementing the Excel-based Public Debt Dynamics Tool. The DDT computes user-defined fiscal adjustment paths toward a debt target within an adjustment period, performs predefined and standardized stress tests, produces fan charts, and identifies key drivers of public debt dynamics.

Inputs in DDT

The first step in using the DDT is to populate country-specific macro-fiscal data. Information and relevant data should only be entered into **the yellow shaded** cells, which are in the tabs with **yellow tabs**. Light **yellow shaded** cells are used to indicate that users can select data from a dropdown menu. The **white** cells contain formulas that users should not override. Five different "blocks" of inputs are described below.

A. Basic Inputs

Users should review the drop-down menus in the **Readme** tab under the heading "Basic Inputs" (Source Data Input) to select:

1. The country of interest,
2. In the first year of projections,
3. The "Year for medium-term indicators", i.e., the year for which debt under the historical and constant primary balance scenarios, on the one hand, and the debt-stabilizing primary balance in the medium term, on the other hand, are presented in the **Output – RefScenario**,
4. coverage of the public sector;
5. Whether uncalled guarantees (and similar contingent liabilities) are included in the definition of public debt. If guarantees are included in total debt, then a menu option appears to specify the type of guarantee, as in the image below. In this case, users need to indicate which type of guarantees are included in overall debt, and the information will be automatically captured in footnote "1/" of the main results table on the **Output - RefScenario tab**.

Select country	Mauritania
First year of projection	2024
Year for medium-term indicators	2026
Definition of the public sector	Government
Are government guarantees included?	Yes
Specify or define guarantees	Outstanding amount of loans guaranteed by the central government

Additional information to enter in the **readme** tab is the preferences for fiscal adjustment paths and stress tests. Before entering these selections, it is recommended that users populate the macro-fiscal data in the **Data Inputs** tab. This data on the Data Inputs tab is used as a reference to define the key drivers of debt in fiscal adjustments inputs.

B. Input - Data

The **Data Inputs** tab provides the DDT 10 years of data and assumptions for macro-fiscal variables to generate the debt to GDP ratio projection. While the baseline projection only requires data for the last year before the projection period, it is desirable to fill 10 years of historical data to use the full functionality of the DDT (e.g., generating a reasonable historical scenario). The projection period is pre-specified to be 12 years, but this period can easily be adjusted. However, this adjustment must be done manually by extending the projection horizon in all relevant tabs. Once these data are entered, the DDT does all the necessary calculations by transferring the inputs to several interconnected tabs.

The required DDT inputs are those needed to project public debt using (8), plus uncalled guarantees if these are included in the debt stock, plus foreign inflation to build fan charts using (10). Therefore, the required annual data include:

- i. *Debt-related data:*
 - a. Stock of total gross public debt, up to the year before the projection period starts (row 9, historical data only),
 - b. Uncalled guarantees as percentage of GDP in local and foreign currency (only if these are included in the definition of reported debt, rows 10-11),
 - c. Share of public debt in foreign currency as percent of total debt (excluding uncalled guarantees, row 12). The template automatically computes the share of debt denominated in domestic currency (excluding uncalled guarantees) as percent of total debt.
- ii. *Macro-fiscal indicators:*
 - a. average and end-of-period nominal exchange rates (domestic per unit of foreign currency, rows 13-14),
 - b. effective nominal interest rates on domestic and foreign-currency debt (rows 15-16),
 - c. GDP deflator inflation (row 17),
 - d. Real GDP growth (row 18),
 - e. Non-extractive primary balance (row 19),
 - f. extractive revenue (line 20),
 - g. Other net debt-creating flows (row 21) and
 - h. Foreign GDP deflator inflation (e.g., that of the US) to be used only for fan charts (row 22).

C. Input into adjustment paths

It is best to choose the settings in this section after the **Input Data** tab has been populated. Under the "Adjustment paths data inputs" header of the **Readme** tab, users need to specify the "Public debt-to-GDP target" and the years in which "Adjustment paths" start and end. For instance, in the figure below, the

DDT would compute adjustment paths to achieve a debt ratio of 60 percent of GDP in 2030, with fiscal adjustments starting in 2022.

Adjustment Paths - Input

Debt target and adjustment period

To be completed following completion of the "Data input" sheet

Public debt target relative to GDP (e.g., for 60 percent of GDP,	45.0
Start of adjustment path	2025
End of adjustment path	2029

For fiscal adjustment scenarios, the DDT allows users to choose values of macro-fiscal variables for the debt dynamics equation that are different from those in **Input Data**. For example, users may assume that the fiscal adjustment needed to achieve the debt target may reduce GDP growth below the baseline because of a negative fiscal multiplier. Users can input their preferred parameters into the DDT using either constant or "time-varying values" for the key variables presented in the figure below.

Valeurs des variables clés pour les trajectoires d'ajustement (pour les valeurs variant dans le temps, veuillez revoir les cellules F29:S38)		
	Valeurs constantes réglées manuellement	Valeurs constantes du menu déroulant
α = Part de la dette en devises étrangères	Valeurs variables dans le temps	
ϵ = Taux de dépréciation	Valeurs variables dans le temps	
i^d = Taux d'intérêt effectif en monnaie locale	Valeurs variables dans le temps	
i^f = Taux d'intérêt effectif en devise étrangère	Valeurs variables dans le temps	
π = Taux d'inflation	Valeurs variables dans le temps	
g = Taux de croissance du PIB réel	Valeurs variables dans le temps	
pbe = Recettes extractives	Moyenne des projections sur 10 ans	3.52
af = Autres flux nets créateurs de dette	Moyenne des projections sur 10 ans	0.00

Choosing constant values for fiscal adjustment paths implies that the variables have the same value throughout the adjustment period. The predefined set of constant values includes selections that reflect either historical data or projection assumptions (10-year or 5-year historical averages, or 5-year or 10-year projection averages, or latest year before projections start), or "Setting constant values manually" in **the yellow** shaded cells of column C rows 31-38. As illustrated in the figure above, if one of the historical or projected values is chosen, column D (rows 31-38) automatically reproduces the appropriate value for each variable. In the figure, the 10-year projection average is selected for real GDP growth and other net debt-creating flows. The corresponding values are shown in column D, rows 37-38 (this information may help users find their preferred assumptions).

Under the "time-varying values" option, the DDT computes fiscal adjustment paths using the baseline assumptions in **Input Data** plus the "Additions to Baseline Assumptions for Fiscal Adjustment Paths" chosen by users. For example, if users believe the adjustment scenario would imply a GDP growth rate that is 1 percentage point lower than the baseline rate, he or she must enter "-1" for the corresponding years in line 38, columns H-V.

Basic assumptions from 'Inputs - Data' worksheet, complemented by 'Addition to Core Assumptions'	2023	2024	2025	2026	2027	2028
at: share of foreign-currency debt in total debt, percent of total debt (excluding guarantees)	86.32	83.52	85.00	85.00	85.00	85.00
et: average nominal exchange rate, local currency per unit of foreign currency	36.51	39.64	39.44	39.63	39.83	40.03
et: end-of-period nominal exchange rate, local currency per unit of foreign currency	39.28	39.84	40.04	40.24	40.44	40.64
itd: nominal effective interest rate on local currency debt, percent	3.63	3.63	3.63	3.63	3.63	3.63
itf: nominal effective interest rate on foreign currency debt, percent	2.31	2.31	2.31	2.31	2.31	2.31
nt: GDP deflator inflation, percent	3.37	4.00	-0.20	2.60	2.40	3.40
gt: real GDP growth, percent	6.51	4.62	4.19	3.71	5.83	6.49
oqt: Other Net Debt Creating Flows, in percent of GDP	-1.82	0.00	0.00	0.00	0.00	0.00
pbet: extractive revenues, percent of GDP	3.72	3.37	5.09	2.92	2.69	3.53

Additions to Baseline Assumptions on Fiscal Adjustment Paths (for time-varying values)	2023	2024	2025	2026	2027	2028
at: share of foreign-currency debt in total debt, percent of total debt (excluding guarantees)						
et: average nominal exchange rate, local currency per unit of foreign currency						
et: end-of-period nominal exchange rate, local currency per unit of foreign currency						
itd: nominal effective interest rate on local currency debt, percent						
itf: nominal effective interest rate on foreign currency debt, percent						
nt: GDP deflator inflation, percent						
gt: real GDP growth, percent						
oqt: Other Net Debt Creating Flows, in percent of GDP						
pbet: extractive revenues, percent of GDP						

As shown in the figure above, for users' convenience, the resulting values of key variables are shown above the "Additions" in the [Readme](#) tab. Choosing "Additions" equal to zero implies that fiscal adjustments are computed using baseline values.

D. Stress Testing Inputs

The final set of inputs under the [ReadMe](#) tab is for the stress test scenarios, which appear under the header "Stress Tests Data Inputs". It includes:

1. The size of the shock to each relevant variable: extractive revenues, non-extractive primary balance, GDP growth, interest rate, and exchange rate depreciation. The size of the shock is measured as a scalar factor that multiplies the historical standard deviation of each variable under consideration (column B rows 43-47). For example, in the figure below, -1 indicates that shocks to the primary balance and GDP growth are calibrated as a reduction in the values of these two variables by 1 historical standard deviation relative to the baseline.

Stress Tests - Input

Design of stress test scenarios: size of shocks

Shock to the non-extractive primary balance
 Extractive revenue shock
 GDP Growth Shock
 Interest Rate Shock
 Exchange rate depreciation shock

Shock size (number of historical standard deviations)

-1

-1

-1

1

1

Design of stress test scenarios: duration of shocks

Onset of the shock to the non-extractive primary balance
 End of the shock to the non-extractive primary balance
 Extractives revenue shock starts
 End of the Extractive Revenue Shock
 GDP growth shock starts
 End of GDP Growth Shock
 Interest Rate Shock Starts
 End of interest rate shock
 Start of exchange rate depreciation shock
 Unwinding the exchange rate depreciation shock

2025

2026

2025

2026

2025

2026

2025

2026

2025

2026

2. The years in which each shock starts and finishes.

In stress tests, only one macro-fiscal variable is shocked at a time. This allows for a clearer comparison of the sensitivity of debt projections to different types of shocks. For example, the primary balance shock scenario impacts only the primary balance keeping the other variables at the levels of the baseline scenario.

All selections and data entered in the **Readme** and **Input Data** tabs are automatically transferred to the corresponding tabs on the template. Tabs with **green** tabs present debt projections under baseline and alternative scenarios.

Fiscal paths to achieve a public debt target

Note that all calculations in green tabs are automatic; users do not need to provide any additional information. However, they can still inspect them for more detail (all necessary information is available in the yellow tabs, including the adjustment years, the debt target, and the value of key variables users remember in **Readme**). Key results from the calculations in green tabs are presented in the **Output RefScenario** tab.

A. Debt-Stabilizing Primary and Non-Extractive Overall Balances

The tabs **DebtStabilizingPrimaryBalance** and **DebtStabilizingOverallBalance** automatically compute the non-extractive primary balance and overall balance that would be required to stabilize debt at the level of the previous year, in either the first projection year or the "Year for medium-term indicators" defined in **Readme**. The results are reported in the **Output - RefScenario**. See Annex IV.A for the underlying equation.

B. Constant primary and overall balance excluding extractive revenues to reach a debt target

Tabs [CibleDetteConstante_sp](#) and [CibleDetteConstante_sg](#) automatically compute the non-extractive primary and overall balances that, if applied to every adjustment year, would achieve the debt target. The [Output-RefScenario](#) tab shows the resulting primary balance. See Annex IV.B for an equation.

C. Constant Annual Adjustment of the Primary Balance and the Overall Non-Extractive Revenue Balance to Achieve a Debt Target

The constant level of the non-extractive fiscal balance that allows to reach the debt target generally implies a significant adjustment (fiscal balance increase) in the first adjustment year, and no adjustment (a constant fiscal balance) after that. One can also consider a smoother adjustment path that achieves the same debt target. Tabs [CibleDetteAjustementConstant_sp](#) and [CibleDetteAjustementConstant_sg](#) show the constant annual non-extractive fiscal adjustment (change in non-extractive primary or overall balance) that would achieve the debt target. This adjustment is indicated in [Output - ScenarioRef](#).

D. Primary and overall non-extractive balances aimed at reaching a debt target through constant annual debt reductions.

Conversely, fiscal policy may aim for constant reductions in the annual debt ratio that would reach the debt target. Tabs [CibleDetteVarConstantDette_pb](#) and [CibleDetteVarConstantDette_sg](#) present the paths for the non-extractive primary and overall fiscal balance that would achieve this objective. Because this exercise implies a fiscal balance for each year of adjustment, the standardized results do not present summary statistics.

E. Customized Adjustment Scenario

To illustrate the possibility of different adjustment modalities, the DDT also allows users to combine a first annual adjustment period of constant NEPB (as in Subsection C) and second period of constant NEPB (as in Subsection B), such that the debt target is reached at the end of this second period. For this exercise, it is necessary to add other data in the Tailored Adjustment tab. The user can set the years in which the first adjustment period starts and ends in cells [B52](#) and [B53](#), the year in which the debt target is reached in cell [D53](#); and the constant non-extractive primary balance for the second period in cell [B55](#). The debt target and the value of the key variables are as defined in [Read Me](#). This customized adjustment scenario is defined for the non-extractive primary balance, but a similar exercise could be carried out for the overall non-extractive balance.

Realism, Stress Tests, and Fan Charts

A. Historical Scenario

The historical scenario assumes that the levels of macro-fiscal variables (nominal effective interest rates in local and foreign currencies, growth, inflation, nominal exchange rate depreciation, non-extractive and extractive primary balance, and other net debt-creating flows) remain at their historical averages throughout the projection period. To fully capture the historical contributions to debt-related changes, the average residual term res_t is added to other net debt-creating flows. Thus, this scenario tells us what

would happen if key variables behaved as in the past. The historical scenario is useful to examine the realism of macro fiscal assumptions: if debt levels in the historical scenario are much higher than in the baseline, this may indicate optimism about macro fiscal assumptions. Of course, it is often possible to justify baseline assumptions that are separate from historical averages. The assumptions of the historical scenario affect the debt dynamics from the second year of projection. The historical scenario is automatically created in the **HistoricalScenario** tab. The debt level in the historical scenario corresponding to the "Year for medium-term indicators" (defined in **Readme**) is reported in the Output - RefScenario tab (cell W23).

B. Constant non-extractive primary balance scenario

This scenario sets the non-extractive primary balance at the level of the first year of projection for the entire projection period, while the other variables remain the same as in the baseline. The scenario is automatically created in the **SPConstant Scenario** table and helps users assess public debt levels in case the government does not implement the assumed fiscal program under the baseline scenario. The debt level in the constant non-extractive primary balance scenario for the "Year for medium-term indicators" (defined in **Readme**) is reported in The **Output – ScenarioRef** tab (cell Y23).

C. Shock scenarios

Tab **Ch-spne**, **Ch-spe**, **Ch-g**, **Ch-int**, and **Ch-er** present shock scenarios for the non-extractive primary balance, extractive revenues, GDP growth, effective nominal interest rates in local and foreign currencies, and average and **end-of-period** nominal exchange rates, respectively. For each of these variables, between the years in which the shock starts and ends (defined in the **Read Me** table), the shocked variable is equal to its baseline value plus a multiple (also defined in the **Readme** tab) of its historical standard deviations. All other macro-fiscal variables take their baseline values.

D. Customized scenario

The DDT also allows users to create a fully customized scenario on the **Customized Scenario** tab, where any value can be input (in **the yellow-shaded** cells) among the key variables that determine the evolution of debt. Possible events modeled in this scenario include natural disasters, failures of public-private partnerships (PPPs), and bailouts of state-owned enterprises (SOEs) and subnational governments.

In addition, the DDT has two additional worksheets, **ScénarioSurMeasure_MP** and **ScénarioSurMeasure_CN**, for commodities and natural disasters. These two worksheets should be used to introduce ND_DDT impacts into the yellow cells (cells B49:G59).

E. Fan charts

To generate stochastic simulations, the fan charts included in the DDT are based on the 2013 model of the Debt Sustainability Analysis for Market Access Countries. These debt fan charts summarize the possible evolution of the debt-to-GDP ratio over the medium term by incorporating shocks into relevant macro-fiscal variables and ordering the resulting debt paths through confidence intervals. For simplicity,

shocks are drawn considering only contemporaneous correlations among variables (correlations and autocorrelations of variables are ignored). The fan charts rely on historical annual data for four important variables that determine debt dynamics. These data are used to generate the sample means and the variance-covariance matrix that define the joint normal distribution of shocks.

The four shocked variables for the construction of the fan charts are $\hat{r}_t^d, g_t$, the augmented primary balance $sp_t^{moy} = \mu_t(sp_t - af_t) - res_t$, where res_t is the residual in period t and the augmented real effective foreign interest rate $\hat{r}_t^{f, aug}$, with which $1 + \hat{r}_t^{f, aug} \equiv (1 + \hat{r}_t^f)(1 + z_t)$. The behavior of these variables can be summarized as $Y_t = \theta + \varepsilon_t$, or $Y_t = (\hat{r}_t^d, g_t, sp_t^{aug}, \hat{r}_t^{f, aug})$; where the vector θ includes the baseline mean value of the four variables, and $\varepsilon_t \sim N(0, \Omega)$ is a vector of normally distributed shocks, with Ω being the variance-covariance matrix that characterizes the joint statistical properties of the historical contemporaneous interrelationships among the variables. Using 1,000 shocks for the key variables, the DDT adds these shocks to the baseline assumptions to compute 1,000 debt paths. These 1,000 debt paths are used to construct the fan charts.

Fan charts are elaborated on the **Fan charts** tab. Nine years of historical data and projections for the four variables are automatically populated using baseline assumptions (cells AS7:BA10). Additional years of historical data can be included (cells C7:AR10). Stochastic simulations produce fan charts over a projection horizon of 12 years. Users need to activate an embedded Excel macro by clicking the blue button to generate the fan charts with the relevant data:

Restrictions on Favorable Shocks	
	is the maximum positive shock to the growth rate (in percent)
	is the maximum negative shock to the local currency interest rate (in percent)
0	is the maximum positive shock of the augmented primary balance
	is the maximum negative plus interest rate shock in foreign currency (in percent)

Users can also opt off shocks to any of the four variables (cells B42:45). The symmetric distribution of shocks implies a symmetric fan chart (where debt levels higher than in the baseline scenario are as likely as debt levels lower than in the baseline). However, users can also build an asymmetric fan chart by restricting the value of shocks (cells D42:45), as illustrated in this figure. For example, one may think that negative shocks to the primary balance are more likely than positive shocks, making an asymmetric fan chart warranted.

Standardized Outputs

Once users complete all necessary inputs in the yellow tabs, the DDT automatically generates the baseline and alternative scenarios, and output tables and charts. Following the user's choices, the standardized results show the name of the country, the coverage of public sector debt, the first year of projections, and whether uncalled guarantees are included. Key results are presented in the blue tabs **Output - Ref Scenario** and **Output - Shocks**.

The **Output - Ref Scenario** tab shows the evolution of public debt under the baseline scenario. The tab also provides a standard decomposition of contributions to debt changes in a table and a chart, reporting

the stock-flow adjustment as a stand-alone item due to intra-year exchange rate fluctuations. The following figure shows an example of the **Output-RefScenario** tab in the DDT. **Output - ScenarioRef** includes a "Realism and Fiscal Adjustments" blue box with the following indicators:

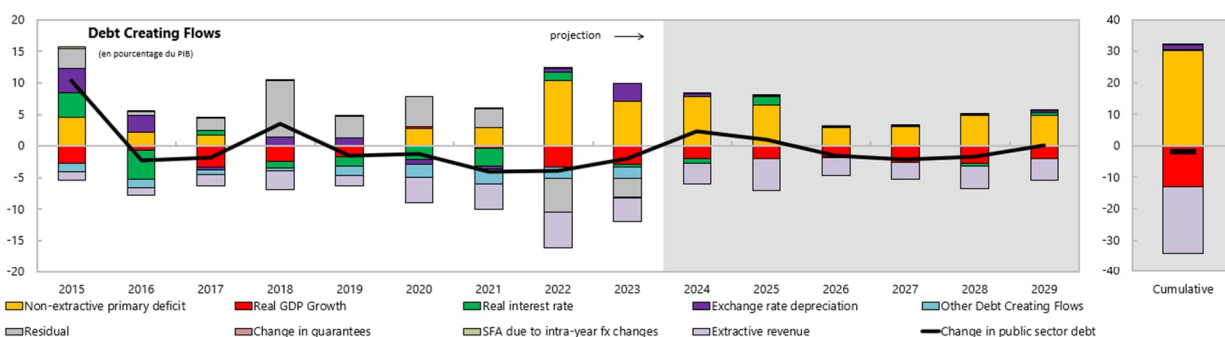
- (i) Medium-term debt levels ("Year for medium-term indicators" in **Readme**) under the historical and constant primary balance scenarios,
- (ii) Debt stabilizing non-extractive primary balance in the first year of projections and over the medium term ("Year for medium-term indicators" in **Readme**),
- (iii) The level and annual change in the NEPB needed to reach the debt target after the adjustment period (under parameters chosen by the user in **Readme**),
- (iv) The probability that the debt level will be below that of the last historical year, as well as the probability that the debt will reach the target defined by users in the final year of adjustment (as defined by the user in **Readme**).

Mauritania Public Sector Debt Dynamics - Baseline Scenario
(Percent of GDP unless otherwise indicated)

	Debt and Economic Indicators 1/									
	Current			Projections						
	2015-2021	2022	2023	2024	2025	2026	2027	2028	2029	
Nominal gross public debt	57.0	48.5	46.4	48.7	49.7	48.1	46.1	44.4	44.6	
Of which: guarantees (not called) ^{3/}	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	
Real GDP Growth (Percent)	3.0	6.8	6.5	4.6	4.2	3.7	5.8	6.5	4.6	
Inflation (GDP deflator, percent)	4.5	-0.6	3.4	4.0	-0.2	2.6	2.4	3.4	1.3	
Nominal GDP growth (in percent)	7.7	6.1	10.1	8.8	4.0	6.4	8.4	10.1	6.0	
Effective interest rate (in percent) ^{4/}	2.7	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	

	Contribution to Changes in Public Debt									
	Current			Projections						
	2015-2021	2022	2023	2024	2025	2026	2027	2028	2029	Accumulated
Change in gross public sector debt	0.4	-3.9	-2.1	2.3	1.0	-1.6	-2.1	-1.6	0.1	-1.9
Identified Debt-Creating Flows	-3.3	1.5	0.9	2.3	1.0	-1.6	-2.1	-1.6	0.1	-1.9
Non-extractive primary deficit	2.1	10.3	7.1	7.8	6.5	2.9	3.0	4.9	4.9	30.1
Extractive revenue	-2.4	-5.6	-3.7	-3.4	-5.1	-2.9	-2.7	-3.5	-3.5	-21.1
Automatic debt dynamics	-1.6	-1.4	-0.6	-2.2	-0.5	-1.6	-2.4	-3.0	-1.3	-11.0
Interest rate/growth differential	-2.6	-1.9	-3.4	-2.7	-0.7	-1.8	-2.6	-3.2	-1.5	-12.4
Of which: real interest rate	-1.0	1.5	-0.5	-0.7	1.3	-0.1	0.0	-0.5	0.5	0.5
Of which: real GDP growth	-1.6	-3.3	-2.9	-2.0	-2.0	-1.7	-2.6	-2.7	-1.9	-12.9
Exchange rate depreciation	1.0	0.5	2.8	0.5	0.2	0.2	0.2	0.2	0.2	1.4
Other Identified Debt Creating Flows	-1.4	-1.8	-1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stock-flow adjustment due to intra-year variations in the exchange rate ^{5/}	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Change in (uncalled) guarantees	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual ^{6/}	3.7	-5.4	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Realism and Fiscal Adjustments	
Debt Levels in 2026:	
Historical and Constant Primary Balance Scenarios	49.4
Debt-stabilizing primary balance	54.3
In 2024 and 2026	
-5.5	-4.5
Level and Annual Change in Primary Balance that give a 45% Debt-to-equity ratio in 2029 ^{7/}	
-1.0	1.1
Probability of debt being less than:	
End-2023 And 45 percent in 2029	69.8
	64.9



Source: Ministry of Finance

1/ The public sector is defined as: Government and includes government guarantees, defined as: Outstanding amount of loans guaranteed by the central government.

2/ Based on available data.

3/ Includes only uncalled guarantees (contingent liabilities) that could be included in the total stock of debt but do not generate interest payments and evolve exogenously.

4/ Defined as interest payments divided by debt stock (excluding guarantees) at the end of previous year.

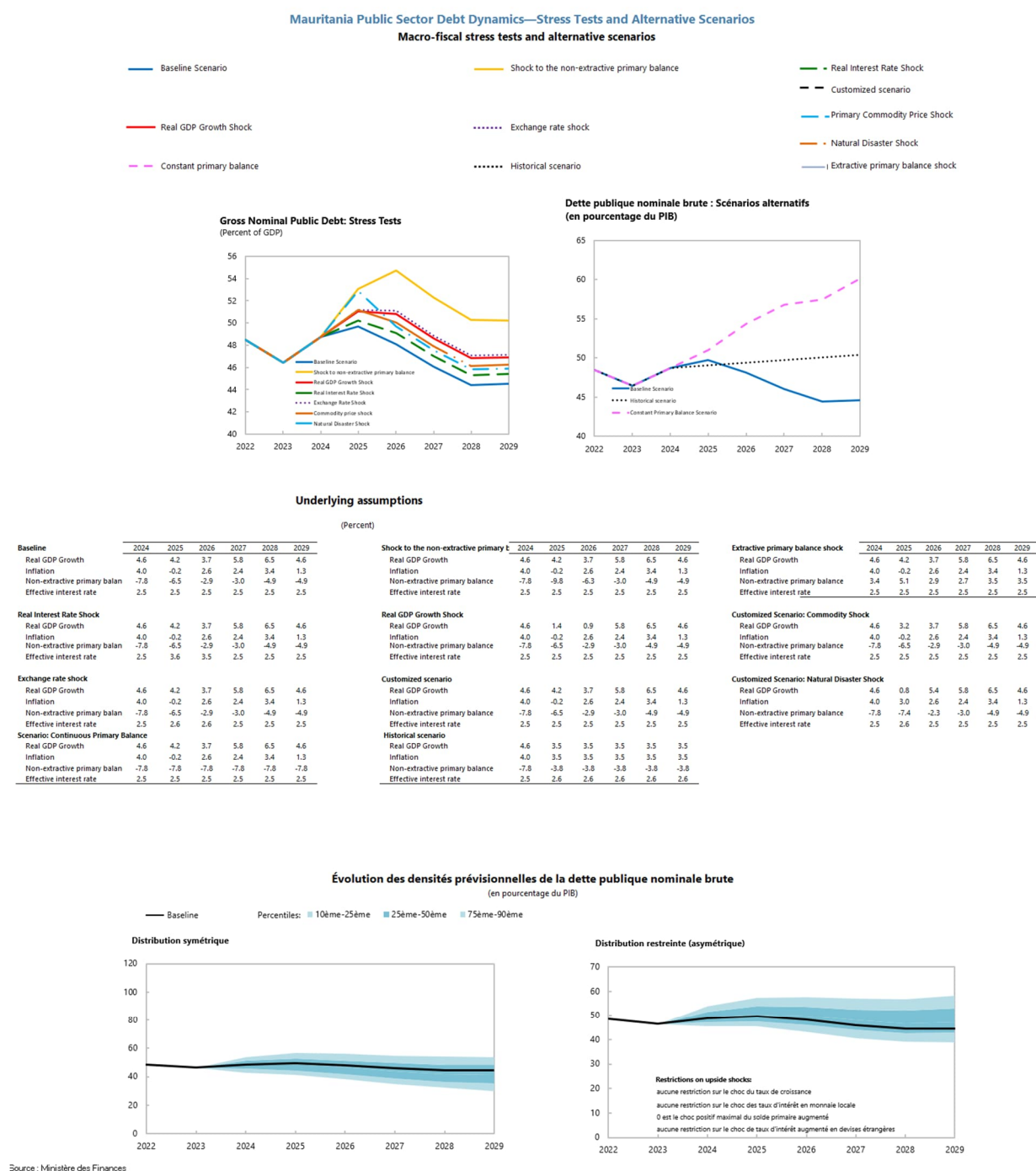
5/ Calculated as the effect of intra-year exchange rate fluctuations on total debt.

6/ For the historical set, this could include residual changes in gross debt due to accounting issues and changes in cross exchange rates.

7/ Measures the constant annual primary balance and the annual change in the primary balance (in percentage points of GDP) needed to achieve the pre-determined debt target.

Adjustment starts by 2025 and ends in 2029.

Output - Shocks presents the debt dynamics for the alternative scenarios, the assumptions underpinning these scenarios, and fan charts. The figure above shows an example of **Output - Shocks**.



ANNEX IV. USER MANUAL: NATURAL DISASTERS PUBLIC DEBT DYNAMICS TOOL

The Excel-based Disaster Debt Dynamics Tool (ND_DDT) computes shocks to macro-fiscal variables that can be used to construct natural disaster scenarios. The ND_DDT was developed by the IMF's Institute for Capacity Development (ICD) for training and technical assistance on macroeconomic frameworks for forecasting and policy analysis. In addition, the ND_DDT automatically imports from the public debt projection scenario from the Public Debt Dynamics Tool (DDT) and exports the natural disaster scenario constructed with the ND_DDT to DDT.

The ND_DDT follows the DDT color codes. Information and relevant data should only be entered into **the yellow cells**, which are only in the **yellow tabs**. Light yellow cells are used to indicate that users can input data from a drop-down menu. The white cells contain formulas that should not be replaced by the user. Worksheets with **green tabs** contain data and calculations.

Responding to Natural Disaster Shocks

A natural disaster shock can be calibrated as follows:

- Comparison of pre- and post- disaster values of each variable for a particular event
- Use econometrics to estimate shocks

In the "Options" worksheet, the user can choose different methods to estimate the shocks.

Individual event	☒
Local projections	☒
Quantile regressions	☒
Manual	☒

The subsections below will discuss these in detail.

Calibration of Natural Disaster Shocks Using an Individual Event

In this method, disaster shocks can be calibrated based on a past natural disaster. First, users need to select a natural disaster event using the event code provided in the Natural_Disasters worksheet. In this version of ND_DDT, this sheet contains natural disasters declared by the International Disaster Database EM-DAT causing material damage greater than 1% of GDP. Users can select a disaster that happened in their own country, or a disaster that occurred in another country, but that they believe might be a good baseline for the effects of a disaster in their country².

² No disasters are reported in Mauritania in Natural_Disasters sheet as EM-DAT does not record any disasters with damages greater than 1 percent of GDP in Mauritania.

When users select an event, they can enter the event number of that event aim in the "Select an event" cell on the Options tab. For example, in the figure below, we choose the drought that occurred in Senegal in 1977 (Event number 16). The ND_DDT contains disaster details, such as the name of the country (Senegal), type of disaster (drought), year (1977), and property damage (12.92% of GDP).

Shocks from individual event			
Select event	16	Country name	Senegal
Pre-disaster values	Average	Disaster Type	Drought
Number of years for average	1	Year	1977
Post-disaster values	Published	Damage (% GDP)	12.92

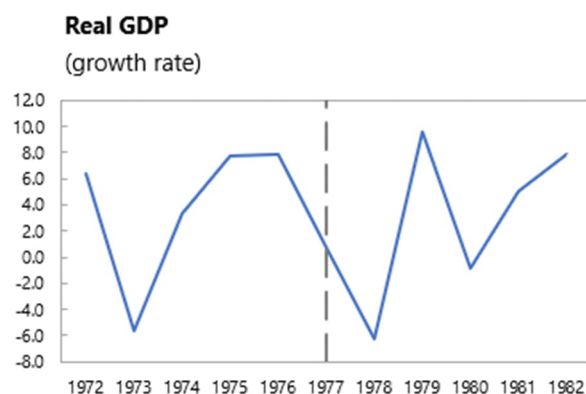
Shocks to macro-fiscal variables are calculated as the difference between pre-disaster and post-disaster values of each variable. This ND_DDT allows users to select different options for both the "Pre-disaster" and "Post-Disaster" values.

For pre-disaster values, users can select either the predicted values of the variables from the last vintage of the WEO before the disaster (**previous WEO vintage**) or the **average value** of the macrofiscal variable before the shock. If the user chooses average, they must select the number of years prior to the disaster that would be used to calculate the average. For example, in the figure above, shocks would be calculated using the **average value** of the variable over the **two** years preceding the disaster.

For post-disaster values, users can select either the predicted values of the variables in the first edition of the post-disaster WEO (**post-WEO edition**) or the values of the post-disaster variables that have been published in the WEO. Important note: Users must choose the preferred options each time to enable the macro that updates the data.

Once the data is updated in the Overview worksheet, users can examine the behavior of key variables around the selected natural disaster. The graph below shows that Senegal's real GDP growth declined in 1977 and then fell again in 1978.

Figure 1: GDP growth in Senegal before and after the 1977 drought



The **Shocks** tab presents the "**Pre- and Post-Disaster**" values of the variables, along with the **implicit "Calculated Shocks"**, which are the differences between post-disaster and pre-disaster values. These shocks are calculated for the disaster year, "t" (which is 1977), and for the subsequent five years. The table below shows the change in GDP (g_t), inflation (π_t), and exchange rate (Δe_t for the disaster year "t" (i.e., 1977), and five years later, compared to the average values for two years before the disaster (i.e., 1975 and 1976). Unfortunately, data for the other macroeconomic variables are not available.

Computed shocks	t	t+1	t+2	t+3	t+4	t+5
Public sector debt	Na	Na	Na	Na	Na	Na
Change in public sector debt	Na	Na	Na	Na	Na	Na
ot (share excl. guarantees)	Na	Na	Na	Na	Na	Na
Δe_t (percent, avg)	2.6	-8.4	-6.0	-0.9	28.3	20.7
Δe_t (percent, eop)	-11.2	-17.0	-9.7	6.5	21.4	11.1
itd	Na	Na	Na	Na	Na	Na
itf	Na	Na	Na	Na	Na	Na
π_t	-5.0	-12.9	-6.8	-7.5	-10.6	1.0
g_t	-7.1	-14.1	1.8	-8.6	-2.8	0.0
pbt	Na	Na	Na	Na	Na	Na
Residual	Na	Na	Na	Na	Na	Na
Exports growth (LIC-DSF)	Na	Na	Na	Na	Na	Na

The values of the calculated shocks reflect differences between macroeconomic outcomes before and after the disaster. For example, for the selected natural disaster (the drought that occurred in Senegal in 1977), GDP growth dropped by 7.1 percentage points in the year of the drought and by 14.1 percentage points the following year (relative to the average of 1975 and 1976). The nominal exchange rate appreciated and inflation declined. Users can decide whether these macroeconomic outcomes around this particular disaster are useful in calibrating the natural disaster shock. Alternatively, they can employ alternative methods to calibrate natural disaster shocks, as discussed below.

This approach cannot be directly applied to past natural disasters in Mauritania, since data for Mauritania are missing from the ND_DDT database. However, the approach can be replicated for a specific event in Mauritania to calculate the macro-fiscal impacts. For example, we can look at the impact of the 1969 drought which caused a significant decline in GDP growth. The 1969 drought was one of the largest droughts in the country. The difference between GDP growth in 1969 and GDP growth of the three-year average preceding the 1969 drought is -3.4%,³ which can be seen as the potential impact of drought on GDP growth. Section 1.3 below provides details on how to incorporate this manual calculation into the natural disaster scenario.

Creating a Shock Using Econometric Approaches

In addition to studying a specific disaster, users can calibrate the natural disaster shock using econometric approaches. ND_DDT uses local projections and quantile regressions.

To obtain empirical estimates of impacts, users need to enter a value for the country and disaster characteristics used for the econometric specification in the Options sheet.

- Pre-disaster primary fiscal balance: pre-disaster primary fiscal balance (percent of GDP)

³ Calculated from the World Bank's World Development Index.

- Income group: country income group (advanced economies, emerging market and middle economies, low-income and developing economies). Supplementary data are available in the Income Group worksheet
- Small island: if the country is a small island.
- Adaptive capacity: reflects the country's ability to adapt to climate change. Historical data are available in the [worksheet Adaptive capacity](#). Adaptive capacity data are from the Notre Dame Global Adaptation Initiative's ND GAIN Adaptive Capacity Index.
- Damage: physical damage caused by the eventual catastrophe (% of GDP). Data is obtained from EM-DAT.
- Disaster Type: The user can select Storm, Flood, Drought, or others.

Based on the country's characteristics and disasters entered by the users, the local projection and quantile regression methods produce their predictions of the macroeconomic variables needed to project public debt dynamics.

We would like to have empirical estimates of the storm that hits Mauritania in 2025. In this example, country characteristics are chosen as follows: the pre-disaster primary balance (year 2024) is -0.58% of GDP, this is a low-income developing country, it is not a small island, and it has an adaptive capacity of 0.758. The disaster is a drought that causes 11.5% of GDP damage.

Shocks from local projections			
Pre-ND fiscal primary balance (% GDP)	-0.58	ND adaptive ability	0.758
Income group (AE, EMMIEs, LIDC)	Low Income and Developing Country	Damage (% GDP)	11.5
Small Island	No	Disaster Type	Drought
Shocks from quantile regressions			
Pre-ND fiscal primary balance (% GDP)	-0.58	ND adaptive ability	0.758
Income group (AE, EMMIEs, LIDC)	Low Income and Developing Country	Damage (% GDP)	11.5
Small Island	No	Disaster Type	Drought

In the worksheet "[Shocks](#)", for the local projection method, for each variable, users can choose whether to calculate the shock using point [estimates](#), or the lower bound of confidence intervals of different width. For the quantile regression approach, for each variable, users can choose to calculate the shock with [median](#) or 5th [percentile](#) or [95th percentile](#).

In this example, we are using point estimates for the local projection approach. GDP growth (g_t) is expected to decline by 0.1 percentage point relative to the local projection approach and by 0.2 percentage point lower than the quantile regression approach.

Shocks from local projections						
Econometric approach	t	t+1	t+2	t+3	t+4	t+5
ot (share excl. guarantees)	13.7	13.4	9.6			
Δet (percent, avg)	1.8	2.3	0.9			
Δet (percent, eop)	5.2	-2.5	2.5			
itd	-2.6	0.3	4.0			
itf	0.1	0.3	-0.2			
π t	-2.5	-1.8	0.0			
gt	-0.1	1.3	1.1			
pbt	-0.9	0.6	1.2			
Exports growth (LIC-DSF)	7.8	4.5	5.8			

Shocks from quantile regressions						
Econometric approach	t	t+1	t+2	t+3	t+4	t+5
ot (share excl. guarantees)	11.7	13.0	9.4			
Δet (percent, avg)	2.4	2.6	1.4			
Δet (percent, eop)	6.2	-2.0	3.2			
itd	-2.6	0.4	4.0			
itf	0.2	0.3	-0.2			
π t	-2.5	-1.7	0.1			
gt	-0.2	1.3	1.1			
pbt	-0.9	0.6	1.2			
Exports growth (LIC-DSF)	7.9	5.0	5.5			

Using judgement and information from outside the ND_DDT, users can modify calibrations obtained from individual events and the econometric method. Alternatively, they may insert here the calculation of the macro-fiscal impact of specific natural disasters in Mauritania as mentioned in Section 1.1. For example, we found that the potential impact of the 1969 drought on Mauritania's GDP growth was a reduction of 3.4 percentage points in the year of the drought.

According to the econometric approach, the primary balance is projected to fall by 0.9 percent of GDP in the year of the drought. If the government of Mauritania is estimated to respond to the drought with a more expansionary fiscal policy, the primary balance can be calibrated to deteriorate by 1.4 percent of GDP in the year of the drought and improve by 0.4 percent of GDP one year later relative to the baseline.

Manual shocks						
Manual shocks	t	t+1	t+2	t+3	t+4	t+5
ot (share excl. guarantees)	0.0	0.0	0.0	0.0	0.0	0.0
Δet (percent, avg)	5.4	0.0	0.0	0.0	0.0	0.0
Δet (percent, eop)	5.4	0.0	0.0	0.0	0.0	0.0
itd	0.0	0.0	0.0	0.0	0.0	0.0
itf	0.0	0.0	0.0	0.0	0.0	0.0
π t	3.2	0.0	0.0	0.0	0.0	0.0
gt	-3.4	1.7	0.0	0.0	0.0	0.0
pbt	-1.4	0.0	0.0	0.0	0.0	0.0
oft (other net debt-creating flows)	0.0	0.0	0.0	0.0	0.0	0.0
Exports growth (LIC-DSF)	0.0	0.0	0.0	0.0	0.0	0.0

For **final shocks**, users can choose shocks using different approaches (i.e., individual, local projections, quantile regression, or manual) and deactivate shocks for certain variables. In this case, we use manual shocks that incorporate judgment of individual events and econometric approaches. The user can select the "manual" option for the relevant macroeconomic variables.

Final shocks								
Final shocks	t	t+1	t+2	t+3	t+4	t+5	Select options	
ot (share excl. guarantees)	0.0	0.0	0.0	0.0	0.0	0.0	Off	
Δet (percent, avg)	5.4	0.0	0.0	0.0	0.0	0.0	Manual	
Δet (percent, eop)	5.4	0.0	0.0	0.0	0.0	0.0	Manual	
itd	0.0	0.0	0.0	0.0	0.0	0.0	Off	
itf	0.0	0.0	0.0	0.0	0.0	0.0	Off	
π t	3.2	0.0	0.0	0.0	0.0	0.0	Manual	
gt	-3.4	1.7	0.0	0.0	0.0	0.0	Manual	
pbt	-1.4	0.0	0.0	0.0	0.0	0.0	Manual	
oft (other net debt-creating flows)	0.0	0.0	0.0	0.0	0.0	0.0	Off	
Exports growth (LIC-DSF)	0.0	0.0	0.0	0.0	0.0	0.0	Off	

Next, in the Options worksheet, users need to select the '**Number of years**' of the shocks and the '**First year of the shock**' for the customized scenario. "**Number of years**" indicates the number of years for which the shocks will be applied to variables in the DDT. For example, selecting "2", the "**number of years**" assumes that the impacts of the natural disaster apply only in years **t** and **t+1** in the final shocks table.

Scenario	
Number of years	2
First year of shocks	2025

Results of the Public Debt Dynamics Tool (DDT)

To create a customized scenario, select the "File Name" button in the DDT tool in the Options worksheet and press the "**Import Baseline**" and "**Export Scenario**" buttons.

Nom de fichier

DDT_Mauritanie_1

Import baseline

Export scenario

Tab **export DDT** shows the debt dynamics in the case of a natural disaster against the baseline scenario. The chart below is an example. The debt dynamics in case of a natural disaster occurring in 2025 are represented by the dashed line (natural disaster scenario). The baseline debt dynamics is depicted as a straight blue line (baseline scenario).

File name

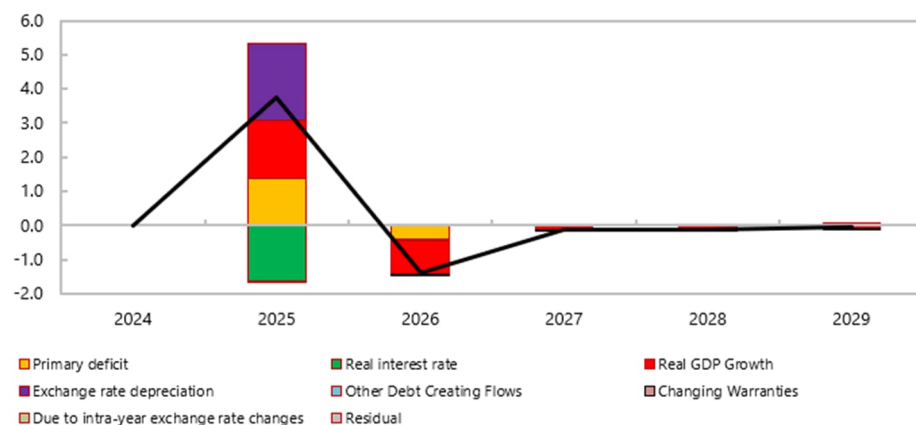
DDT_Mauritanie_1

Import baseline

Export scenario

Debt Creating Flows: Customized *minus* Baseline

(% of GDP)



Tab **export DDT** also shows the difference in factors contributing to the debt-creating flows between the customized scenario and the baseline scenario, like the chart below. In this example, in 2025, the figure shows that the primary deficit, the exchange rate depreciation, and the decline in real GDP growth contribute to the increase in the public debt-to-GDP ratio under the customized scenario—the one with a natural disaster—compared to the baseline. Higher inflation, on the other hand, lowers the real interest rate, and therefore the public debt-to-GDP ratio in the customized scenario. By 2026, the recovery in growth reduced the debt-to-GDP ratio.

The **Output-Shocks** tab in the DDT presents the stress test of the natural disaster shock (customized scenario), as well as other shocks.

ANNEX V. USER MANUAL: PUBLIC DEBT PROJECTIONS FOLLOWING A SHOCK TO MAURITANIA'S COMMODITY EXPORT PRICES

Commodity price shocks in Mauritania

For resource-rich countries like Mauritania, commodity price shocks can have a large impact on macroeconomic outcomes such as fiscal revenues, output growth, and public debt.

How to Forecast Mauritania's Public Debt Following a Commodity Price Shock

We start by collecting data on commodity shocks. We use the IMF's Commodity Terms of Trade Database (see <https://www.imf.org/en/Research/commodity-prices>). The following products are included:

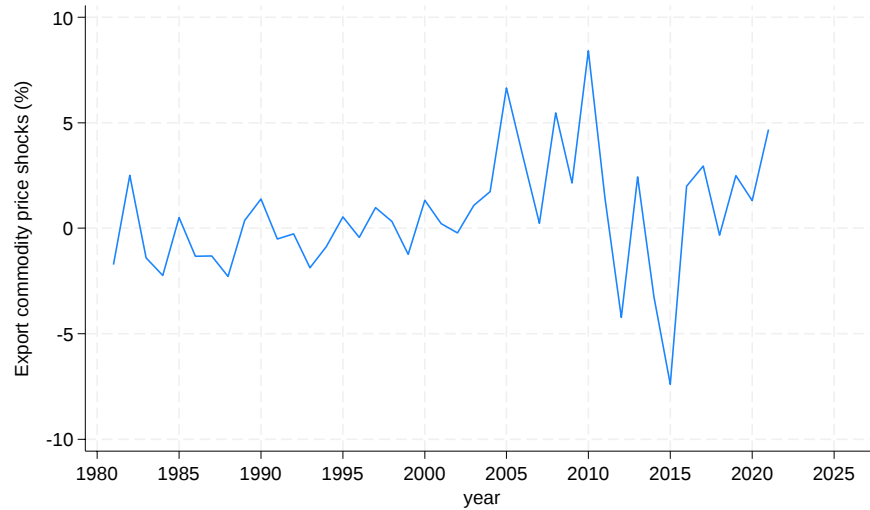
- **Energy:** coal, crude oil, and natural gas.
- **Metals:** aluminum, copper, gold, iron ore, lead, nickel, tin, uranium and zinc.
- **Food and beverages:** bananas, barley, beef, cocoa, coffee, maize, fish, fishmeal, groundnuts, lamb, olive oil, oranges, palm oil, poultry, rapeseed oil, rice, prawns, soybean meal, soybean oil, soybeans, sugar, sunflower oil, pork, tea and wheat.
- **Agricultural raw materials:** cotton, hard logs, wood, hides, natural rubber, soft logs, soft sawn timber and wool.

It includes Mauritania's main export products. These are iron ore, gold, fish and, in the near future, natural gas. This dataset computes country-specific shocks to commodity export prices. Shocks depend on changes in the prices of the commodities a country exports and the share of these commodities. 45 products are included. The index is constructed as follows:

$$\Delta \log(index)_{i,t} = \sum_{j=1}^{J=40} \Delta P_{j,t} \Omega_{i,j}$$

where $\Delta P_{j,t}$ is the logarithm of the real price of the export product j in year t and $\Omega_{i,j}$ represent the average product and country weights in GDP terms. The figure below shows past shocks to Mauritania's commodity export prices.

Figure 3: Mauritania's Past Commodity Export Price Shocks



The calibration of commodity price shocks in Mauritania first requires identifying the impact of past shocks on commodity prices using cross-country data. The empirical approach follows the local projection method.

$$\Delta y_{i,t+h} = \alpha + \beta_h ComShock_{i,t-1} + \sum_{\tau=0}^h ComShock_{i,t+\tau} + \Delta y_{i,t-1} + fe_i + fe_t + \epsilon_{i,t} \quad (1)$$

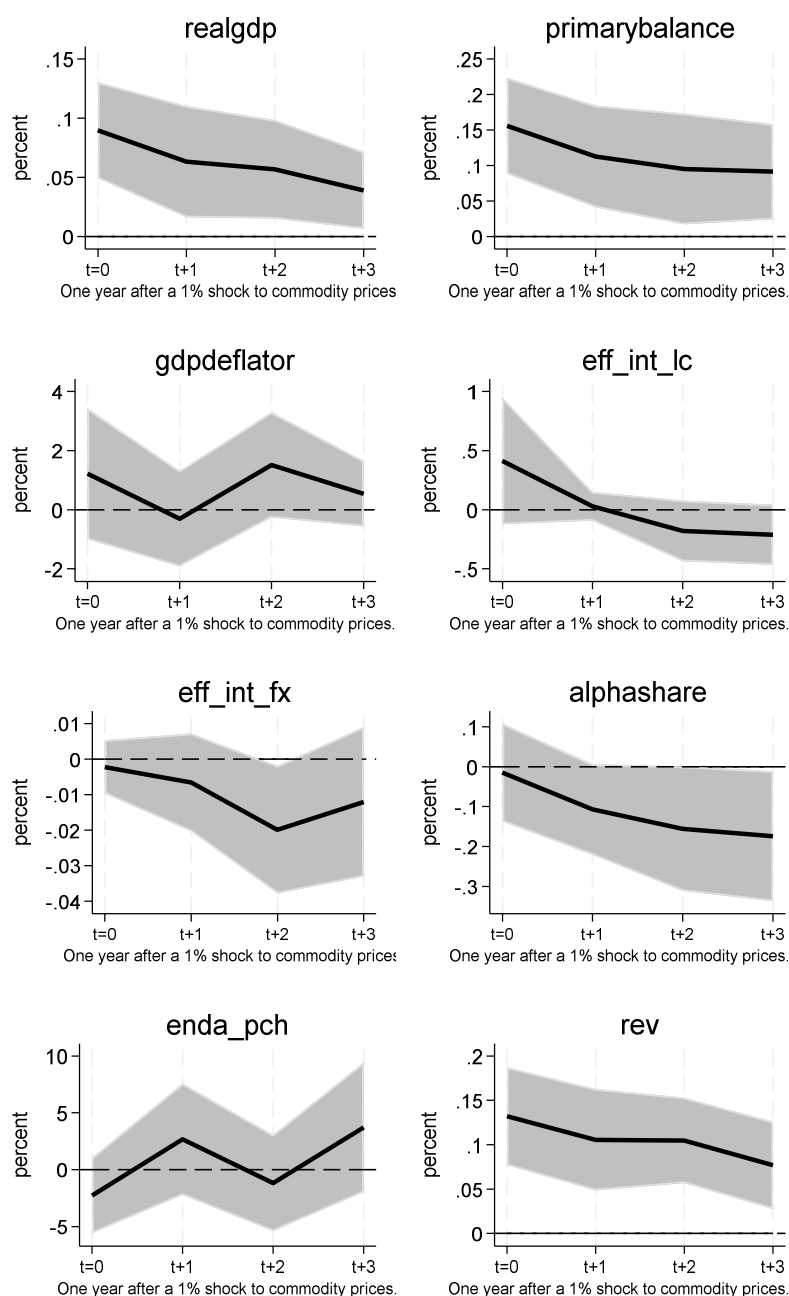
Where:

- $\Delta y_{i,t+h}$ is the outcome variable, which can be the output growth over one year;
- $ComShock_{i,t-1}$ is a one-year commodity price shock
- We control for commodity price shocks several years ahead: $\sum_{\tau=0}^h ComShock_{i,t+\tau}$
- fe_i are country fixed effects, to control for country characteristics (such as trend growth)
- fe_t are year fixed effects, to capture global shocks for that year;
- $\Delta y_{i,t-1}$: lagged dependent variables.

Figures 4 and 5 show the impacts of a temporary 1 percent shock to commodity export prices on the main macro variables. The average impact across countries is shown in Figure 4 using global data. The impacts on Mauritania are shown in Figure 5 using country-specific data only. Globally in all countries, a positive shock to commodity prices boosts GDP growth and improves the primary balance through improved revenue collection. Positive impacts are persistent and long-lasting for a few years (Figure 4). In Mauritania, after a positive commodity price shock, GDP growth accelerates, but it is more short-lived.

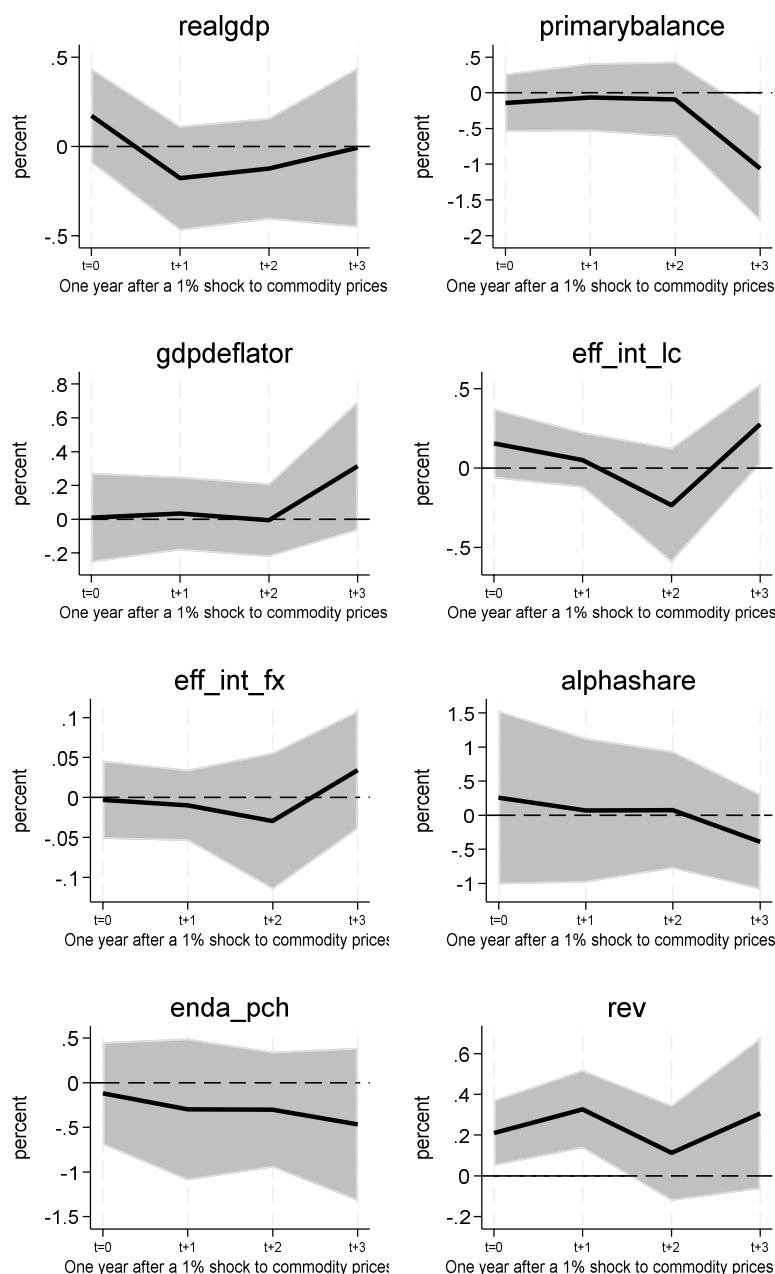
Interestingly, Mauritania's primary balance is not improving, despite the increase in government revenues (Figure 5).

Figure 4: Impacts of Past Shocks on Commodity Export Prices (all countries)



Notes: realgdp: real GDP growth ; primarybalance: primary balance as % of GDP; gdp deflator: GDP deflator; eff_int_lc: effective interest rate for local-currency debt; eff_int_fx: effective interest rate for foreign-currency debt; alphashare: share of foreign debt; enda_pch: end of period exchange rate changes; rev: fiscal revenue as % of GDP. Shaded areas indicate 90% confidence intervals

Figure 5: Impacts of previous shocks on commodity export prices (data from Mauritania)



Notes : realgdp : real GDP growth ; primarybalance : primary balance as % of GDP ; gdp deflator : GDP deflator ; eff_int_lc : effective interest rate for local-currency debt ; eff_int_fx : effective interest rate for foreign-currency debt ; alphashare : share of foreign debt ; enda_pch : end of period exchange rate changes ; rev : fiscal revenue as % of GDP. Shaded areas indicate 90% confidence intervals

Mauritania, Public Debt Projections in case of a Commodity Shock

Users can predict the impact of a commodity price shock for Mauritania based on empirical estimates. For example, one can calibrate the public debt projection after a 5 percent negative shock to commodity export prices (similar in magnitude to 2021).

Users can use the ND_DDT model for calibration. The ND_DDT is designed to calibrate natural disaster shocks. However, its design is flexible and allows for calibration of other types of shocks as well. The main entry is manual shocks in the "Shocks" tab.

Figure 5 shows that a 1 percent positive shock to commodity export prices boosts GDP growth by about 0.2 percentage points. Assuming a symmetric response, then after a 5 percent negative commodity price shock, GDP is calibrated to decrease by 1 percentage point (0.2×5). Figure 5 also shows that a 1 percent positive shock to commodity export prices increases revenue by 0.2 percent of GDP and thus the primary balance by about 0.2 percent of GDP. For a 5 percent negative commodity price shock, the primary balance is calibrated to decrease by 1 percent of GDP (0.2×5). In the second year, users can calibrate the reduction in the primary balance by half that amount (0.5 percent of GDP).

Manual shocks							
Manual shocks	t	t+1	t+2	t+3	t+4	t+5	
αt (share excl. guarantees)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Δet (percent, avg)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Δet (percent, eop)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
itd	0.0	0.0	0.0	0.0	0.0	0.0	0.0
itf	0.0	0.0	0.0	0.0	0.0	0.0	0.0
πt	0.0	0.0	0.0	0.0	0.0	0.0	0.0
gt	-1.0	0.0	0.0	0.0	0.0	0.0	0.0
pbt	-1.0	-0.5	0.0	0.0	0.0	0.0	0.0
oft (other net debt-creating flows)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exports growth (LIC-DSF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The final shock is imported as follows, after users select "Manual" for g_t and pb_t in the final shocks.

Final shocks							
Final shocks	t	t+1	t+2	t+3	t+4	t+5	Select options
αt (share excl. guarantees)	0.0	0.0	0.0	0.0	0.0	0.0	Off
Δet (percent, avg)	0.0	0.0	0.0	0.0	0.0	0.0	Off
Δet (percent, eop)	0.0	0.0	0.0	0.0	0.0	0.0	Off
itd	0.0	0.0	0.0	0.0	0.0	0.0	Off
itf	0.0	0.0	0.0	0.0	0.0	0.0	Off
πt	0.0	0.0	0.0	0.0	0.0	0.0	Off
gt	-1.0	0.0	0.0	0.0	0.0	0.0	Manual
pbt	-1.0	-0.5	0.0	0.0	0.0	0.0	Manual
oft (other net debt-creating flows)	0.0	0.0	0.0	0.0	0.0	0.0	Off
Exports growth (LIC-DSF)	0.0	0.0	0.0	0.0	0.0	0.0	Off

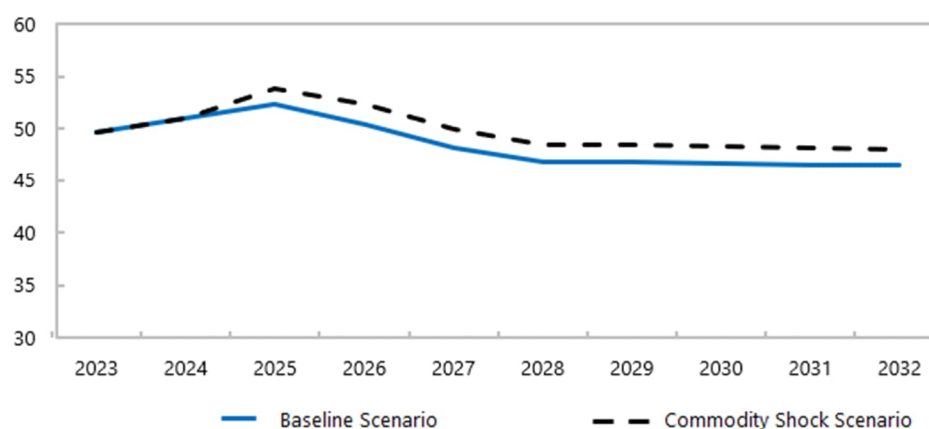
Output

Tab **export_DDT** shows the output: debt dynamics in the case of a 5 percent negative shock to commodity prices relative to the baseline. Debt dynamics with the negative commodity price shock occurring in 2025 are represented by the dashed line (commodity price shock scenario). The baseline debt dynamics with no policy changes is depicted as a straight blue line (baseline scenario). Public debt is projected to increase by 2 percent of GDP.

Figure 6

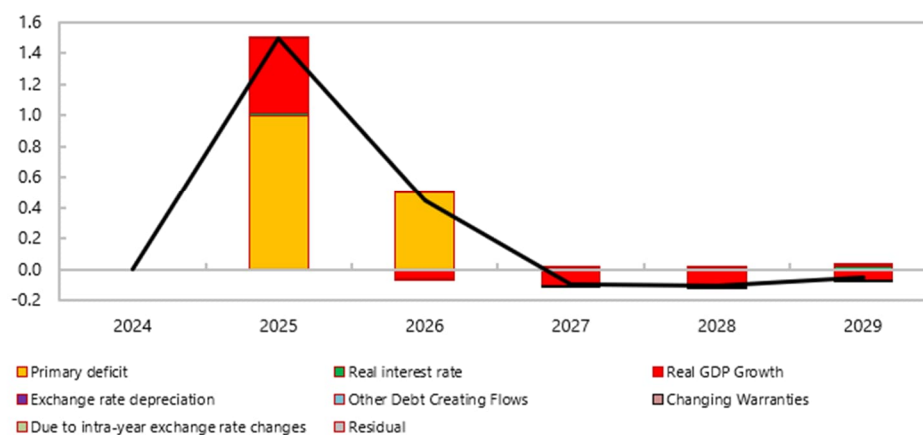
Gross Nominal Public Debt: Alternative Scenarios

(% of GDP)



Debt Creating Flows: Customized minus Baseline

(% of GDP)



Tab **export_DDT** also shows the difference in factors contributing to the debt-creating flows between the customized scenario and the baseline scenario, as shown in the chart below. For this shock, by 2025 the figure shows that the primary deficit and lower real GDP growth contribute to the higher public debt-to-GDP ratio under the customized scenario (the one with a commodity shock) relative to the baseline. The increase in 2025 amounts to 1.5 percent of GDP. In 2026, the persistent deterioration in the primary balance contributes to an additional 0.5 percent of GDP debt increase.

ANNEX VI. PROJECT FRAMEWORK

Objective:			
Develop capacity in macroeconomic forecasting and policy analysis to support policy decision-making and communication - MFR			
Outcome:			
Analytical models and forecasting tools are developed and operational			
Annual Assessment Rating: 4 fully achieved			
Annual Assessment Narrative: The core team leverages the customized Debt Dynamics Tool (DDT) specifically designed for Resource Rich Countries to generate accurate and comprehensive public debt projections. This specialized tool enables the team to account for the unique economic characteristics and challenges faced by Mauritania, ensuring tailored and relevant analyses. Furthermore, the integration of the ND-DDT enhances their capabilities by allowing them to simulate and analyze alternative scenarios. This includes assessing the potential impacts of climate-related shocks and fluctuations in commodity prices, providing critical insights into how such shocks could influence debt sustainability. By combining these tools, the core team is well equipped to offer robust, scenario-based forecasting and risk assessment for informed decision-making.			
Outcome Rating Date: 1/28/2025			
Outcome Indicator	Baseline Value	Target Value	Current Assessment Value
Macroeconomic Projection Tool (MPT) is developed in the form of a fiscal/debt sustainability tool, e.g. public Debt Dynamic Tool (DDT)	No	Yes	4 Fully Achieved as of 9/23/2024

Milestone Name	Target Completion Date	Milestone Actual Completion Date	Milestone Rating
The core team produces a draft Public Debt Report using the DDT.	8/30/2024	12/31/2024	4 Fully Achieved as of 1/28/2025
Outcome:			
Improved analytical skills, better macroeconomic forecasting and policy analysis capacity			
Annual Assessment Rating: 4 fully achieved			
Annual Assessment Narrative: The core team benefitted from virtual asynchronous training on DDTx and an in-person workshop on the DDT. Throughout the project, multiple refreshment sessions were conducted to reinforce learning and address any new challenges, ensuring a thorough understanding of the tools. In addition, a comprehensive user manual was developed to serve as an ongoing reference for the team. As a result, the core team has demonstrated significantly improved analytical skills and has started effectively using the DDT to produce public debt projections and gain a deeper understanding of debt dynamics.			
Outcome Rating Date: 1/28/2025			
Outcome Indicator	Baseline Value	Target Value	Current Assessment Value
Participants have successfully completed the accredited training delivered through various modalities (online, classroom courses, workshops).	0	100	4 Fully Achieved as of 1/23/2024
Analytical framework centered around the MPT is used to produce medium-term forecasts, scenarios as well as risk and policy analysis	To be assessed during Pre-Scoping Meetings	Équipe Core is able to produce Debt/GDP projections by means of the DDT.	4 Fully Achieved as of 9/23/2024

Milestone Name	Target Completion Date	Milestone Actual Completion Date	Milestone Rating
Core team finished asynchronous training of the DDT (through EdX) with virtual follow-ups.	1/5/2024	12/29/2023	4 Fully Achieved as of 1/22/2024
Équipe Core is able to produce baseline medium-term projections of the Debt/GDP path using the DDT.	1/31/2024	1/19/2024	4 Fully Achieved as of 1/28/2025
Core team produced a risk matrix for the Mauritanian economy, included climate-related risks, and is capable of including climate-related risks by means of the ND DDT.	12/31/2024	09/04/2024	4 Fully Achieved as of 9/23/2024

ANNEX VII. PROJECT TEAM

1. Abdel Baghi	14. Muhammad Abad Yah
2. Azza Abdallahay Haballa	15. Mohamed Abdel Kader
3. Bacar Khayar	16. Mohamed Didi Taleb
4. Baham Ahmed Benane	17. Mohamed El Yezid
5. Bakary Gandega	18. Mohamed Khilil
6. Didi Sid'ahmed	19. Mohamed Yahya Cheikh Mohamed El Mokhtar
7. El Hadj Cheikh-Abdallahi	20. Mohamed Yahya Mohamed El Moustapha
8. El hadj Dembele	21. Niang Idrissa
9. Fatma Abdelkader	22. Sarra Mohamed Cheikh Sidiya
10. Hamoud MICHEL	23. Sarre Adama Souleymane
11. Housein Mejdoub	24. Sidi Lemrabott
12. Jemila Abdarraahmane Emir	25. Youssouf Cheikh Sidiya
13. Mariem Zeidane	