INTERNATIONAL MONETARY FUND

Fiscal Forecasting Errors in Nigeria

Salma Khalid

SIP/2025/095

2025
JUL

SELECTED ISSUES PAPER

 SIP/2025/095

IMF Selected Issues Paper
African Department

Fiscal Forecasting Errors in Nigeria

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Authorized for distribution by Axel Schimmelpfennig
July 2025

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ABSTRACT: *The Ministry of Budget and Economic Planning's budget implementation reports reveal large fiscal forecast errors over the 2011-2023 period, for a range of fiscal aggregates including total revenues, expenditures, and the fiscal deficit. Revenues forecasts errors are driven by optimistic budget projections for oil production which consistently exceed actual outturn. Capital expenditures are also subject to systematic optimism bias, with outturn falling short of budget allocations. Large fiscal forecast errors limit the usefulness of the budget in providing a framework for the authorities' fiscal policy intentions. Cross-country experience suggests that the quality of budget forecasts can be improved by enhancing the capacity of the macro-fiscal unit responsible for forecasting, publishing internal and external forecast performance reviews, and enhancing political commitment to budget targets. By improving the quality of fiscal forecasts, the authorities can enhance the credibility of the budget in serving as a guide to fiscal policy in Nigeria.*

RECOMMENDED CITATION: Salma Khalid. 2025. Fiscal Forecasting Errors in Nigeria. IMF Selected Issues Paper SIP/2025/095

JEL Classification Numbers:	E62; H61; H68
Keywords: Budget forecasting; forecasting errors; budget projections; fiscal forecasting	
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SELECTED ISSUES PAPERS

FISCAL FORECASTING ERRORS IN NIGERIA

Prepared by Salma Khalid (FAD)[1]

[1] The author would like to thank Sybi Hida (IMF) for their guidance and close collaboration.

INTERNATIONAL MONETARY FUND

NIGERIA

SELECTED ISSUES

May 29, 2025

Approved By
The African Department

Prepared By Salma Khalid (FAD. Chris Stumphius (AFR) provided research assistance and Joanna Delcambre (AFR) editorial support.

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FISCAL FORECASTING ERRORS IN NIGERIA[1]

The Ministry of Budget and Economic Planning's budget implementation reports reveal large fiscal forecast errors over the 2011-2023 period, for a range of fiscal aggregates including total revenues, expenditures, and the fiscal deficit. Revenues forecasts errors are driven by optimistic budget projections for oil production which consistently exceed actual outturn. Capital expenditures are also subject to systematic optimism bias, with outturn falling short of budget allocations. Large fiscal forecast errors limit the usefulness of the budget in providing a framework for the authorities' fiscal policy intentions. Cross-country experience suggests that the quality of budget forecasts can be improved by enhancing the capacity of the macro-fiscal unit responsible for forecasting, publishing internal and external forecast performance reviews, and enhancing political commitment to budget targets. By improving the quality of fiscal forecasts, the authorities can enhance the credibility of the budget in serving as a guide to fiscal policy in Nigeria.

A. Motivation

1. A government's budget represents a detailed financial plan for revenue collection and expenditure allocation for a fiscal year. The budget process is important for ensuring fiscal discipline, efficient resource allocation, well-guided economic planning, and effective public service delivery. By providing a framework for fiscal decision making, the budget helps determine the direction of fiscal policies, ensures discipline with respect to approved budget targets, and promotes transparency in terms of how fiscal resources are mobilized and spent.

2. Key to the budget preparation process is the development of credible fiscal forecasts which provide a data-driven foundation for policy making. By developing realistic fiscal forecasts, budgets are less likely to run the risk of expenditure overruns or under execution, by balancing the government's ability to raise revenues and its borrowing abilities with the needs and capacities of line ministries to apply these revenues towards operational and capital expenditures. Unrealistic revenue and expenditure forecasts can contribute to budgetary imbalance which deteriorate the path of public finances, strain borrowing limits, create unplanned debt accumulation, and misallocate scarce resources. Persistent biases in budget forecasts relative to budget execution also undermine the reliability of the budget document as a guide for fiscal policy making, exacerbate fiscal policy uncertainty, and reduce the confidence of both the private sector and voters. As such, poor fiscal forecasting can have wide-ranging consequences for public finances, economic growth, and political stability.

3. In this context, we analyze fiscal forecasting errors in Nigeria over the 2011-23 period. Forecast errors are estimated for the key revenue components of oil and non-oil revenues, as well as large expenditure aggregates of recurrent and capital expenditures, by comparing budget

[1] Prepared by Salma Khalid (FAD).

appropriations with budget execution data.[2] Systematic analysis of forecast errors helps identify economics aggregates that are most likely to deviate from budget appropriations, the impact of these errors on the trajectory of the fiscal deficit and therefore debt, and highlight the need for the authorities to improve the quality of their fiscal forecasting and tie budget execution more tightly to fiscal needs and targets. We use budget implementation reports as published on the website of Nigeria's Ministry of Budget and Economic Planning.[3]

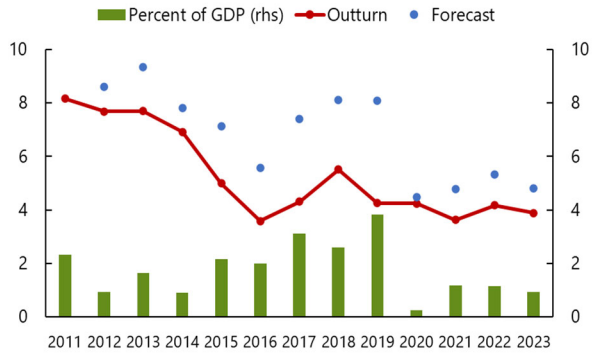
B. Revenues

4. Government revenue projections show a consistent optimism bias over 2011-2023, with the budget forecasts for revenue exceeding revenue outturn for all years except 2020, when the gap is narrow (Figure 1). The scale of forecast errors is large, averaging 1.8 percent of GDP or 36 percent of actual revenues. Though revenue forecast errors are decreasing in recent years, they remain sizable at 1.1 percent of GDP or 28 percent of revenues over the 2021-23 period. Analysis of error components (below) indicates that revenue forecast errors emerge primarily from forecast errors in oil revenues, due to optimistic oil production projections in the budget.

Text Figure 1. Revenue Forecast Errors

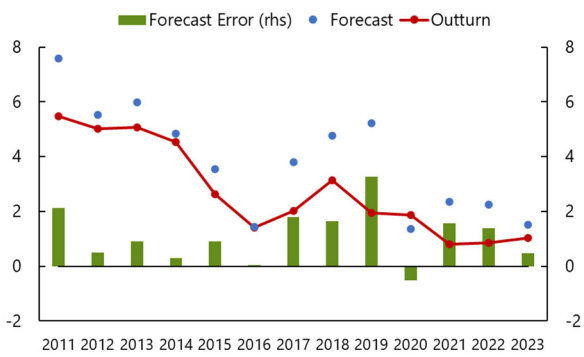
Total Revenues Forecast and Outturn, 2011-2023

(Percent of GDP)



Oil Revenues Forecast and Outturn, 2011-2023

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

[2] This work extends and updates earlier work done by FAD in collaboration with AFRITAC West. Forecast errors are defined as the difference between the budget forecasts and the actual outturns, expressed as a percentage of GDP outturn for the respective year.

[3] For years in which the budget implementation report is unavailable for the 4th quarter (reflecting the full execution of the budget), we utilize the execution report for the following year which contains information on execution in the prior year. For 2023, we use information shared bilaterally by the government for the 2024 Article IV surveillance. We also use information the authorities' published MTEFs as needed.

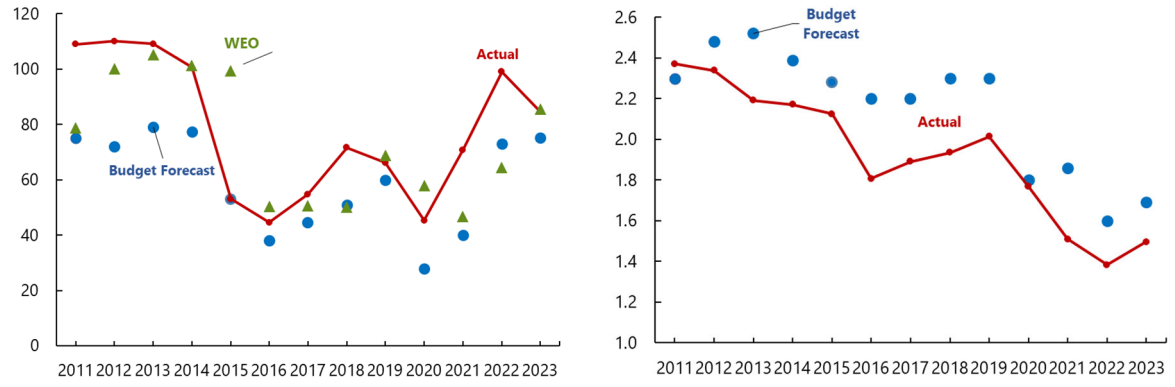
Oil Revenues

5. Oil revenues forecast errors follow a similar trend as forecast errors in overall revenues. Oil revenues are consistently overestimated over the analysis period, except for 2020. The size of forecast errors is large, explaining most of the total revenue forecast errors, averaging 1.1 percent of GDP and 61 percent of oil revenues over this period. There is significant heterogeneity year to year, with small forecast errors in the 2012-2016 period, followed by large and increasing forecast errors in the 2017-2019 period.

6. The benchmark price used by the authorities for oil revenue projections is systematically more conservative than the actual oil prices observed in global markets which serves to offset the optimism bias in oil revenue forecasts. WEO projections have borne a closer relationship with oil price outturn during the earlier years of our analysis, but the gap between the two price estimates has closed in recent years.[4] Systematic optimism in oil revenue forecasts cannot therefore be explained by systemically optimistic oil price projections. In fact, the conservative oil benchmark prices actually serve to offset errors in total oil revenues.

7. Oil revenue forecast errors are driven by production forecast errors. Comparing budget forecasts of oil revenue production against actual outturn, we find that actual production has failed to achieve budget targets in 11 of the 13 years studied. As such, consistent optimism in projections for oil production appears to be a key contributor to overall optimism in oil revenue forecasts.

Text Figure 2. Oil Price Forecast Errors



Sources: Nigeria Ministry of Budget and Economic Planning, World Economic Outlook and IMF Staff calculations

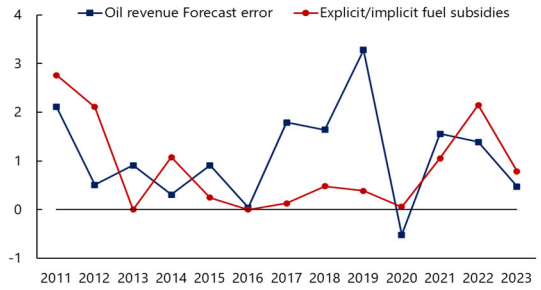
[4] We use October WEO projections from the year prior (i.e. Oct 2010 WEO vintage for 2011 Oil price)

8. Shortfall in oil revenues has been attributed variously to technical constraints as well as poor security. An analysis of the narrative of budget implementation reports indicates that shortfall in oil revenues across all years is attributed to various combinations of low oil lifting volumes, crude oil theft and pipeline vandalism, and illegal bunkering, with occasional references to low international oil prices. However, the narrative does not provide a breakdown of what proportion of the shortfall is attributable to operational/technical capacity constraints for oil lifting or leakages due to the poor security situation.

Text Figure 3. Oil Revenue Forecast Errors

Oil Revenue Forecast Errors and Explicit/Implicit Oil Subsidies

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

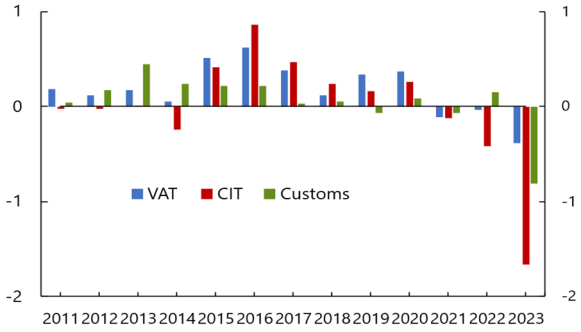
9. Budget implementation reports also cite fiscal deductions as being a cause of net oil revenue underperformance but lack sufficient details on the source of the deductions. While the 2019 budget implementation report specifically cites PMS under-recovery deductions on remittances from NNPC, the 2021 and 2022 reports broadly refer to fiscal deductions on oil revenue without elaborating on the source of these deductions and the reason for their departure from budget projections[5]. Comparing the size of explicit and implicit subsidies provided for oil consumption with the size of oil revenue forecast errors, we find that in years where the subsidy is large, such as 2011 and 2021/2022, the size of forecast errors is commensurately large, suggesting that these subsidies may be contributing to forecast errors in form of unbudgeted fiscal deductions.[6]

[5] PMS under-recovery deduction is the mechanism by which the government covers the cost of the implicit fuel subsidy through remittances from the federation accounts to National Nigerian Petroleum Company (NNPC) Limited.

[6] The explicit and implicit subsidies on oil arise from the price setting mechanism for oil products in Nigeria, where the price of petroleum products is set by the government and not allowed to vary with respect to international price movements.

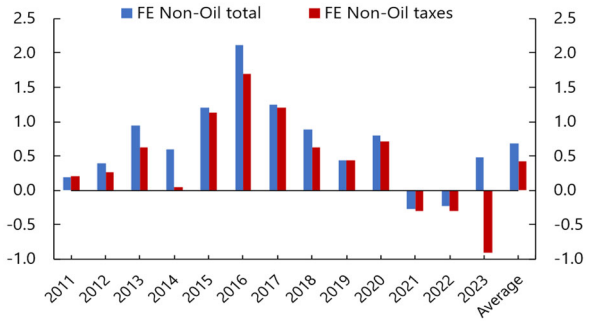
Text Figure 4. VAT and Non-Oil Revenue Forecast Errors

VAT, CIT And Customs Revenue Forecast Errors, 2011-23 (Percent of GDP)



Non-Oil Revenue Forecast Error, 2011-2023

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

Non-Oil Revenues

10. Three taxes comprise the bulk of non-oil revenue streams: VAT, CIT and Customs taxes. Forecast errors in VAT are also characterized by an optimism bias for the years prior to 2020, with VAT overperformance thereafter reversing the direction of forecast errors. While forecast errors are large as a percentage of VAT revenues, averaging 25 percent of VAT revenue, they are small in percent of GDP averaging only 0.2 percent of GDP. CIT forecast errors follow a similar pattern of optimism bias for the years 2015-2020 followed by strong growth of CIT revenues which is not captured in projections for this period, resulting in pessimism bias. Customs revenue forecast errors, unlike VAT and CIT, remain positive and large in recent years, with optimism bias in budget projections for this revenue item, which is not borne out by the revenue outturns, particularly in 2022 and 2023.

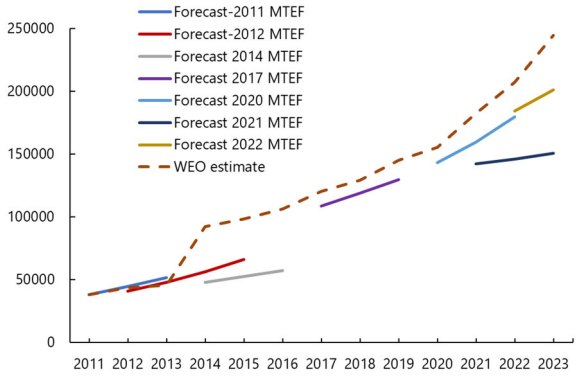
11. Forecast errors in total non-oil revenues exceed forecast errors in non-oil revenues from taxes. Comparing non-oil revenue from taxes against net non-oil revenues, we find that forecast errors are, on average, larger for net non-oil revenues, suggesting that deductions and other non-tax lines of revenue also optimism bias in budget projections, therefore compounding forecasting errors in the calculation of net non-oil revenues.[7]

[7] Analysis of budget implementation reports indicates that deviations between total CIT, VAT and Customs collections and the Net Non-Oil revenue are attributable to federation account levies, cost of collection and refunds, transfer to other accounts (such as Nigerian Police Trust Fund, North East Development Commission) and exceptional sources of revenue (e.g. surcharge on luxury items)

12. An analysis of the narrative of budget implementation reports indicates that in some years shortfalls in non-oil revenue outturns relative to budget forecasts have been attributed to leakages. The leakages are attributed to lack of remittance from Ministries, Departments and Agencies (MDAs), weaknesses in tax collection, administrative challenges faced by the Federal Inland Revenue Service (FIRS), and delays in implementation of revenue-enhancing policies. However, most budget implementation reports lack an in-depth analysis of sources of forecast errors or revenue underperformance in the non-oil sectors.

Text Figure 5. Nominal GDP Forecasts vs. WEO Estimates

(Billion Naira)



Sources: Nigeria Ministry of Budget and Economic Planning, World Economic Outlook and IMF Staff calculations

13. Examining nominal GDP assumptions from Medium Term Economic Framework (MTEF) documents, we do not find systematic evidence for optimism bias in the projections, with outturn exceeding authorities' projections. Insofar as nominal GDP growth underlies non-oil revenue forecasts, the forecast optimism in non-oil revenue projections does not arise from optimistic assumptions regarding the nominal growth rate of the economy.

C. Expenditures

14. The government budget projections for total federal government expenditures also reflect consistent positive forecast errors, averaging 0.8 percent of GDP over the 2011-23 period and exhibiting an upwards trend since 2020. Hence, budget forecasts consistently overestimate federal government expenditures relative to the actual outturn, in line with the optimism in revenue forecasts. Analysis of expenditure components indicates that expenditure forecast errors are predominantly driven by optimistic projections regarding capital expenditures, with capex execution falling short in nearly all years analyzed.

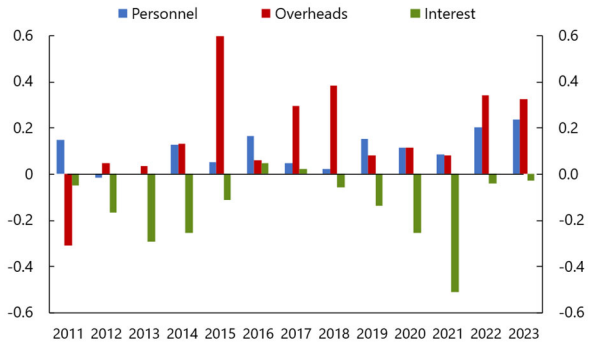
Recurrent Expenditures

15. Forecast errors in recurrent expenditures are a small proportion of the total expenditure forecast errors. Evaluating expenditure components, we find that personnel expenditures have very small forecast errors on average, though the size of the errors has increased in recent years. While forecast errors are large in overheads and other non-debt/non-personnel expenditures in percent of expenditures, they do not form a large proportion of forecast errors in

percent of GDP, averaging 0.2 percent of GDP in the 2011-23 period.[8] Both personnel and overheads errors imply that the government budget appropriation exceed actual outlays. In contrast, debt service payments have mostly negative forecast errors with budget projections frequently underestimating the true size of interest payments during the year. These errors are small however, averaging -0.1 percent of GDP over the 2011-2023 period, with negligible errors in 2022/23 in spite of large fluctuations in the interest bill. Taken together, budgets have tended to overestimate recurrent expenditures, driven by projections for overheads and personnel costs in recent years.

Text Figure 7. Recurrent Expenditures Forecast Errors, 2011-23

(Percent of GDP)

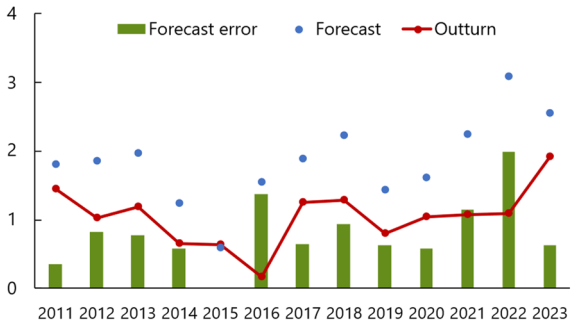


Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

16. Budget implementation reports note that the government prioritizes limiting recurrent expenditures in the face of weak revenue performance and to reverse the trend of escalating recurrent expenditures as a proportion of total expenditures. Hence, the positive forecast errors in overhead costs and personnel expenditures are likely a reflection of the government's need to restrict in-year spending as revenue mobilization outturns miss targets.

Text Figure 8. Capital Expenditures Forecast and Outturn, 2011-2023

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

17. Increasing gaps between recurrent expenditure execution and the budget envelope may be attributable to public financial management reforms. The rollout of an electronic database systems for managing payroll to reduce leakage in personnel costs, and restrictions on unauthorized recruitment by MDAs since 2021 are highlighted in budget implementation reports as administrative measures for reducing recurrent expenditures, which can account for the increasing savings between personnel expenditure outturns and budget forecasts in recent years. Rationalization of overheads using an efficiency unit, freezing of overheads, the use of an IT system for public financial management and the use of the Treasury Single Account are all cited as contributing to reduction in overheads. On the other hand, overruns

[8] For the purpose of this presentation, overheads include Other Service Wide Votes, Presidential Amnesty Program, Tetfund and Special interventions.

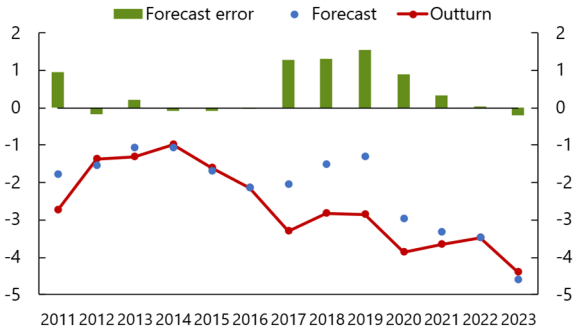
in interest expenditures are attributed to higher issuances or increasing costs of rolling over existing issuances.

Capital Expenditures

18. Budget forecasts of federal government capital expenditure are very optimistic considering low execution. Forecast errors in capital expenditures average over 70 percent of the actual executed values, and 0.8 percent of GDP over the 2011-2023 period. These projection errors reflect optimism bias, with budgeted capital expenditures far exceeding actual execution in all but one year in the period examined.

Text Figure 9. Fiscal Balance Forecast and Outturn, 2011-2023

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

19. Despite capital budgets appropriations being extended to the following fiscal year, giving rise to concurrent budgets, underutilization is persistent. Underutilized capital budgets from the year can be extended to the subsequent year to allow MDAs greater time to execute on their capital projects. However, this comes at the expense of delaying implementation of the capital expenditures budget of the current year, suggesting that MDAs do not have the capacity to execute both budgets simultaneously. This would suggest that forecast errors in one year have a snowball effect of generating larger forecast errors in the subsequent year. The budget implementation report also notes financing constraints at the project level despite underutilization of the budget, and frequent recommendations for MDAs to prioritize project completion over managing recurrent projects. This would suggest that MDAs are capacity constrained in their ability to effectively manage multiple recurrent projects, leading to incomplete and abandoned projects.

D. Fiscal Deficit

20. Forecast errors in the fiscal balance rose between the 2017-2021 period, but have shrunk thereafter, with the fiscal balance outturn being higher than budgeted in the most recent year of data. When comparing the fiscal balance forecast errors with their components, we can see that years with large forecast errors are characterized by strong optimism bias in revenue projections, both oil-and non-oil. Following 2021, oil revenue forecast errors – though sizable – have been on a declining trend, which has helped reduce forecast errors. However, part of the reason for shrinking forecast errors in the fiscal balance is under execution of budgeted expenditures which offsets revenue underperformance. As such, while the fiscal balance errors may appear small, they mask large, off-setting errors in their components, suggesting gaps in the government's ability to project its revenues and needs accurately.

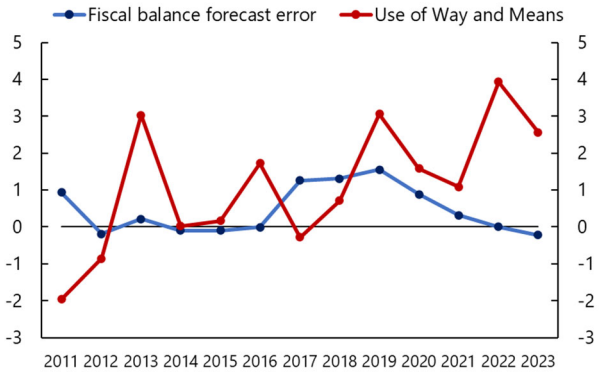
21. The relationship between fiscal balance forecast errors and central bank financing of the deficit is not consistent. However, we do find that a period of large fiscal balance forecast errors during 2017-2021 coincides with an increasing trend in the use of ways and means during the 2018- 2023 period. Hence, fiscal forecast errors may be a contributor to the government resorting to central bank financing due to unbudgeted shortfalls in revenue.[9]

E. Conclusion and Policy Advice

22. Forecast errors in Nigeria's budgeting process indicate persistent optimism with respect to the government's ability to mobilize revenue. While an analysis of 16 economies in Eastern and Southern Africa indicates the presence of positive forecast errors in revenue projections across the majority of the countries, the size of forecast errors in Nigeria's revenue place it at the top by size of average revenue forecast errors (Figure11, Battersby & Lienert, 2021).

Text Figure 10. Fiscal Balance Forecast Errors and Use of Ways and Means

(Percent of GDP)



Sources: Nigeria Ministry of Budget and Economic Planning and IMF Staff calculations

23. Positive revenue forecast errors have had limited impact on the fiscal deficit due to expenditure compression. Revenue optimism should ostensibly result in large errors in fiscal deficit forecasts if the government experiences no borrowing constraints. In Nigeria's situation, despite revenue shortfall, forecast errors in the deficit are relatively contained in most years, which can be attributed to in-year expenditure reduction. We see evidence for such expenditure compression in payroll and overheads, and this is also indicated in budget implementation reports.

24. Large and persistent forecast errors in budget revenue projections run the risk of underfunding of essential expenditures during the budget year when shortfalls occur, due to constraints on the borrowing envelope. Expenditure compression on overheads and personnel can harm the ability of MDAs to finance their personnel and operational needs and therefore exert a direct impact on the ability of MDAs to execute on their capital expenditure allocations and can compromise the quality of their spending and investment. Persistent shortfall of capital expenditure execution, and the use of concurrent budgets, indicate capacity constraints at the level of executing agencies, with budget implementation reports indicating weakness in expenditure management and cash flow. As noted in budget implementation reports, this is manifested in the form of capital expenditures projects that are abandoned before completion. With capital expenditures constrained

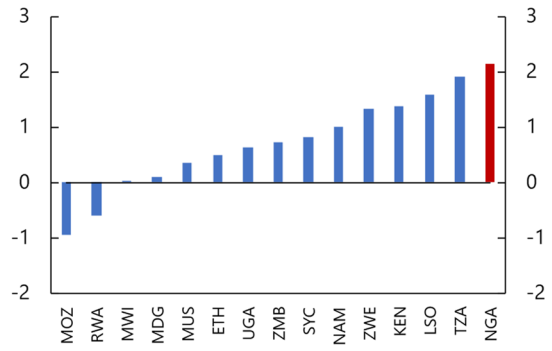
[9] Use of ways and means is proxied by evaluating the change in net central bank claims on the central government, in the monetary and financial account statistics.

by MDA capacity, the task of correctly budgeting limited resources to the most pressing needs, and the most capable ministries for execution, is critical. This requires more accurate and realistic accounting of government revenues and expenditures.

25. Cross-country experience from other African economies indicates that forecasting performance can be improved if the macro-fiscal unit conducts ex post assessments of the accuracy and quality of their budget forecasts. For example, in Kenya the macro-fiscal department analyzes the quality of macro-fiscal forecasts and publishes their analysis as an annex to its annual Budget Policy Statement. Their analysis includes a table discussing of the size of divergences between forecasts and outcomes and their main causes. Malawi's MoF has also calculated the forecasts errors for nominal GDP growth and government revenue, and used these to present confidence intervals around their macro-fiscal forecasts, as part of their development of their fiscal risk-statement.

Text Figure 11. Average Revenue Forecast Errors

(2012/13-2018/19, Percent of GDP)



Sources: Battersby & Lienert, 2021 and IMF staff calculations

26. Best practices for improving the budget forecasting function include:

- Recognizing the importance of producing clear and credible forecasts of fiscal aggregates and placing the macro-fiscal departments responsible for budget forecasts on par with other MoF and Budget departments
- Ensuring coordination between all fiscal departments to ensure data sharing and collaboration and enhancing quality and timeliness of data. Formal memoranda of understanding for data exchange can be drawn up between relevant agencies.
- Ensuring staff training and use of tools for forecasting which are compatible with the skill sets of staff.
- Conducting and publishing forecast performance reviews, to enhance transparency, create incentives for improving accuracy, and build public and market confidence in the credibility of the budget documents as a guide for fiscal policy.
- Enhancing political commitment to budget targets, by conducting periodic reviews of forecasts, internally highlighting the fiscal cost of different policy choices, and encouraging reviews by external consultants or stakeholders to mitigate political pressure on forecasters. In the case of Nigeria, these reviews can be conducted by the Fiscal responsibility Council on a regular basis and presented to the Ministries and to Parliament.

27. Reducing errors in the budget forecasting process can enhance government function. Accurate budget forecasts ensure that the government makes budget choices that are consistent with its economic policy priorities and set MDAs up to deliver on these priorities. Improving budget credibility can generate benefits for the government across multiple domains and with a range of stakeholders including:

- *Enhancing public expenditure management.* By aligning annual spending with medium and long-term spending priorities, and ensuring spending plans are subject to macroeconomic constraints, credible budgets can enhance the efficiency of resource allocation and improve public service delivery

- *Enhancing debt management*. Persistent deviations between the budget and execution as a result of revenue underperformance or expenditure over execution can result in unanticipated debt accumulation and put fiscal sustainability at risk. Lack of fiscal transparency can also influence borrowing costs by increasing risk perceptions.

- *Reducing uncertainty among investors regarding the direction of economic policies.* Timely, transparent, and credible budgeting, accompanied by effective implementation are crucial for engendering private sector confidence and allowing greater public-private partnership.

- *Enhancing public trust in government institutions and the budget process.* Credible budgeting, upholding budget commitments and clearly demonstrating why deviations from these commitments occur can help deliver greater trust in government and greater public willingness for policy reforms.

References

Battersby, B., & Lienert, M. I. (2021). *Macro-Fiscal Management Practices in Eastern and Southern Africa*. International Monetary Fund.