TECHNICAL ASSISTANCE REPORT

ANGOLA

Strengthening the Forecasting and Policy Analysis System on the Transition to Inflation Targeting

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Prepared By

Silvio Michael de Azevedo Costa (Short-Term Expert)

Monetary and Capital Markets Department

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Glossary

AFS	Regional Technical Assistance Center for Southern Africa (AFRITAC South)
BNA	Banco Nacional de Angola
DEE	Departamento de Estudos Econômicos
DES	Departamento de Estatística
FPAS	Forecasting and Policy Analysis System
FT	Forecasting Team
IRF	Impulse Response Function
MCM	Monetary and Capital Markets Department
MPC	Monetary Policy Committee
OMO	Open Market Operations
QPM	Quarterly Projection Model
TA	Technical Assistance
UIP	Uncovered Interest rate Parity

Preface

At the request of the Banco Nacional de Angola (BNA), a Monetary and Capital Markets (MCM) Department mission visited Luanda, Angola from May 20 to May 24, 2024, to assist the authorities in reviewing its forecasting and policy analysis system (FPAS), proposing enhancements to modeling and forecasting procedures and introducing fiscal channels into the core forecasting model that better characterize the dynamics of the Angolan economy.

The mission met with Vice Governor Ms. Maria Juliana de Carvalho Van-Dúnem de Fontes Pereira, Mr. Sebastião Kivampolo Tuma (DEE Director), Ms. Martine Emma Dias dos Santos (Deputy Director of DEE), other senior BNA officials, and IMF AFRITAC South representatives in a high-level closing meeting. The mission worked daily with a group of experts from all the DEE divisions to discuss the forecasting process, challenges, and desired medium-term outcomes. The mission wishes to thank the BNA authorities and staff for their active cooperation, productive discussions, and hospitality.

Executive Summary

This report presents an updated assessment of the operations of the Forecasting and Policy Analysis System (FPAS) at the Banco Nacional de Angola (BNA). The objective of the TA mission was to strengthen the analytical capacities at the Banco Nacional de Angola (BNA) to produce analysis and forecasts to support policymaking and communication along the transition to inflation targeting.

The BNA has made impressive progress in recent years in improving its FPAS. The mission reviewed various components of the FPAS, assisted BNA staff in introducing fiscal channels into the QPM, and evaluated aspects of the policymaking process. Key recommendations focused on pending actions related to the FPAS to be adopted in the near term that could strengthen the transition to Inflation Targeting . The recommendations seek to increase the BNA's ownership of its FPAS and models to respond efficiently and on-demand to the economic challenges that will arise.

The mission shed light on mounting vulnerabilities for the FPAS at BNA. The recommendations outline a more forward-looking approach for strengthening the FPAS, which requires practice and confidence to make the enhancements in the shortest time possible. Staff is well prepared to support the transition to inflation targeting and produce high-quality inputs for decision-making. However, high turnover, small teams, and senior profile scarcity are challenges for sustained improvements and pose implementation risks for the mission's recommendations.

The final assessment of the mission is that the current stage of the FPAS at the BNA partially meets the environmental conditions to operate under inflation targeting. The mission's recommendations aim to help smooth the transition to full-fledged inflation targeting and support building the analytical capacity required for an effective analysis and forecasting system under inflation targeting. Moving to inflation targeting will require further progress in the way FPAS models are used internally for forecasting and policy advising, and on monetary policy communication.

Recommendations

Table 1. Key Recommendations

Recommendations and Authority Responsible for Implementation	Priority	Timeframe 1/
Modeling and Forecasting		
Switch immediately to the model with the Taylor rule and uncovered interest rate parity (UIP) condition; if helpful, consider running the old version in parallel for a short period when new tunes are placed to align projections; do not make tunes on medium-run inflation.	High	Near-term
Extend the forecasting window to at least 24 months ahead; check key model gaps closing in the long term.	High	Near-term
Track and document forecast performance continuously to ensure effective narrative construction and support model maintenance. [3]	High	Near-term
Build empirical evidence on the power and dynamics of key macro shocks, such as interest rate, exchange rate, and fiscal impulse. [3]	High	Near-term
Produce sensitivity analysis for key parameters whenever necessary, to understand general equilibrium responses beyond the immediate effect.	Medium	Near-term
Invest some time to deepen comprehension of model codes; consider regular training in MATLABMATLAB and IRIS toolbox; try small changes and create new products to gain confidence and ownership of the codes.	Medium	Near-term
Create additional analysis and decomposition tools of scenarios to improve understanding of what is driving forecasts; make the case for changes in model parameters and specifications.	Medium	Near-term
Improve data integration between departments; enhance information sharing through secure network folders (beyond email).	Medium	Medium-term
Address human resource management challenges like high turnover, weak skills transfer, and scarcity of senior profiles; consider increasing the number of staff with quantitative skills.	Medium	Medium-term
Policy formulation process and communication		
Schedule regular, pre-planned meetings between different teams along the forecast cycle to improve coordination of assumptions and validation of the baseline scenario, and to brainstorm about alternatives; ensure the discussions are prospective.	Medium	Near-term
Enhance communication with the public immediately with a more forward-looking approach; draft monetary policy documents with a prospective analysis, emphasizing main drivers and the Monetary Policy Committee (MPC) assessments behind policy decisions. [3]	High	Near-term

Recommendations and Authority Responsible for Implementation	Priority	Timeframe 1/
Start budgeting interest rate paths and discuss policy trade-offs to support MPC decision[2]; adjust communication to include MPC's views on monetary policy stance and timing to convergence.	High	Near-term
Evaluate the quality of survey-based market expectations, particularly for inflation in medium-term horizons.	High	Medium-term

[1] Near term: < 12 months; Medium term: 12 to 24 months.

[2] Budgeting interest rate paths refers to the process of presenting different interest rate paths and the corresponding costs to economic activity and the timing of inflation returning to target.

[3] Recommendations also included in the 2022 TA Report on Transition to Inflation Targeting.

Introduction

1.   **In response to a request from the Banco Nacional de Angola (BNA), a technical assistance (TA) mission visited Luanda in late May 2024.** The mission had the purpose of i) reviewing the operation of the Quarterly Projection Model (QPM) and following up on the recommendations from previous TA missions; ii) assisting BNA staff to build a fiscal block in the QPM to account for the importance of fiscal channels for story-telling and short-term forecasting; iii) assessing the adequacy of BNA resources for the operation of the core model to produce medium-term forecasts; and iv) discussing potential topics for further technical assistance.

2.   **The 2022 TA report highlighted the role of improving analytical capacity in a road map for the implementation of inflation targeting.** Key achievements along the transition include: i) tracking and documenting forecast performance continuously; ii) using the core projection model to actively generate interest rate paths; and iii) fully supporting forward-looking monetary policy. In particular, the mission recommended two changes in the QPM to be implemented in the short term: i) making the Taylor rule active, and ii) imposing an UIP condition instead of an adjustment equation for the nominal exchange rate.

3.   **The mission assisted the BNA in incorporating a fiscal block in the core model.** This block would also enhance the economic analysis and forecasting capabilities at BNA and support monetary policy decision-making. The BNA requested assistance to introduce fiscal channels in the QPM, with the understanding that the core model should consider the traditional IS curve fiscal channels on the economy. Treasury operations in foreign exchange markets affect price formation and are closely related to the government's fiscal results. The 2022 TA report also made a couple of recommendations for improving monetary and foreign exchange operations in the roadmap for implementing inflation targeting.

4.   **The current mission also explored ways to strengthen resources and processes.** The mission assessed organizational, human, and technological resources that could be improved to strengthen BNA analytical capacity in supporting a more forward-looking process and effectively advising on the conduct of interest rate-based monetary policy. The recommendations are strongly aligned with the previous TA missions' assessments and seek to produce a smoother transition for the FPAS to the inflation target regime.

I. Reviewing the Forecasting and Policy Analysis System

5.   **The BNA has made consistent progress in consolidating FPAS processes and improving information sharing.** Following the restructuring, all staff members involved in the forecasting process are housed in the DEE. The workflow and communication have improved significantly, and the whole team is committed to delivering the best possible outputs for the core model. The DEE is in a good position to make additional investments to keep improving its processes in an inflation-targeting environment, which requires augmented responsibilities.

A. Current Set-Up

6.   **Team roles are well-organized, and a formal calendar for the forecasting cycle is in place.** Each forecasting cycle takes six weeks in the run-up to the MPC meeting and sets up deliverables, responsibilities, and the timeframe. During the cycle, members of the forecasting team (FT) can have on-demand side meetings with DEE groups and with members from other departments. The calendar includes briefing meetings to explore data releases but does not include any all-together meeting to present a tentative baseline scenario and discuss the role of each deliverable in driving the forecasts. MPC members do not currently participate in the meetings that discuss conjunctural developments. Since there is no review or retrospective meeting, each group might have a limited view of the impact of their inputs.

7.   **The BNA model toolkit is well-suited to the BNA's current needs and the databases are organized, but further improvements are necessary to better respond to policy questions within an appropriate timeframe.** The relevant data inputs for the QPM are organized by department and information sharing is just sufficient to meet planned needs. However, databases and data workflows seem to be still poorly integrated within the Bank and do not offer much flexibility, making it challenging for staff to investigate the data in detail without prior notice to other units. This may reduce the team's ability to conduct additional research to quickly answer policy questions that come up during the forecasting cycle. Nowcasting and near-term forecasting models set for selected variables are operational and productive. The core model contains a set of specifications tailored for the Angolan economy, to improve data fitting and storytelling. Such specifications attempt to capture the actual dynamics in the non-official exchange rate market, the deep effects of oil prices on Angolan activity and inflation, and the country's high exposure to the global cycles in food prices.

8.   **The version of QPM used to support MPC decisions continues to be based on monetary aggregates.** In that version, there is a money block with a demand equation and a money supply equation operated by the central bank. Thus, the real interest rate is endogenously calculated by filtering, given the observable Luibor rate (Luanda Interbank Offered Rate), the benchmark interbank interest rate. The underlying real interest rate is the measure affecting the dynamics of the non-oil sector output gap and core inflation. A Taylor rule is muted, and the official exchange rate is set to gradually reduce the spread to the non-official exchange rate, whose dynamics are affected by the gaps of the real exchange rate and the real interest rate.

9.   **The current QPM is calibrated to generate a small response of inflation to a money supply shock.** The impulse response function (IRF) of a shock to money supply reveals the model-filtered interest rate equivalence. Changes in the real interest rate pass through the non-oil output gap with a small effect so that the overall effects on exchange rates and inflation end up being weak. BNA staff assesses that current instruments may have difficulties in stabilizing the economy in the short term through the demand channel. They believe that the non-oil output may face little consequences from rising interest rates since private and public investments are primarily determined by other variables, such as expectations for oil revenues and the exchange rate, and even fiscal results, which can determine government-led investments. Banking channels have a limited role at present.

10.   **Currently, the QPM is used to produce internally consistent paths for a baseline scenario and an alternative scenario.** The material in the DEE presentation to the MPC contains a 6-quarter horizon forecast for the main variables of the economy, including output and its sectoral decomposition, consumer inflation and its macro components, the monetary base and broad money M2, the official and non-official exchange rates, and the interbank interest rate.

11.   **However, a closer look into the forecasts produced by the current QPM also reveals some drawbacks.** Despite the staff's confidence in the numbers presented to the MPC, the breakdown of the projections can show the significant importance of the filtered gaps in supporting the projections. Indeed, for the non-oil output gap, the real interest rate gap, and the real exchange rate gap, the FT assesses that some magnitudes may be disconnected from reality. However, no judgment is directly imposed on those factors determining the numbers.

12.   **In addition, the judgments in the baseline scenario are not based on the best practices.** Since the BNA has undisclosed inflation objectives (that can change frequently based on the economic outlook) the FT considers these numbers when producing the baseline scenario. Some judgments are placed to make inflation in the medium term meet the desired disinflation objectives, and so the model calculates corresponding money supply paths that are viewed as consistent with the inflation trajectory. In this sense, the model works as a mere calculator to project the money growth rates necessary to achieve exogenous inflation paths.

B.   Follow-up on the Recommendations from the 2022 TA Report

13.   **The changes in QPM proposed by the 2022 TA report were produced but not yet deployed.** The previous TA mission recommended activating the Taylor rule (and deactivating the money block dynamics) and imposing a UIP condition for exchange rate dynamics. BNA staff implemented a version of the model with those equations working (of which some minor issues were detected and solved during this mission) and tried a forecasting exercise based on the same assumptions carried out in the official core model.

14.   **BNA staff hesitated to switch to the new version of the model.** The main reasons are i) the ongoing need to forecast and consistently report money aggregates to the MPC during the transition to inflation targeting; ii) the evaluation that the BNA interest rate cannot yet be taken as a benchmark for market interest rates; iii) the reduced power of interest rates to control aggregate demand; and iv) the short-term projections for exchange rate movements and consumer inflation seem excessive and unrealistic.

15.   **The current practice uses shocks to generate a medium-term profile, which has clear drawbacks.** First, the underlying shocks in the medium run are always unanticipated, and the desired numbers are not determined from the drivers of price formation like exchange rate, excess demand, or commodities. Second, the implied shocks have no explanation or counterpart, they only mean unusual abstract events of disinflation "dropping out of the sky" and with no adjustment costs. Third, shocks in one period may contribute little to a consistent disinflation process and anchoring expectations in subsequent periods. Fourth, the money supply policy derived from this exercise is neither a forward-looking decision-making nor an efficient policy recommendation, as the central bank is also surprised by the disinflation occurring each period.

16.   **While policy recommendations to achieve central bank objectives are always a relevant policy-making question, the way to obtain these objectives must be different.** The model can be a useful tool to find paths, but the strategy must always rely on tuning policy instruments and looking to their effects on the endogenous variables.

17.   **The FT argued that money supply policies in the current QPM cannot be used to generate the inflation paths because the response of inflation is too low.** The team tried to calibrate the money supply shock such that the medium-term inflation would meet objectives, but the response of inflation is small. The FT also considers it a hard task to find consistent trajectories for aggregates to achieve monetary objectives, since inflation feeds back strongly into the demand for money.

18.   **The discussion shed light on the importance of moving towards more efficient monetary policy instruments.** The FT needs to do more work to confirm by other means that the power of monetary policy over non-oil activity is indeed so low. Indeed, the role of transmission channels is a continuous task for central banks and the mission emphasized the importance of having these elasticities well-known immediately to improve forecasting and policy advising during the transition to inflation targets.

19.   **The mission recommended switching immediately to the new version of QPM with a Taylor rule and a UIP condition.** The current version and its procedures are no longer appropriate for advising policy. If the FT considers it beneficial for communication with authorities, they can plan to run the two versions in parallel for a few months, while making refinements on initial conditions and short-term judgments that improve model forecasts. Staff must refrain from making judgments on inflation in the medium term because it is of paramount importance to observe how inflation responds endogenously to policy alternatives and short-term conditionings.

20.   **FT assessment of the mechanical outputs of the model is part of the process; however, there should be governance to include judgments.** Forecasts of the new model that the FT considers non-realistic can be subjected to exogenous conditioning. The team needs to identify the sources of unrealistic effects. In the baseline scenario the TA explored during the mission, the forecasts showed a strong immediate devaluation of Kwanza produced by the UIP condition, even with higher interest rates, which caused projected inflation above the reported by the current model.
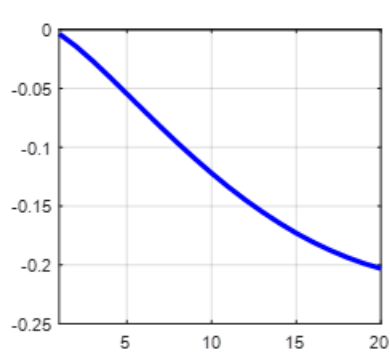
Figure 1. Responses to a Contraction in Money Supply[1]

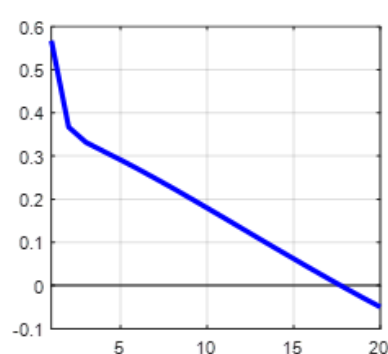Shock to Money Supply (decrease of 1 percent qoq)
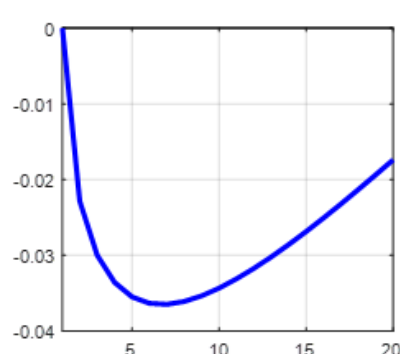
Money Supply (percent qoqar)
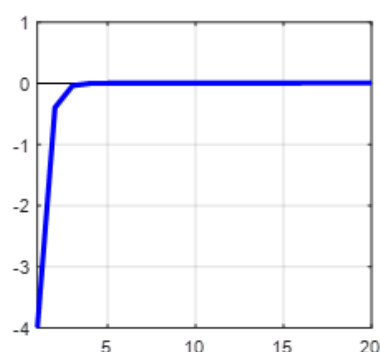
Headline Inflation (percent qoqar)

Model-Implied Interbank Rate (p.p.)

Non-Oil Output (p.p.)

Sources: Banco Nacional de Angola and IMF staff calculations.

[1] A decrease of 1 percent qoq (4 percent qoqar) in money supply generates an implied interest rate hike of around 55 bps.

21. **FT should organize a protocol to make judgments in selected variables.** The protocol must define variables and the number of quarters for short-term conditioning. This is important to organize the discussion of hypotheses between meetings and track changes in judgments. Typically, central banks create baseline scenarios with trajectories for selected variables with greater volatility, such as exchange rates, oil prices, and food prices. Then, the effects of alternative paths are explored with alternative scenarios. Back to the case of the baseline scenario evaluated during the mission, the FT could evaluate setting a near-term trajectory for the official and informal exchange rates and external variables for a few quarters.

22. **When building the baseline scenario, the FT should monitor key filtered gaps, as they are important for storytelling.** Model gaps are essential in determining the dynamics of key macro variables, and some gaps appear to be excessively open. It is necessary to pay attention to the filter results and make point adjustments about the current state of the economy when necessary. In particular, the dynamics of the exchange rate and the activity of the non-oil sectors have shown important imbalances, so the model will project a kind of rebalancing in the short run that may be unrealistic. For the case of the real exchange rate gap, the FT calculates an out-of-model estimate of the effective real exchange rate gap for the Kwanza that is of regular monitoring for the MPC. Staff

could consider providing an educated guess for the real exchange rate gap before filtering, seeking to obtain a better trend/cycle decomposition and more realistic forecasts for the exchange rate.

23.   **Another immediate recommendation is to start reporting a longer forecasting window on the road to inflation targeting.** We recommend extending the forecasting window to at least 24 months ahead and closely monitoring medium-term inflation and its drivers. Also, it is necessary to check if the key model gaps are closing in the long term. Inflation targeting requires a more forward-looking approach for analysis and policy advising, as policymakers can face trade-offs between gradual or timely responses and the buildup of central bank credibility.

24.   **The TA mission developed and explained to FT an alternative code for budgeting interest rates.** The mission recommended discussing and advising on alternative interest rate paths in terms of the costs to economic activity and the timing of convergence of inflation to the objectives. The new script might eliminate the need for hard tunes on medium-term inflation to meet inflation objectives. The FT should extend the codes to discuss budgeting interest rates under different conditioning paths for key variables like exchange rates, oil prices, and other external variables.

25.   **An illustrative exercise to inform monetary policymaking (Figure 2) is to shed light on monetary policy tradeoffs in achieving inflation objectives vis-à-vis costs in terms of activity and employment.** This is the kind of trade-off that policymakers face when deciding about policy responses, and the model is built to reveal these costs when it forecasts the dynamics of economic adjustment. Model outputs are valuable inputs for decision-making and adequate forward-looking communication. There is no free disinflation process driven by shocks, and policy decision-making should concentrate on finding the most efficient responses.
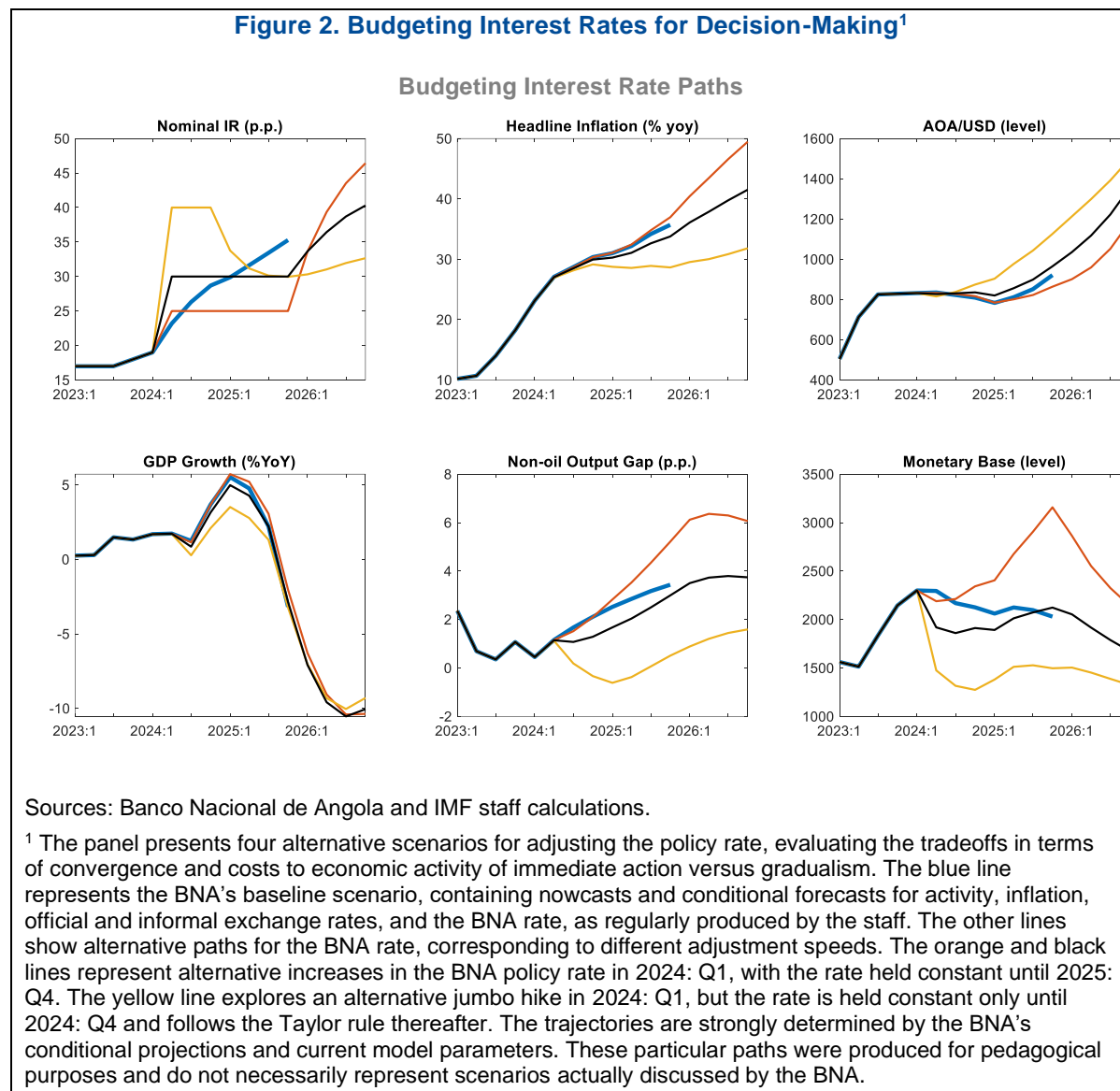
26.   **The TA mission added a satellite specification based on the money quantity equation for the purpose of reporting money growth consistent with endogenous variables.** The objective is to accelerate the effective implementation of the version with Taylor rule and UIP as the core model used for the MPC. Having an endogenous projection for the quantity of money can be useful during the transition to inflation targeting and can increase staff confidence in moving to the new QPM immediately.

27.   **The mission reinforces previous TA mission recommendations for the BNA to track and document forecast performance.** Evaluating forecasts is a daily task for central banks, as it can help build narratives, improve communication, and indicate necessary corrections to be implemented later in the baseline scenario. The FT usually presents comparisons between current and previous MPC baseline scenarios, but the role of forecast errors in changing the nowcasts and the near-term forecast remains unknown. The team should consider explaining the source of errors and its importance for changing nowcasts. In addition, tracking changes in model gaps can improve storytelling. Additional TA can help design a transition map to account for changes between current and previous scenarios.

28.   **Another recurrent TA recommendation is to build empirical evidence to support model elasticities.** In particular, the mission sees an immediate need for out-of-model estimates of the power and dynamics of interest rate shocks, exchange rate shocks, and fiscal impulses, to validate calibration and improve the strength of the channels. Some parameters are key for the stability and usage of the model under inflation targeting, for example, the coefficients determining the pass-

through of transmission channels of monetary policy. Here again, there is room for additional TA to assist the staff in estimating and/or recalibrating model parameters.

Figure 2. Budgeting Interest Rates for Decision-Making[1]

Budgeting Interest Rate Paths

Sources: Banco Nacional de Angola and IMF staff calculations.

[1] The panel presents four alternative scenarios for adjusting the policy rate, evaluating the tradeoffs in terms of convergence and costs to economic activity of immediate action versus gradualism. The blue line represents the BNA's baseline scenario, containing nowcasts and conditional forecasts for activity, inflation, official and informal exchange rates, and the BNA rate, as regularly produced by the staff. The other lines show alternative paths for the BNA rate, corresponding to different adjustment speeds. The orange and black lines represent alternative increases in the BNA policy rate in 2024: Q1, with the rate held constant until 2025: Q4. The yellow line explores an alternative jumbo hike in 2024: Q1, but the rate is held constant only until 2024: Q4 and follows the Taylor rule thereafter. The trajectories are strongly determined by the BNA's conditional projections and current model parameters. These particular paths were produced for pedagogical purposes and do not necessarily represent scenarios actually discussed by the BNA.

C. Enhancements and Steps Forward

29.   **The TA mission updated the QPM codes with warnings and errors.** The medium-term model is largely based on MATLABMATLAB scripts that are coded in old software versions. Some scripts were throwing recurrent warnings or not functioning at all. The FT works on a 2018a version of MATLAB, but an in-progress renewal of licenses could make the members work with different MATLAB versions in the near term. The mission updated the scripts to be compatible with any released version and with the newest 2023 IRIS Toolbox, removing the use of the 2015 IRIS Toolbox, and explained the main syntax differences between those versions.

30.   **The TA mission recovered the code for IRFs and recommended its regular use to understand the overall effect beyond the immediate impact.** The mission explained the parts of the code and used it to produce IRFs for alternative calibrations, particularly for the parameters created for the fiscal block. The FT needs to test alternative calibrations of selected parameters whenever necessary to improve the understanding of transmission mechanisms and overall effects on key variables. These elasticities are indeed the numbers that modelers can keep in mind for model comparisons.

31.   **The TA mission recovered the code for Bayesian estimations.** The mission explained the elements of code used to perform built-in maximum likelihood estimation that is in the new IRIS version and ran the script to locally estimate some of the parameters created for the fiscal block.

32.   **In the simulation code, the mission introduced a graph to highlight all the judgments made in the scenario.** The code for scenario simulation can become hard to read, but a quick visual check on the tunes used to simulate can help screen for errors or missing items. In this regard, the FT should invest a lot more time to analyze scenario outputs and check for inconsistencies. Additionally, the team's lack of familiarity with the code, as also identified by previous missions, should be tackled immediately, as it limits the team's ability to progress further in model analysis.

33.   **On the road to inflation targeting, the FT needs to create new analysis and decomposition tools to improve understanding of scenarios and model channels.** The demand for analysis and decomposition in each scenario will increase significantly in a more forward-looking FPAS. Additional technical assistance can help build new tools and richer reports, but the staff needs to be confident to modify and add decompositions whenever necessary. This recommendation reinforces the urgency of increasing the teams' familiarity with codes and model channels.

34.   **The mission recommends improving data sharing and integration between areas.** More efficient means of sharing data can help improve the process itself. Many central banks transfer data through secure network folders and avoid email attachments. This can of course improve data security and integrity, but also has positive effects in terms of coordination and control of deliveries and the overall efficiency of FPAS.

35.   **An external review of the FPAS operating during one forecasting cycle could help BNA staff identify other areas of improvement.** The BNA could benefit from an external assessment of the practical issues that may arise during a real cycle and consider improvements in information flow, tools and scenario decisions. The BNA staff may consider hosting an external review of the FPAS soon to gain insights from an outside point of view. The review can discover elements of improvement that are quick to implement, as well as help the staff find solutions to technical problems during the process.

D. Assessing the Adequacy of the BNA Resources

36.   **FT should invest time to deepen comprehension of model codes.** In-depth knowledge and ownership of the model and codes are essential for the BNA to progress in its FPAS, but progress in this matter has been below expectations. As pointed out by previous TAs, the staff needs to increase familiarity with the model and its dynamics and gain expertise enough to implement

changes whenever necessary. The model contains adequate features to assess the current stance of the economy and produce internally consistent forecasts so that the staff is well-positioned to generate policy advising for a transition to inflation targeting. The mission strongly recommends continuous and intensive training in MATLAB and IRIS toolbox to catch up faster.

37.   **The mission assesses that FPAS at BNA has substantial vulnerabilities related to human resources.** The number of team members in some groups of the FT is small, which might increase the risks of staff burnout and turnover. There is no slack, and all the forecasting activities of the core model are performed by only three people. There is also no manual of usage and procedures for the entire BNA forecasting process that can be successfully followed by people joining the team. Beyond the numbers, the deficiency of expertise in several groups prevents the staff from making greater progress in FPAS. The mission identified that FT members have doubts about the code steps, and do not know where they should move to overcome warnings and errors or to implement deeper changes like adding new variables to the database and the model.

38.   **BNA needs to address administrative challenges like high turnover, loss of specialized knowledge, and scarcity of senior profiles.** Building all the capacities is costly and time-consuming, and proficiency is a combination of academic formation, specialized training, and practical experience in modeling and forecasting. BNA should evaluate the size of its forecasting team to ensure a well-functioning FPAS. An eventual absence of a senior officer can put the process of supporting decision-making under substantial operational risks. Furthermore, the mission suggests that the BNA should generate more opportunities for internal training and multiplication of specific knowledge, in addition to seeking greater engagement with the central banks in the region operating similar systems. The mission's team also suggests that FT members returning from specific training engage in practical forecasting activities, aiming to consolidate fresh knowledge. An example of valuable activities is making deeper changes to codes, or designing new products, to gradually increase teams' confidence and ownership.

39.   **Shortages in proficiency and ownership are expected to be exacerbated in a transition to inflation targeting.** The inflation-targeting operation requires a more forward-looking communication. In turn, FPAS must be adapted to produce prospective analyses and narratives consistent with increasing MPC needs. A couple of new products can enhance decision-making and communication under inflation targeting, and the FT needs to i) address quantitatively the contribution of scenario assumptions and the uncertainty; ii) discuss the prospective inflation and the drivers involved in different scenarios;
and iii) prepare the MPC to deliver an effective communication with the public.

40.   **The mission recommends resizing and improving the technological infrastructure available for running FPAS.** During the mission, recurrent events of network instability complicated the development of the mission, including technical and high-level meetings. Moreover, only one MATLAB license was operational during the week of technical assistance, hindering the general understanding of the codes and the transfer of knowledge from the TA. The small number of ready-to-use computers with specific software is responsible for keeping a centralized way to prepare and run scenarios. This is an additional challenge for resizing human resources in FT. The BNA must increase the availability of computers prepared to run scenarios as the forecasting exercises must run in parallel to gain productivity. The mission also assesses that a rotation of responsibilities within the

group that runs the QPM would benefit the process, by increasing awareness of the FT's key messages across the entire set of information that is produced for the MPC.

41.   **FT must prioritize expanding its knowledge about codes and models; the development of the models should be an objective only for the medium term.** Given the constraints, the staff team must concentrate its efforts on explaining the contribution of each conditioning variable to the changes in forecasts between meetings. This approach is necessary to build consistent storytelling and gain intuition from the model's mechanisms. The mission understands that building analysis tools for a more forward-looking FPAS should have a higher priority than expanding the model with other blocks, at least for the upcoming quarters.

II. Introducing Fiscal Channels into the QPM

42.   **The BNA requested technical assistance to introduce fiscal channels in the core model, aiming to improve storytelling.** The staff is concerned about the Treasury's active role in price determination, particularly in the exchange rate markets. FT foresees that having fiscal channels in the model can improve the historical decomposition and storytelling, as well as the fiscal channels can be used to produce fiscal policy simulations and the required monetary policy reaction.

A. Background

43.   **Debt is not a concern in the near term, so the focus is on fiscal result flows.** 79 percent of Angola's debt in 2022 is exposed to exchange rates, and 70 percent is foreign debt. A portion of 21 percent corresponds to the overall internal debt denominated in kwanzas, with several indexation measures. Angolan debt is on a downward trajectory, as a fiscal consolidation process is underway.

44.   **Angola's strategic planning aims to reduce dependence on the export of natural resources and encourage the development of local markets.** Angola has a high and positive general government primary balance, and the current account balance is consistently positive at around 5 percent. The good numbers are strongly influenced by the results of the oil sector. In the long term, the continued reduction in productivity of the oil sector could bring out a couple of vulnerabilities in the domestic economy. Indeed, the primary balance of the non-oil sector is highly negative and persistent. Debt sustainability is not an issue now, as the magnitude and evolution do not affect short-term adjustment. Therefore, the focus of the mission is on flows and the impact of fiscal channels on short-term dynamics.

45.   **Treasury movements in the foreign exchange market cause high volatility and distort price formation.** The Treasury collects revenues in foreign currencies (mainly, tax collections from the oil and diamond sectors). These revenues are deposited in a BNA account denominated in US dollars, or accounts abroad, such as Escrow accounts related to debts to China. It should be noted that the necessary reforms in the Angolan foreign exchange markets and the adoption of new instruments for the BNA to tackle volatility were the subject of previous TA recommendations.

46.   **The demand for the Angolan Kwanza is reduced and reinforced by the institutional environment.** Neither foreign companies nor investors are required to convert dollars to local currency, and they are likely to maintain positions in Kwanzas just to meet their short-term obligations in local currency. Demand for Kwanzas is structurally lower than in other countries, and the currency has not been used as a store of value by private agents.

47.   **Treasury partially converts its balances in foreign currency to pay the primary deficit in Kwanzas.** Government expenses paid in Kwanza generally exceed revenues. The Treasury uses its balances to finance the non-oil sectors' primary deficits. The movements of the Treasury in foreign exchange markets are not programmed, and the BNA does not yet have a framework and instruments that allow it to smooth the entry of large volumes and avoid distortions in the formation of the exchange rate.

B.   The Importance of Fiscal Channels to Price Stability

48.   **The mission assessed the convenience and relevance of having fiscal channels in the QPM.** TA discussed with the staff how central banks typically use fiscal channels in core models, the main fiscal instruments, the traditional transmission channels, and the international empirical evidence on fiscal multipliers. The staff considered it adequate to include a traditional demand channel for fiscal impulses, being the current expenditure and public investment as the relevant instruments for the Angolan economy.

49.   **In addition to the fiscal impulse channel, the team considers it important to model a risk channel in the foreign exchange market.** The staff understands that the effects of active participation of the Treasury in the foreign exchange markets are super relevant for the formation of the spot exchange rate. The staff is concerned with the transmission to inflation and the activity of non-oil sectors. The main idea is to create an exchange rate risk channel for fiscal flows to improve storytelling and describe a richer short-term dynamic. In this sense, the risk channel must affect directly the official and informal exchange rates and be associated with the needs of the Treasury to finance primary deficits in local currency and the Treasury's cash reserves in foreign currency.

50.   **The conduct of Treasury foreign exchange operations sometimes poses challenges for the economy and must be handled accordingly.** Previous TAs have outlined recommendations to reform the foreign exchange market in its legal and institutional aspects. The purpose is to correct incentives and boost efficiency in price formation. Currently, the Treasury's foreign exchange actions are characterized by moral hazard problems. The timing of hard currency sales can be strategic by waiting for diminished liquidity in foreign currency to obtain greater gains in Kwanzas. This speculative behavior against the national currency is especially harmful to citizens and companies in the non-oil sector that do not have revenues in hard currencies.

51.   **The exchange rate risk channel may lose importance after foreign exchange market reforms.** Under inflation targeting and a flexible exchange rate policy, the reforms of institutional aspects can regularize the availability of foreign currency in Angola, even if foreign companies and the government keep their store of value in hard currencies and their demand for local currency continues low. Financial organization and planning of the Treasury movements and the additional instruments for the BNA could greatly contribute to reducing the impact on the formation of the exchange rate and regularizing the supply of dollars internally. Therefore, the exchange rate risk channel of fiscal flows may be switched off shortly.

C.   Data Availability and Modeling Choices

52.   **Only fiscal results on a cash basis are available at a quarterly frequency.** Incorporating fiscal channels into the model requires the availability of at least quarterly data for timely assessment and decision-making. In this sense, the available data are quarterly flows calculated on a cash basis that do not coincide with the official annual Treasury figures that use the accrual basis.

53.   **The staff concluded that the primary balance in Kwanzas and the government's foreign currency reserves are the two relevant variables to explain the formation of the exchange rate in Angola.** The total primary balance considers all non-interest government revenues and expenses. The overall primary balance, which is consistently positive given revenues from the oil sector, is not

an appropriate variable to address the fiscal channel. The primary balance in Kwanzas, which is defined as government revenues from the non-oil sectors minus current expenditure and public investment and does not include revenues from the oil sector collected in US dollars, more appropriately reflects discretionary fiscal policy by the government.

54. **The government has a fiscal target for the primary balance of the non-oil sectors. The result must be greater than -5 percent of GDP.** Therefore, this primary balance is a relevant variable to assess the current stance of fiscal policy.

55. **The mission incorporated the demand channel and the exchange rate risk channel into the core model to address fiscal policy developments.** The primary balance in Kwanzas was added to the IS curve, and several calibrations options—including the strength of the demand channel—and their effects on the overall dynamics were considered. For the risk channel of fiscal policies, the TA proposed expanding the risk premium equation with three channels related to fiscal balances: i) the primary balance in Kwanzas, which determines the pressure for the Treasury to settle the deficit by using its foreign currency balances. The higher the deficit, the greater the pressure, increasing the risk premium and leading to Kwanza depreciation. This risk channel is also inflationary for the Angolan economy; ii) the government revenues in hard currency, which increase the availability of reserves and can reduce the risk premium, and iii) the government expenditures in foreign currency, which reduce international reserves and can pressure the risk premium. The strength of these three risk channels is determined by the coefficients of the fiscal measures in the risk premium equation. The country risk premium is a non-observable variable in the current version of the QPM.

56. **The mission carried out sensitivity analyses for all new parameters included by the fiscal block.** As mentioned before, TA fixed the code that generates IRFs and expanded it to allow comparison of models with alternative calibrations. Next, the mission discussed with the staff the appropriate calibration for the coefficients to mimic the real economic responses to fiscal shocks.

57. **Empirical evidence on the strength of fiscal channels must validate model responses.** While the sensitivity analysis and discussion performed during the mission can help understand channels and calibrate new parameters, the staff still has to research empirical evidence supporting the actual impacts of fiscal channels on the economy.

58. **The mission estimated the IS curve equation of the core model to improve adherence to the data.** TA explained and presented the Bayesian estimation code contained in the IRIS Toolbox. Then, the coefficients of the IS curve equation and the standard deviation of the demand shock were estimated using the maximum likelihood estimation. Regarding the results, it is important to note that the coefficient of the impact of the real interest rate on the non-oil sector output gap doubled in value. In turn, the primary balance coefficient was estimated to be low but relevant for the short run adjustment.

59. **The mission also estimated the augmented country risk premium equation with risk channels related to fiscal flows.** The results show little effect of incorporating fiscal channels on the endogenous dynamics of the risk premium. It is important to remember that the risk premium variable feeds the UIP equation but is not observable. Given the non-relevant results of the risk channels associated with fiscal variables, the mission recommended that other empirical evidence and staff

assessment give additional contributions to calibrating the parameters for the forecasting horizon, since their identification in Bayesian estimation is not reliable, as the data contains several exchange rate regimes throughout history.

Figure 3. Responses to an Increase in Government Spending[1]

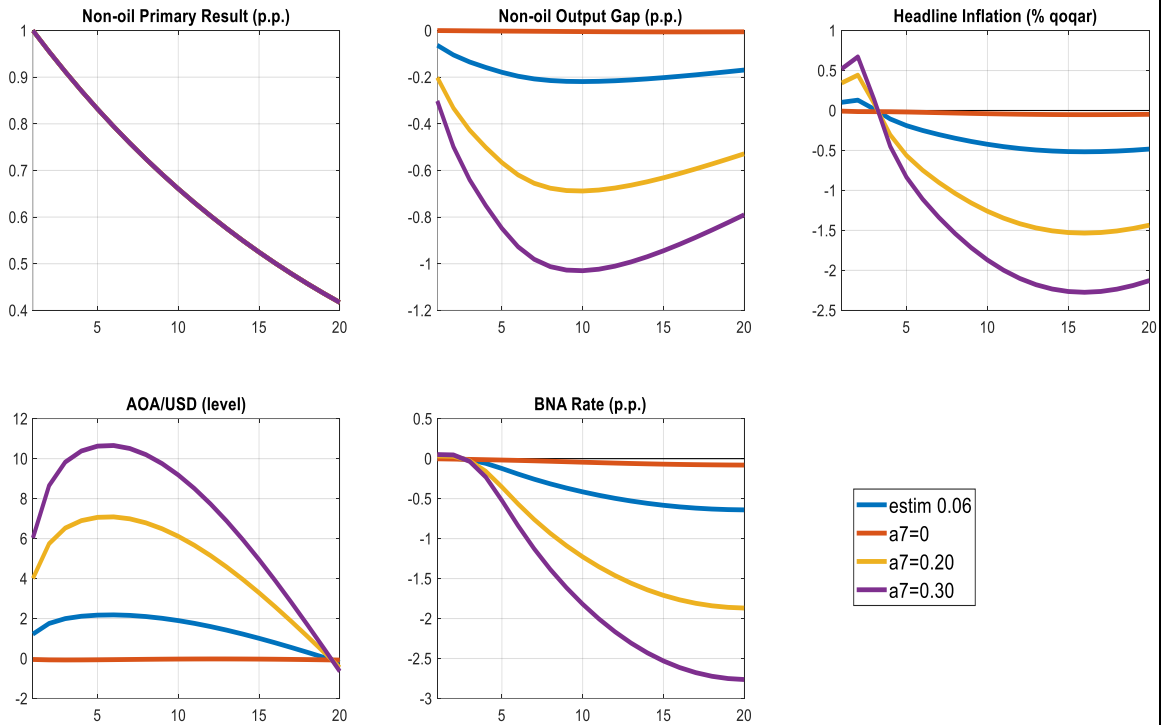**Shock to Government Spending (Expansion of 1 percent of GDP)**
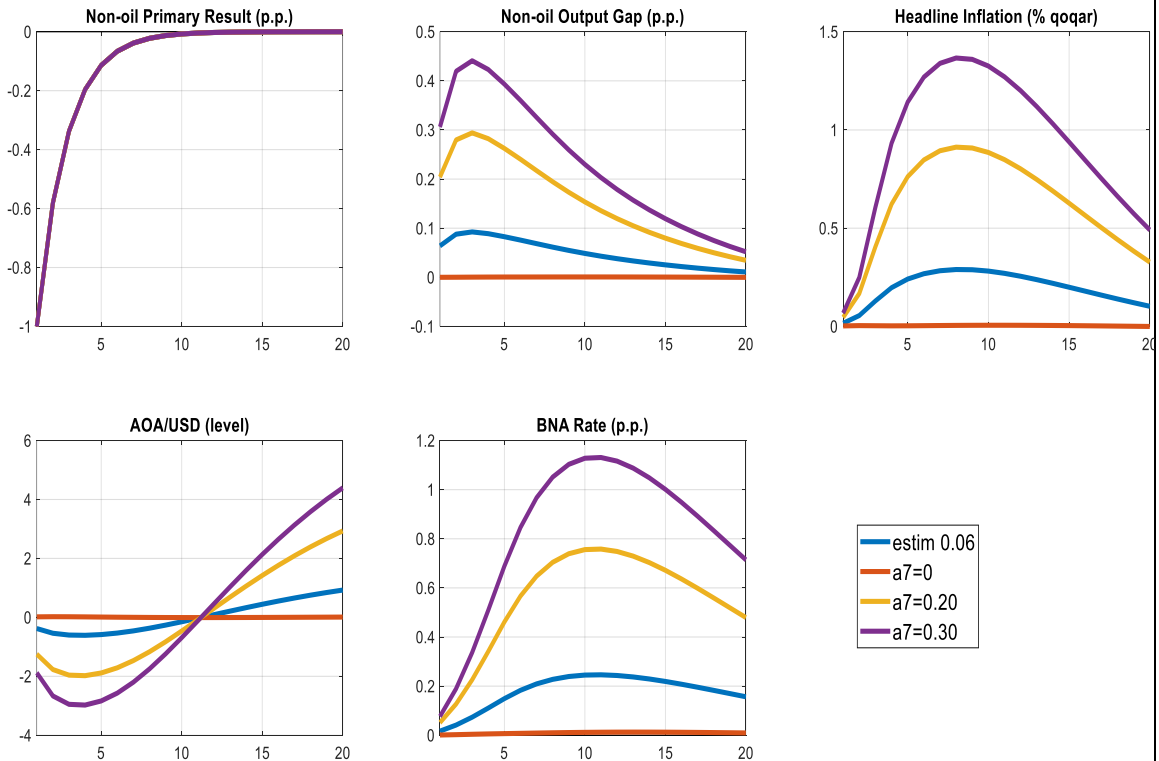
Sources: Banco Nacional de Angola and IMF staff calculations.

[1] An expansion in government spending (expenses or investment) around 1 percent of GDP can boost non-oil sectors, pressuring inflation and requesting a timely response for the BNA to bring inflation back to its target. The coefficient a7 in the equation of the IS curve determines the contemporaneous impact of the shock on non-oil activity, and eventually, the staff can run a sensitivity analysis on this parameter to finetune the strength of the fiscal impulse channel for Angola. The coefficient a7=0.06 was estimated during the TA mission.

Figure 4. Responses to an Increase in Taxes for Non-Oil Sectors[1]

Shock to Tax Revenues (Expansion of 1 percent of GDP)

Sources: Banco Nacional de Angola and IMF staff calculations.

[1] An increase in taxes levied on the non-oil sectors around 1 percent of GDP can reduce the non-oil sector activity, with downward pressures in prices and opening policy space for the BNA to cut rates. The coefficient a7 in the equation of the IS curve is for the non-oil primary balance, so the contemporaneous Impact of the tax shock on non-oil activity is the same as of the government spending shock. The coefficient a7=0.06 was estimated during the TA mission.

Figure 5. Responses to a Reduction in Government's USD Balances[1]

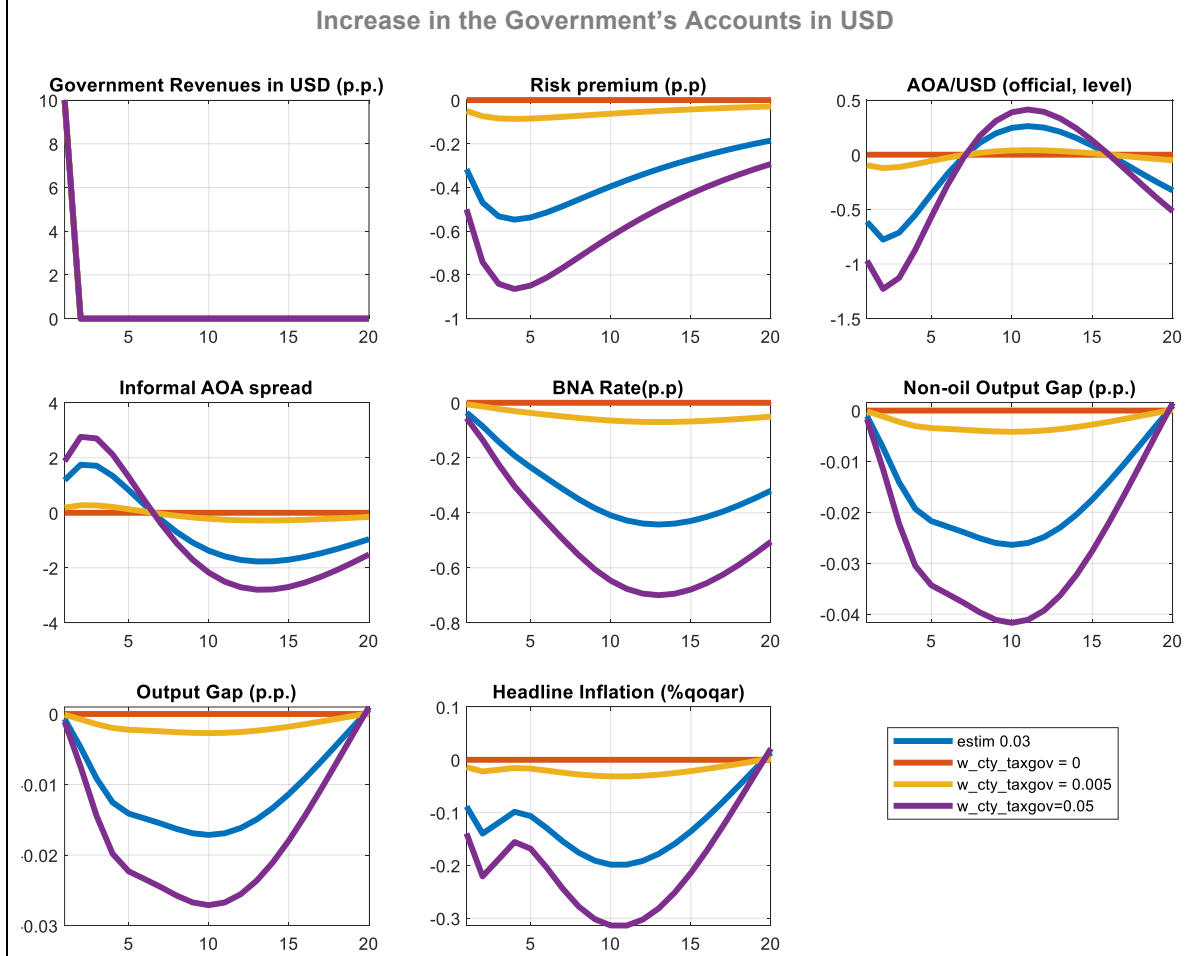### Reduction in the Government's Accounts in USD
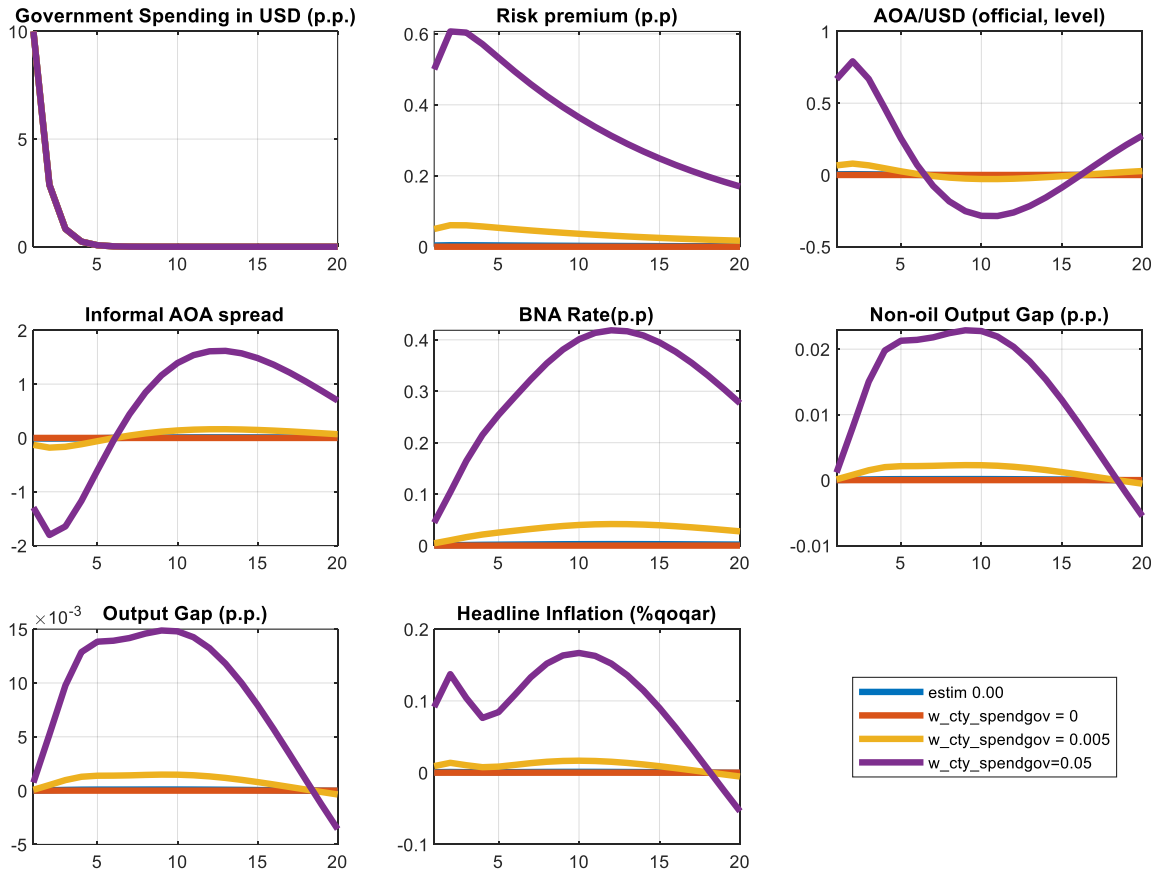
Sources: Banco Nacional de Angola and IMF staff calculations.

[1] A 10-percent reduction in government foreign accounts in USD (e.g., a USD selloff to settle the primary deficit in Kwanzas) can increase the risk premium. The higher risk premium leads to Kwanza depreciation, reducing the gap to the non-official Kwanza rate. The official exchange rate follows a UIP rule. The shock is inflationary, which requires a timely policy response from the BNA. The coefficient w_cty_spendgov in the country risk premium equation controls the strength of this shock that materializes through the exchange rate. The value found for the coefficient in the local estimation of the risk premium equation during the TA was low. The coefficient w_cty_spendgov was estimated to be around zero during the TA mission.

Figure 6. Responses to an Increase in Government's USD Balances[1]

Increase in the Government's Accounts in USD

Sources: Banco Nacional de Angola and IMF staff calculations.

[1] A 10-percent increase in government foreign accounts in USD can reduce the risk premium and appreciate the Kwanza. The dynamics are like those presented for the reduction in the government's USD balance, but the coefficient found in the estimation was more significant. This asymmetry could indicate that changes in the government's USD balance related to oil revenues are important for exchange rate dynamics.

III. Improving the Policy-Making Process

60.   **On the road to becoming an inflation-targeting country, the BNA must focus on strengthening the foundations of the monetary policy decision-making process and efficient institutional communication.** FPAS must become more forward-looking in its analyses and assessments of scenarios. In turn, medium-term inflation expectations must be continually evaluated and adjusted to ensure the best information available for decision-making. The conduct of monetary policy must aim for disinflation objectives in the medium term and simultaneously take care of anchoring expectations. Institutional communication must be effective and always must outline the key factors and policy options determining future actions to ensure convergence with the targets.

A. Changing the Mindset towards a More Forward-Looking Process

61.   **BNA must improve its monetary policy framework and open market operations (OMO) to ensure the official BNA rate becomes the benchmark for market interest rates.** The operational performance on implementing the rates defined by the MPC is a working hypothesis for the core QPM model. There should be no doubt about either the BNA's power to affect directly and immediately the market interest rates, or the performance of OMO to make the policy rate the benchmark rate. The failure of this working hypothesis makes the FPAS and its products inefficient in producing economic stability.

62.   **Staff might start budgeting interest rate paths and discuss the policy trade-offs to support MPC decision, aiming to draft an effective forward-looking communication.** BNA staff should focus on evaluating policy options and recommending monetary policy decisions in terms of interest rates, magnitudes, and timing. Although there is an internally consistent model-based dynamics for money aggregates, the staff should avoid referencing the paths as policy variables. During the mission, FT received additional tools and suggestions for conditioning variables that can help produce the baseline scenario. In particular, the code for budgeting interest rate trajectories is an essential tool for analyzing policy alternatives and for constructing the technical recommendation for the MPC decision.

63.   **Regular, pre-planned meetings between different groups can improve the forward-looking nature of FPAS.** Meetings between different groups already happen during the cycle, but they are on-demand, and the discussion is not very prospective or used to validate short-term forecasts. Instead, these meetings are just for analysis and decomposition of newly released data. MPC members do not participate in preliminary meetings to discuss hypotheses, scenarios, and simulations. Neither do they meet with the forecast team previously to the MPC meetings to understand the results and request new studies. There is room for changing the scope and relevance of technical meetings to prepare all groups to deliver a more integrated and forward-looking analysis.

64.   **The mission recommended setting up regular all-team meetings to be previously scheduled for each forecasting calendar.** Team meeting dates should be closely linked to the dates of MPC meetings and should involve all DEE groups. Senior management and MPC members can be kindly invited to join the meetings. The first meeting must present, discuss, and evaluate short-term projections and the inputs for the medium-term model. In the second meeting, the QPM

forecasting team must present to technical staff the preliminary results of the baseline scenario, aiming to validate assumptions, provide feedback on the actual impact of nowcasts on prospective inflation, and anticipate alternative scenarios. The participation of high-level officials can improve the evaluation of the current outlook, the assessment of the conditioning variables, and the quality of analysis and forecasts. The meetings are great spots to pre-order the FT with meaningful alternative scenarios that are relevant to policymaking. High-level participation also improves forward-lookingness and seniority of economic analysis and policy advising and simultaneously may help the BNA to start building communication strategies earlier in the cycle. With much of the technical discussion anticipated in these meetings, the MPC can primarily focus on the conduct of monetary policy and communication.

B. The Role of Survey-Based Market Expectations

65.   **The mission met off-agenda with members of DEE and DES to discuss aspects of the BNA's survey-based market expectations.** There is a market expectations survey with inflation expectations for a 1-year horizon. The mission recommended expanding the survey to include longer horizons to begin monitoring these horizons immediately. Current reports of projections of inflation for longer horizons might have a lot of noise and volatility and are indeed difficult for most research participants, including market agents, to calculate long-term inflation with quality. Nonetheless, the staff agreed that monitoring these perceptions of long-term inflation can still help Angola's disinflation process and support the conduct of monetary policy, particularly in the transition to inflation targeting. Going forward, the quality of long-run inflation reported in the expectations survey should be investigated in-depth, as they are key for evaluating the anchoring of inflation targets and the credibility of the conduct of monetary policy.

66.   **The mission brought to light relevant aspects for evaluating the quality of expectations reported in the survey.** Currently, some participants report outlier values, either due to a lack of technical structure or a lack of incentives to predict better. BNA trims central tendency statistics to get better numbers. Based on international practices, the mission suggested that the staff continually monitor projection errors in market expectations and start to rank the best forecasters of short/medium/long term dynamics.

67.   **The alignment of incentives for better reporting can be significantly improved by giving publicity to the dynamics of forecasting errors.** In due course, the BNA may create publicity and reward mechanisms for the best individual forecasters to expand incentives further. Having a flexible categorization of the participants in the expectations database into different groups, such as sectoral, regional, best forecasters, most active forecasters, etc., can help the staff obtain more robust and reliable central tendency metrics, always using forecast errors as a metric for evaluation.

68.   **Assessment of research responsiveness to shocks can contribute to improving the information available for the FPAS and the conduct of monetary policy.** The response time of expectations survey reports to shocks occurring in the economy is a relevant element to guide the discussion and conduct of monetary policy. MPC should have the best number available given the current economic outlook. Expectations are currently collected monthly and fixed in the second week of each month. The BNA must evaluate the convenience of changing collection dates and

synchronizing them with dates around the MPC meetings to ensure the best possible snapshot of market forecasts.

69.   **BNA staff might create a habit of continuously evaluating the quality and responsiveness of its survey of expectations, especially for medium-term inflation.** FT must regularly monitor the evolution of inflation and other variables to understand what is driving market expectations. This can generate insights about the drivers of inflation forecasts and meaningful alternative scenarios. In the future, as long expectations of inflation in the medium run gain shape and become robust, FT may consider using a time series of market expectations to feed the core model and assist in the economic narrative.

C. Building an Effective Communication under Inflation Targeting

70.   **The BNA's monetary policy communication must change substantially to strengthen the transition to inflation targeting.** Currently, the monetary policy statement is drafted in the DEE and contains a lot of known data facts, but little or no discussion of the prospective scenario. The documents of monetary policy communication are poorly positioned on the BNA's website for public consultation. Monetary policy documents are normally highlighted on central bank portals, since price stability is the first mission of a central bank, as is the case with the BNA. The mission suggests that documents related to monetary policy be reformed in format and content and that the BNA's means of external dissemination be improved for easy access and research of the documents.

71.   **The transition to inflation targeting requires immediate enhancement of public communication to start building credibility.** Although disclosure and communication at the BNA have shown great advances in recent years, it is still necessary to keep improving. Formats and contents of monetary policy statements have to move towards a more forward-looking approach, and minutes of the MPC meetings might describe the general discussion on the prospective scenario carried out by the members of the MPC, highlighting the factors that led to decisions. Forward-looking communication is an essential element of the inflation-targeting regime. Signaling about the elements that affect the path of inflation from the MPC perspective, and its assessment of the elements that matter for the conduct of monetary policy are must-haves to anchoring inflation expectations and ensuring convergence towards the targets.

72.   **Changing the mindset, discussing prospective scenarios for inflation, improving market expectations, and reforming monetary policy communication are complementary activities and should be pursued in parallel.** The transition to inflation targeting requires the gradual buildup of one central bank's credibility in the policy assessment, decision-making, implementation, and effective communication of its actions to the public. The BNA needs to make further progress on several fronts, and failing in or skipping any step compromises the whole process. Increasing the credibility of a central bank framework is in essence what makes it possible to generate consistent disinflation and obtain price stabilization in an inflation-targeting regime.

IV. Next Steps

73.   **The authorities expressed interest in follow-up TA requests pending their adopting the recommendations of this mission and the 2022 TA mission.** Such TA could include enhancing monetary policy communication in an inflation targeting regime and support to calibrate and enrich the QPM by tailoring it further to the Angolan economy.