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ANGOLA

SELECTED ISSUES

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ANGOLA

SELECTED ISSUES

February 26, 2024

Approved By
The African Department

Prepared by Zviad Zedginidze (AFR), Sherifa Abdelrazek (AFR), Marco Miguel (AFR) and Alexander Borodin (ICD). Guidance, support, and comments by Lisa Kolovich, Naomi-Rose Alexander, Vivian Malta, Monique Newiak (all SPR), Virginia Alonso-Albarran (FAD), Marcos Souto and Victor Duarte Lledo (AFR) were greatly appreciated.

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MODELING MONETARY POLICY IN RESOURCE-RICH ECONOMIES: THE CASE OF ANGOLA[1]

A. Introduction

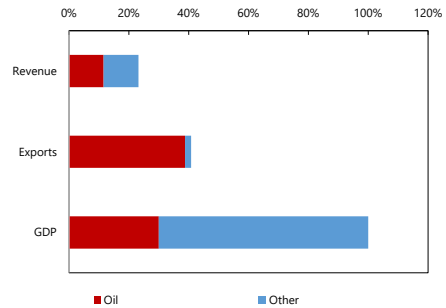
1. As a small open economy with high reliance on the oil sector, Angola is vulnerable to frequent shocks. The primary shocks are related to oil exports and includes fluctuations in oil prices and production levels. Due to its dependence on external financing, Angola is also exposed to fluctuations in global interest rates and swings in investors' risk appetite. Domestic supply shocks, including those stemming from climate change, also impact the economy. These shocks present policymakers with complex trade-offs regarding (the levels of) inflation, growth, international reserves, as well as fiscal sustainability. Unlike many resource-rich countries (such as in the GCC), Angola has moved to a greater exchange rate flexibility and is transitioning to an inflation-targeting framework.

2. This paper uses an extended semi-structural New Keynesian model to simulate shocks and analyze policy scenarios in Angola. The model features Angola's oil dependence and strong linkages between the oil sector and the exchange rate. The key objectives are to develop a forward-looking framework that can (i) model the impact of shocks on an economy calibrated to mimic Angola, and (ii) inform monetary policy discussions with the analysis of various policy trade-offs. The paper is structured as follows: (i) an overview of Angola's economy; (ii) an assessment of the cyclical stance of the economy; (iii) the main features of the model, including the calibration any key results; (iv) policy-relevant scenarios for Angola, and (v) policy implications.

B. The Role of Oil for Angola's Economy

3. Angola's economy is closely linked to its oil sector. Fluctuation in oil income has become the main source of volatility in its economy since the end of the civil war in 2002. Non-resource sectors such as, construction, trade, transportation, services, and finance are also closely linked to the oil sector, particularly through the fiscal channel. Oil price shocks can result in disruptive fluctuations in fiscal and external balances, frequently leading to weaker and more volatile economic growth.

Figure 1. Oil Concentration in Angola, 2022
(Percent of GDP)



4. Angola continues to heavily rely on oil (Figure 1). In 2022, oil accounted for more than 50 percent of fiscal revenues, 95 percent of exports, and 35 percent of GDP. Such dependence leaves Angola highly vulnerable to oil related shocks, often forcing the authorities to navigate

[1] Prepared by Zviad Zedginidze (AFR), Sherifa Abdelrazek (AFR), and Alexander Borodin (ICD).

through difficult trade-offs. This vulnerability was particularly pronounced in 2023, when a decline in oil production led to lower foreign exchange earnings and a contraction in output. In response, the nominal exchange rate depreciated significantly in mid-2023.

5. Shocks to the oil sector influence both the cyclical and structural levels of the economy, especially given the nature of ageing oil fields in Angola. The sharp and persistent decline of oil prices in 2014–16 led to a reduced investment—no longer sufficient to offset the natural decline of oil fields. Angola witnessed significantly lower investments in the oil sector during the Covid pandemic. As a result, the oil sector faced challenges in 2023. Between November 2022–June 2023 the unexpected extension of oil maintenance operations led to a drop in oil production below its potential level—contributing to cyclical downturn. Maintenance operations, however, are transitory and thus are not expected to impact the trend.

6. Oil sector shocks also complicate the conduct of monetary policy as they lead to significant volatility in the nominal exchange rate. Exchange rate flexibility plays an important to absorb shocks to the economy (especially for the fiscal sector). However, exchange rate swings complicate monetary policy making, given their high pass through to the inflation.

7. Against this background, the BNA Law passed in 2021 provides the basis for a transition to inflation targeting (IT) framework. The law established a price stability mandate, increased operational autonomy of the BNA, limited monetary financing, and improved central bank governance. With the introduction of the law, the BNA initiated transition to an inflation-targeting framework in the medium term.

8. Despite some progress, short-term interest rates are yet to be established as an operating target for monetary policy. The BNA communicates its policy decisions using a reference policy rate. However, current interbank rates are in part misaligned with the targeted policy rates, primarily due to excess liquidity conditions in the interbank market. The monetary policy formulation is in part based on money aggregates.

C. The Model of the Angolan Economy

Model Framework

9. The paper uses a semi-structural New Keynesian model, incorporating four key blocks: aggregate demand, aggregate supply, external, and monetary blocks. To capture Angola's reliance on oil and allow simulations of terms-of-trade shock, the model explicitly incorporates the oil sector. Aggregate demand is divided into oil and non-oil sectors. In addition, oil earnings—dominating the exports and driving the current account balance—represent the key channel through which Angola interacts with the rest of the world. To this end, oil income has significant implications for both aggregate demand and external components of the model.

10. The model captures behavioral relationships among the key macroeconomic variables and the policy transmission mechanism. The model includes: (i) IS curve, (ii) Phillips curve, (iii) Taylor-type forward looking monetary policy reaction function, and (iv) uncovered interest rate

parity.[2] These core equations are further supplemented with additional equations on external accounts and are tailored to feature Angola specific characteristics. While these equations could broadly be derived from microeconomic principles, they are not rigidly bound to micro-foundations, which allows greater flexibility in incorporating country-specific characteristics.

11. All variables in the behavioral equations are expressed as "gaps", defined as percentage deviations from their trend or equilibrium levels. These trend levels are estimated within the model. Accordingly, the model captures the interaction between the trend and cycle, providing greater economic consistency in the estimation than purely statistical filtration methods, such as, for example, the Hodrick-Prescott method. The concept of "gaps" in the model is linked to the business cycle, while the trends are shaped by the economy's underlying structural features, which are, driven by structural policies. Disturbance terms, denoted by ε, represent shocks affecting each macroeconomic variable and are incorporated in all behavioral equations with respective subscripts. The model uses quarterly data.

Model Equations

12. The aggregate demand is divided into oil and non-oil parts, with the latter modeled as an investment-saving (IS) curve:

$$\hat{y}_t = \omega * \hat{y}_t^{oil} + (1-\omega) * \hat{y}_t^{noil}$$

$$\hat{y}_t^{noil} = \alpha_1 \hat{y}_{t-1}^{noil} + \alpha_2 E_t \hat{y}_{t+1}^{noil} - \alpha_3 \widehat{rr}_{t-1} + \alpha_4 \hat{z}_t + \alpha_5 \left(\hat{y}_t^{oil} + \widehat{relpOIL}_t\right) + \varepsilon_t^y$$

Non-oil output gap ($\hat{y}_t^{noil}$) depends on monetary conditions represented by interest rates ($\widehat{rr}_{t-1}$) and real effective exchange rate ($\hat{z}_t$) gaps. The equation also takes into account non-oil economy's strong linkage to oil sector and incorporates the oil output gap ($\hat{y}_t^{oil}$) and oil price gap ($\widehat{relpOIL}$). The degree of persistence in aggregate demand is represented by its lagged value ($\hat{y}_{t-1}^{noil}$) and the economic outlook by its estimated forecast ($E_t\, \hat{y}_{t+1}^{noil}$).

13. The oil output fluctuates around a trend level, determined primarily by autonomous factors.

$$\hat{y}_t^{oil} = \rho_{\hat{y}}^{oil} \hat{y}_{t-1}^{oil} - \varepsilon^{\hat{y}^{oil}}$$

$$\Delta \bar{y}_t^{oil} = \rho_{\bar{y}}^{oil} \Delta \bar{y}_{t-1}^{oil} + (1-\rho_{\bar{y}}^{oil}) \Delta \bar{y}_{ss}^{oil} + \varepsilon_t^{\bar{y}^{oil}}$$

Oil production gap ($\hat{y}_t^{oil}$) is driven by the exogenous factor ($\varepsilon^{\hat{y}^{oil}}$) and the degree of persistence represented by $\rho_{\hat{y}}^{oil}$. An example of such an exogenous factor is oil maintenance operations which can be temporary by nature and affect production levels without changing the trend (potential) level. Trend level is driven by its underlying trend growth rate ($\Delta \bar{y}_t^{oil}$), which, in turn, is variable in time. To allow for persistent changes in the production capacity, a trend growth shock is introduced by $\varepsilon_t^{\bar{y}^{oil}}$. This term is a shock to the trend and will average over time to zero, allowing trend growth

[2] Drawing from Berg et al., (2006a, 2006b); Kumhof and Laxton (2007); Laxton and Pesenti (2003).

to eventually converge to its steady state growth rate ($\Delta\bar{y}_{ss}^{oil}$). An example of such a shock is the pandemic related slowdown in the investments, which impact the trend production levels over an extended period.

14. The aggregate supply curve is represented by a forward-looking Phillips Curve, modified to incorporate the country specific features:

$$\pi_t = \beta_1\pi_{t-1} + (1-\beta_1-\beta_2)\pi_t^e + \beta_2\pi_t^m + \beta_3\hat{z}_t + \beta_4\,\hat{y}_t^{noil} + \varepsilon_t^{\pi}$$

$$\pi_t^e = \delta E_t\pi_{t+1} + (1-\delta)\pi_{t-1}$$

Headline CPI inflation (π_t) is influenced by the non-oil output gap ($\hat{y}_t^{noil}$) and the real effective exchange rate gap ($\hat{z}_t$)—sum of these variables broadly indicates real marginal costs in the economy. The degree of persistence is represented by its lagged term (π_{t-1}) and the inflation expectations (π_t^e) are described by a mix of forward-looking and backward-looking expectations. In addition, imported inflation (π_t^m) and cost-push shock (ε_t^{π}) are also included.

15. The nominal exchange rate is reflected in the model via an uncovered interest rate parity (UIP) condition.

$$S_t = S_t^e + (i_t^* - i_t + prem_t)/4 + \varepsilon_t^s$$

$$S_t^e = \rho_s E_t S_{t+1} + (1-\rho_s)(S_t + \Delta\bar{S}_{t+1})$$

The nominal exchange rate against USD dollar (S_t) depends on its expected value (S_t^e) and the interest rate differential between domestic (i_t) and foreign rates (i_t^*) adjusted for country risk premia ($prem_t$). To account for the persistency in the exchange rate, exchange rate expectations (S_t^e) are described by a weighted average of the model-consistent forecast (E_tS_{t+1}) and the forecast implied by the long-term trend.[3] UIP shock (ε_t^s) is also introduced to capture the residual factors beyond interest rates, risk premia and expectations.

16. International reserves are linked to oil earnings, domestic demand, and real exchange rate.

$$\widehat{res}_t = \delta\,\widehat{res}_{t-1} + X\left(\hat{y}_t^{oil} + \widehat{relpOIL}_t\right) - M(\,\hat{y}_t^{noil} - \psi_m\hat{Z}_t) + \varepsilon_t^{res}$$

The deviation of international reserves from its desired level—expressed as percent of GDP ($\widehat{res}_t$)—is driven by the current account balance, approximated by the difference between exports

[3] The long-term trend is derived in relation to the real exchange rate trend and the difference between domestic and foreign inflation targets. This approach assumes that market participants have some perspective on the long-term trend exchange rate and are using this perspective to form expectations by extrapolating from current levels.

$X\left(\hat{y}_t^{oil} + \widehat{relpOIL}_t\right)$ and imports $M(\hat{y}_t^{noil} - \psi_m \hat{Z}_t)$.[4] The equation highlights the trade-off between the exchange rate and the reserves for a given current account balance. [5]

17. Currency risk premium is determined by the deviation of international reserves from desired levels:

$$\widehat{prem}_t = \rho_{prem}\widehat{prem}_{t-1} - \theta\widehat{res}_t + \varepsilon_t^{prem}$$

The deviation of the currency risk premium from its trend level ($\widehat{prem}_t$) is inversely related to the deviation of reserves from their desired levels. Specifically, as reserves decline relative to these desired levels, the risk premium increases. This increased risk premium, in turn, influences the exchange rate through the UIP condition, thereby creating an indirect link between the reserve position and the exchange rate. A substantial drop in reserves below the desired levels could exert pressure on the exchange rate. This structural context highlights the advantage of greater exchange rate flexibility in response to permanent terms-of-trade shocks.

Model Parametrization

18. The model parameters are largely calibrated, to ensure alignment of the model with Angola's data and to enhance its relevance for policy analysis. Staff calibration draws from quarterly projection models (QPM) by Benes (2015), Andrle (2013a), Alichi (2008). The primary advantage of calibration is to reflect the country characteristics, particularly in the absence of long time series for robust estimation and with frequent structural changes in the economy.

19. Some parameters are estimated using Bayesian methods (Figure 8). Bayesian estimation involves determining the parameters based on prior values, the model itself, and the likelihood of observed data.[6] Four key coefficients are estimated with the Bayesian method. These are the non-oil output gap sensitivity to oil gap, the REER impact on output, inflation sensitivity to output gap, and the weight on inflation deviation from its target in the policy reaction function. For most of the estimates, posterior modes are close to the priors, confirming the calibration values.

D. Assessing Cyclical Stance and Estimating Potential Output

20. Non-oil and oil output gaps are estimated to be negative in 2023 (Figure 2). A Kalman filter is used to estimate unobservable time series for oil and non-oil output (namely their gap and trend) to help assess the country's cyclical position. Cyclical weakness in the non-oil sector is largely attributed to negative spillovers from the oil sector. In addition, fiscal and financial sector implications of lower oil revenues also contributed to the non-oil sector weakness. Particularly,

[4] Lagged reserve values ($\widehat{res}_{t-1}$) with the coefficient, δ, close to one captures the accumulation of reserves between periods (similar to a capital accumulation equation).

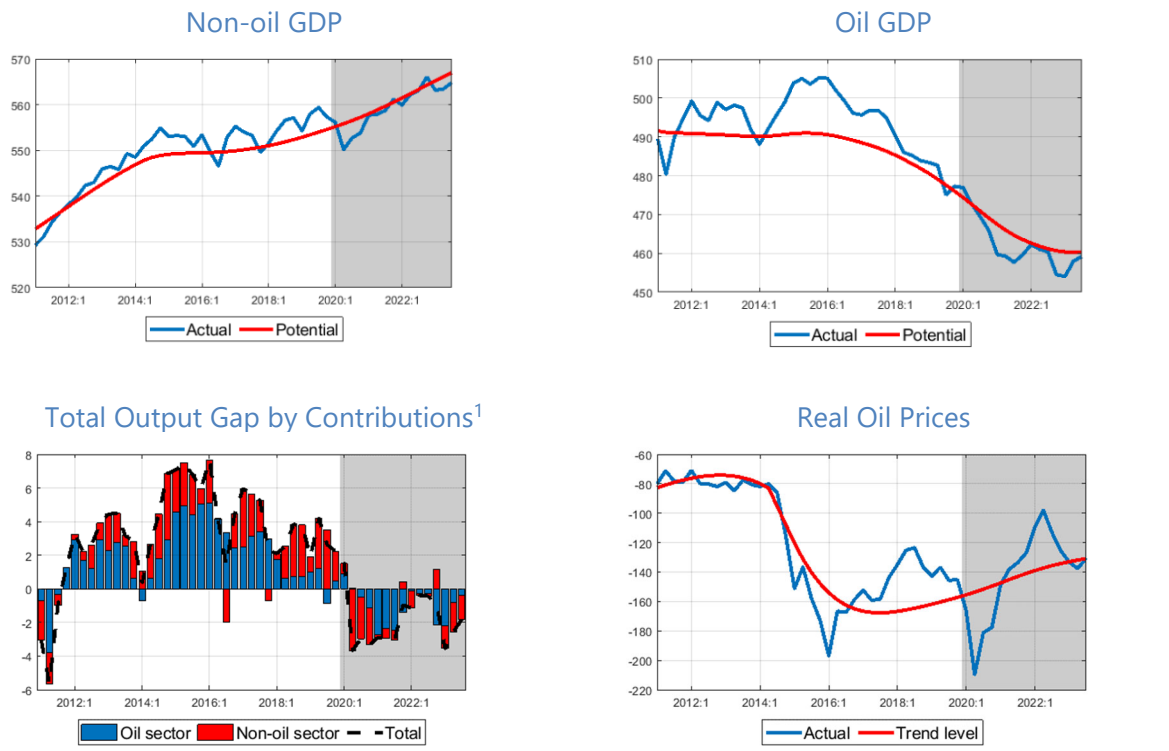
[5] This is broadly in line with the approach implemented by Zedginidze (2023).

[6] In the initial phase, staff introduced a set of assumptions regarding the parameter values of the model. Subsequently, these assumptions are re-evaluated and potentially adjusted based on the insights obtained from the data. The estimation results show both prior and posterior distributions. See for example Smets and Wouters (2004).

government domestic arrears to suppliers and foreign exchange backlogs adversely impact the non-oil economic activity.

21. While the oil sector seems to have both structural and cyclical weakness, its declining trend has broadly stabilized (Figure 2). The model's distinction between the trend and the cyclical components of the oil sector helps assess the sector's cyclical position. The cyclical weakness is arising mainly from oil maintenance operations and is expected to be temporary. In contrast, the slowdown in trend, which is largely attributed to underinvestment aimed at offsetting declining oil fields, is likely to persist longer. However, as the figure shows, the declining trend observed since 2016 has begun to stabilize since 2022, pointing to a more positive outlook ahead. This relatively optimistic view is supported by the authorities' robust investment projections in the sector. Separately, real oil prices—defined as Angola's oil prices adjusted for US inflation—appears to be aligning with its trend, indicating no significant misalignment in current pricing of Angola's oil.

Figure 2. Potential Output of Oil and Non-Oil Sectors



[1]This figure presents only the direct contribution of the oil sector. Total contribution of the oil sector is higher when considering its indirect impact through the non-oil sector.

E. The Impulse Response Analysis

22. An impulse response analysis provides further insight on the model's dynamics. These include simulations of the following shocks: (i) a hike in monetary policy rate; (ii) an aggregate demand shock, with a lagged monetary policy response; and (iii) an international oil price shock.

The starting point for each simulation is a steady state, whereby all variables are expressed as percent deviations from their respective steady states. Thus, all variables are set to zero when the shock takes place. The results from the simulations confirm the model's desirable properties and inform policy analysis on the key transmission channels in the economy.

- **Monetary policy shock** (Figure 4)**.** This simulation assumes an unanticipated increase in the BNA's key monetary policy rate by one percentage points. This initial increase in the policy rate is transmitted to the interbank rate and consequently to the real interest rates in the economy. A tighter monetary policy contributes to an exchange rate appreciation in nominal and real terms. Cumulatively, the nominal exchange rate appreciates by 0.2 percent over the medium-term. A higher real interest rates and stronger currency result in a widening of the output gap and lower inflation. The impact on inflation is also estimated at 0.2 percent over a year, with full transmission materializing. The transmission mechanism assumes the interbank rates to be aligned with the policy rates.

- **A delayed monetary policy response** (Figure 5)**.** This scenario shows a comparison between the delayed and timely monetary policy response following a 1 percent of GDP demand shock. A delay in monetary policy response by two quarters leads to roughly 0.3 percentage points higher inflation and 0.5 percentage points depreciation of the nominal exchange rate in a year.[7] The depreciation pressures also result in lower reserves and this, in turn, increases in the currency risk premium compared to the counterfactual. The results are in line with Clarida and others (1999), illustrating that passive monetary policy can amplify fluctuations following a shock. However, when monetary policy adjusts interest rates appropriately, it helps to stabilize the economy, mitigating the impact of the shocks and returning the variables to their steady states.

- **An oil price shock** (Figure 6)**.** This scenario shows transition dynamics in response to a 10 percent decrease in the real oil price (defined as Angola's oil prices adjusted for US inflation). A hypothetical drop in real oil prices causes a contraction in the output (negative output gap), while raising inflation. An increase in inflation is driven by a currency depreciation, resulting from lower external flows. In this scenario, monetary policy foregoes output and responds with increasing interest rates to prevent second-round inflationary effects. This situation mirrors a typical negative supply side shock (cost-push shock), highlighting the heightened policy trade-offs that central banks often face in times of negative supply shock. The extent of optimal interest rate response, however, crucially depends on the degree of the monetary policy credibility.

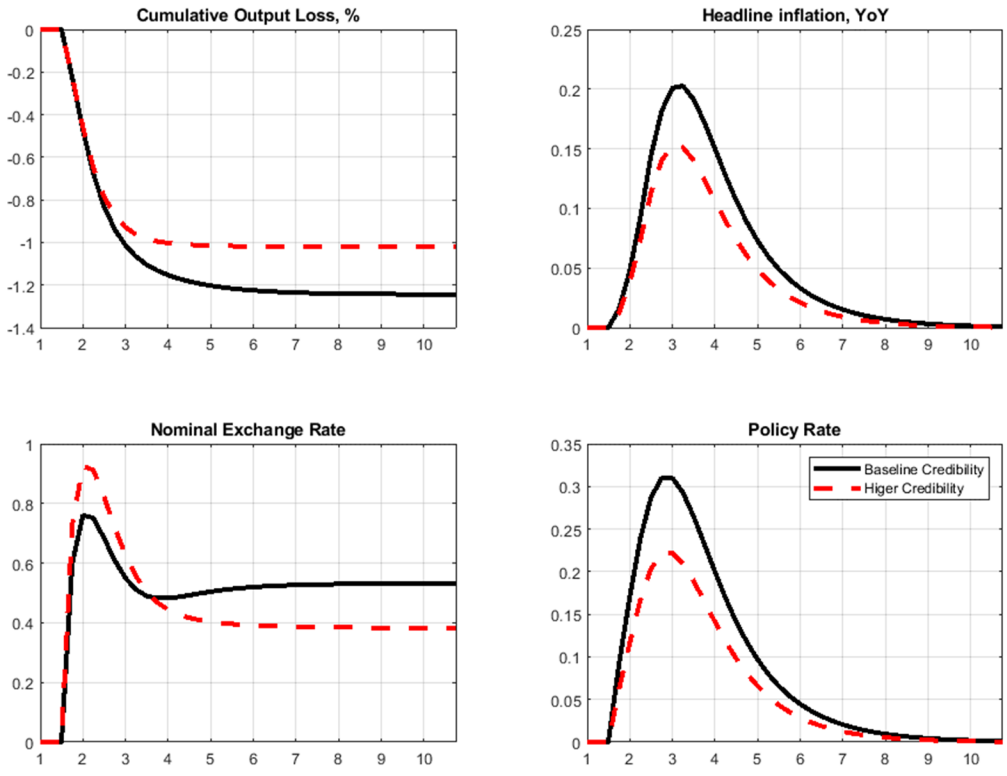
The Impact of Monetary Policy Credibility

23. This section examines the role of monetary policy credibility for the optimal response to an oil price shock (Figure 3)**.** In the context of the above oil price shock, this simulation compares two scenarios: one with a baseline monetary policy credibility and another with relatively higher credibility. To evaluate the impact of varying monetary policy credibility levels, the weight on

[7] A higher demand shock and longer delay in monetary policy response leads to higher economic volatility and inflation.

the forward-looking component in inflation expectations is adjusted. As the monetary policy credibility increases, economic agents become more forward looking, leading to more anchored inflation expectations. The simulation highlights that, in the higher credibility scenario, the need for interest rate hikes in response to an adverse supply shock is lower by almost one-third at its peak than in the baseline scenario. Similarly, the outcomes in the higher credibility scenario reflects a more contained inflationary outturn and lower cumulative output loss over the medium-term, highlighting the benefits of improved monetary policy credibility.

Figure 3. Monetary Policy Credibility



F. Policy Implications

24. The above analytical framework enables the simulations of key external and domestic shocks in the context of Angola's oil intensive economy. Considering the extent of economic volatility stemming from these shocks, understanding how monetary policy can influence the economy and support economic stability is key to policymaking. The modeling framework demonstrates the heightened trade-offs the central bank faces in times of adverse external shocks, such as oil price shock. These trade-offs include (i) stabilizing output versus mitigating second-round inflationary effects; and (ii) maintaining a stable exchange rate versus preserving international reserves.

25. The modeling results examine the costs of delaying monetary policy reaction in response to a demand shock and quantify these costs in terms of economic volatility. More broadly, as monetary policy decisions affect the economy with a time lag, a forward-looking analysis underpinned by such a framework can assist the central bank in designing optimal policies. The BNA's continued progress and commitment to developing the Forecasting and Policy Analysis System (FPAS) marks a significant step towards achieving this goal.

26. The simulations highlight that improving monetary policy framework and credibility can lower output cost and economic volatility during shock periods. When the central bank can credibly signal a commitment to disinflation, the effect on market expectations reduces the actual need of interest rate hike to contain inflation expectation, lowering the costs of supply shocks. For a central bank to harness these benefits, however, it is essential to have demonstrated strong track record of decisive action when warranted, effective transmission mechanism—including by aligning interbank rates with the announced policy rate—and a robust communication framework[8].

27. In this vein, improving interbank liquidity management is a key priority. The BNA's recent efforts to increase mandatory reserve requirements and remove the custody fee on commercial banks' excess balances at the central bank have been significant steps to reduce the downward pressure on interbank rates. Going forward, further efforts are needed to align interbank markets with the policy rate, including greater cooperation between fiscal and monetary authorities to coordinate money market operations, separate the maturity lines of their instruments, and develop money markets.

[8] See 2023 Angola Article IV Consultations Staff Report, Annex V: Improving BNA's Communication Channels

G. Extended Results

Figure 4. Monetary Policy Response Shock

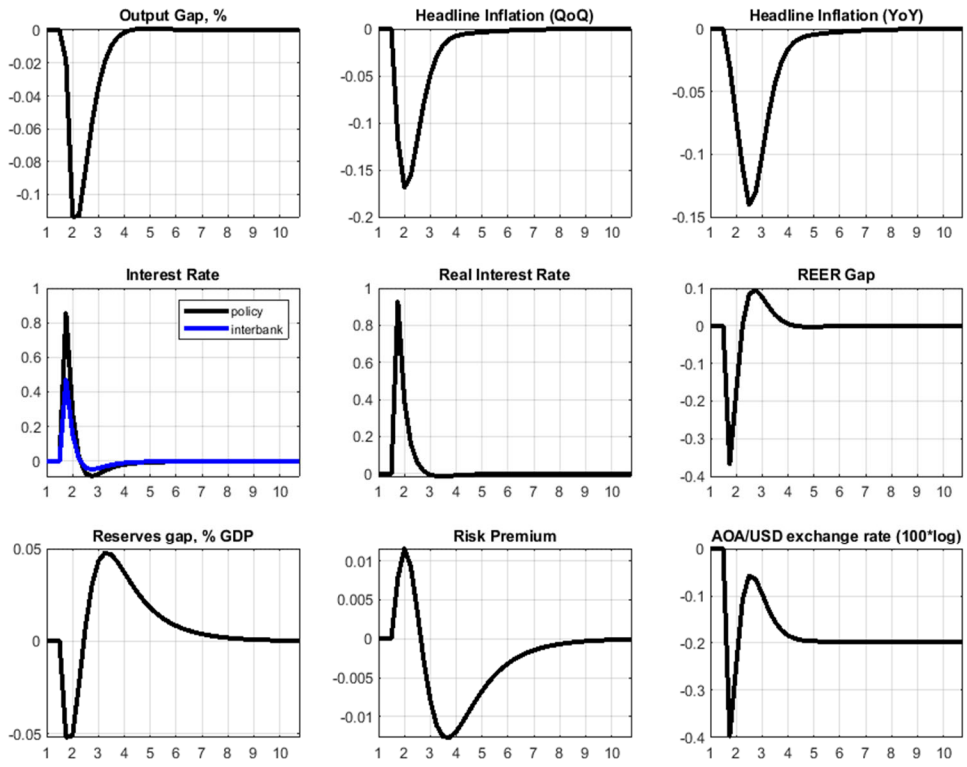


Figure 5. Delayed Monetary Policy Response to Demand Shock

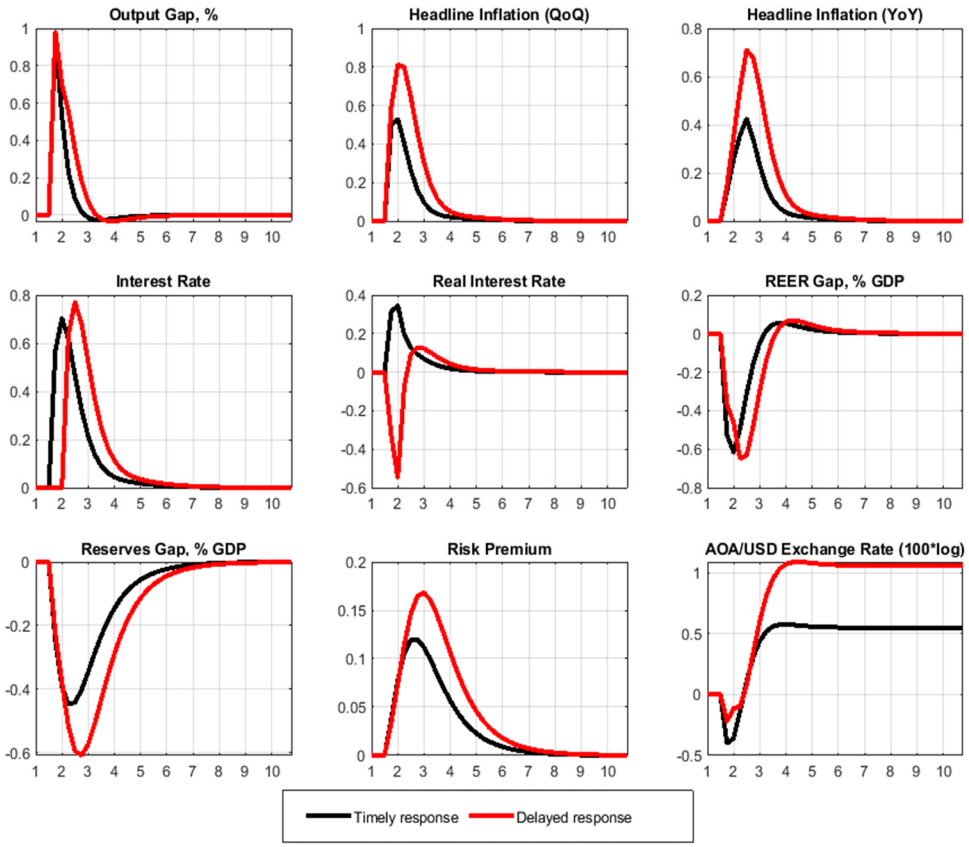


Figure 6. An Oil Price Shock

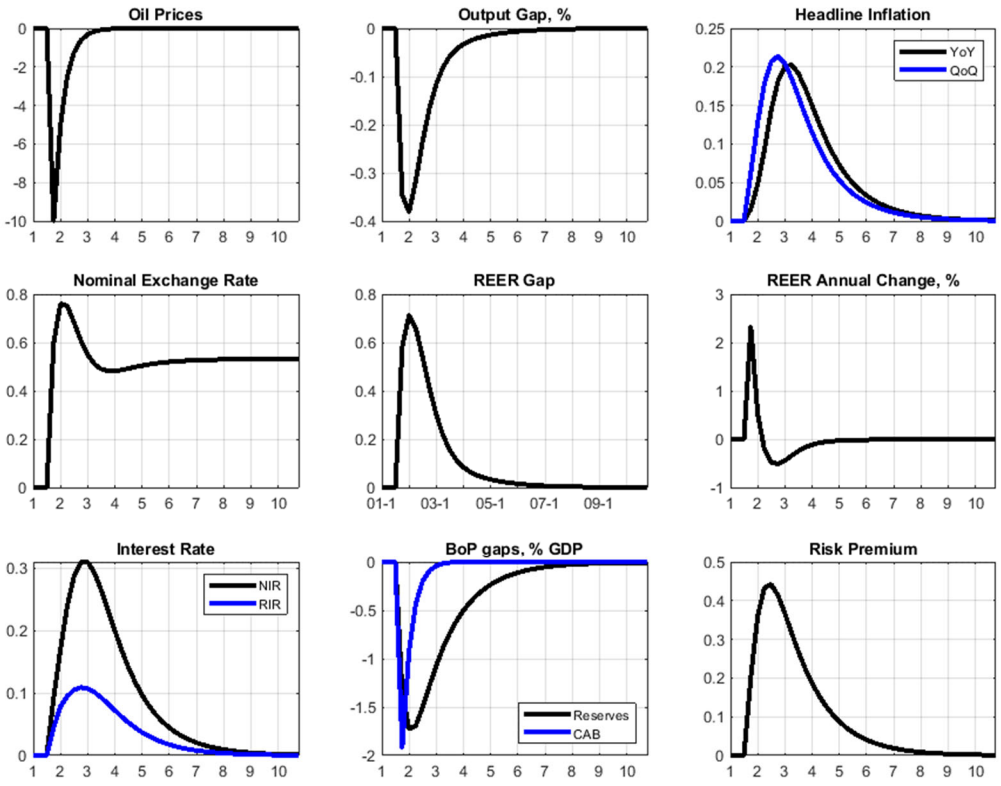


Figure 7. Calibrated Parameters (Behavioral Equations)

Headline inflation		Non-Oil Output Gap		Credibility	
β_1	0.55	a_1	0.65	δ	0.5
β_2	0.1	a_2	0.1		
β_3	0.15	a_3	0.1	**Oil GDP weight**	
β_4	0.2	a_4	0.05	ω	0.35
		a_5	0.05		
				Exchange Rate	
				ρ_s	0.75

Interest Rate		Currency Risk Premia		International Reserves	
c_1	0.5	θ	0.6	δ	0.9
c_2	2	ρ_{prem}	0.8	ψ_m	0.5
c_3	0.3				

Figure 8. Bayesian Estimation of Key Parameters

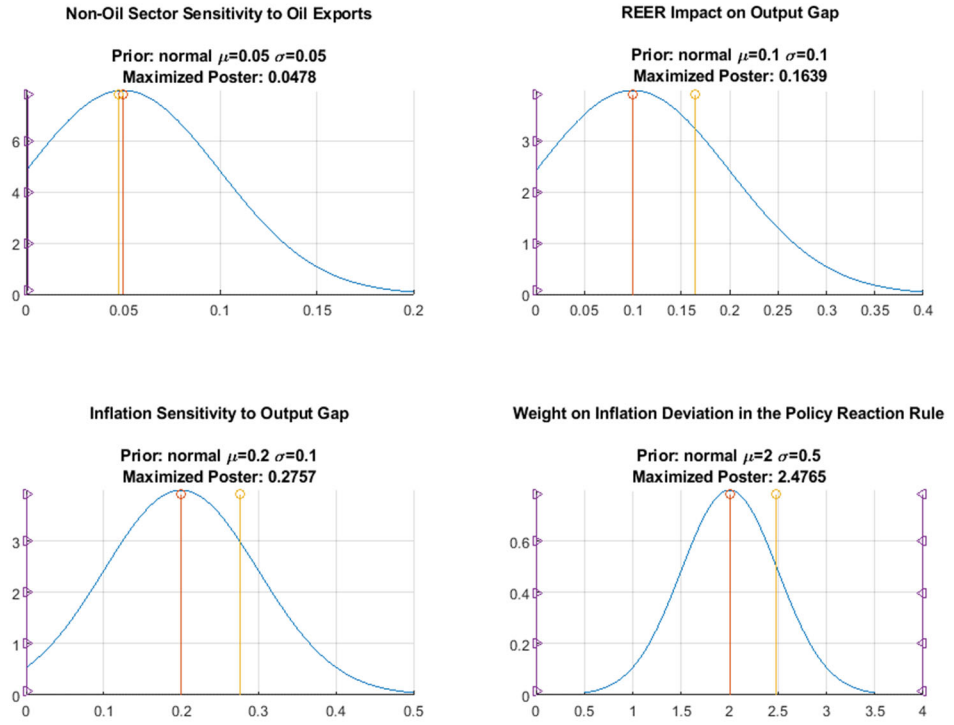


Figure 9. Model Steady States

Policy Variables	*Domestic*	*Foreign*
Inflation target	7	2
Neutral real interest rate	2.5	0.5
Neutral nominal interest rate	9.5	2.5
Potential growth: non-oil sector	3.5	
Potential growth: oil sector	2	
Potential growth: total	3	2
Exchange Rates		
Real exchange rate depreciation	-2	
Nominal exchange rate depreciation	3	
Country risk premium	4	
Terms of trade improvement	0	
Informal market exchange rate spread	5	

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GENDER GAPS AND POTENTIAL GROWTH IN ANGOLA[1]

This paper explores the state of gender equality and education attainment in Angola. Using a production function model, it estimates the impact of eliminating education gaps on potential GDP. The data shows that gender gaps are particularly salient in education (7 years among women against 9.2 years of average schooling among men) and informal employment (89.8 percent among women against 71.2 percent among men) with female labor force participation gap relatively reduced (about 4 percentage points). Our simulations show that policies specifically designed to increase female education attainment and prevent early pregnancies could yield an additional annual GDP growth rate increase ranging from 0.17 to 0.21 percentage points. Ramping up the implementation of gender budgeting would be critical to ensure such interventions are well-funded and effective.

A. Introduction

1. Addressing gender gaps is essential to guarantee inclusive and sustainable economic growth. There is ample evidence that reducing gender inequality can positively impact economic growth rates and foster greater macroeconomic stability (Stotsky 2006, Newiak, et al. 2013, Loko and Diouf 2009) and limiting women's opportunities hinder economic progress (Loko and Diouf 2009).

2. Addressing gender gaps is essential to guarantee inclusive and sustainable economic growth. There is ample evidence that reducing gender inequality can positively impact economic growth rates and foster greater macroeconomic stability (Stotsky 2006, Newiak, et al. 2013, Loko and Diouf 2009) and limiting women's opportunities hinder economic progress (Loko and Diouf 2009).

3. Women empowerment and gender equity has become an important objective in Angola's latest development strategy and plan. "Angola 2050", the country's development strategy for the next 30 years approved in 2023, aims to create conditions "conducive to women's autonomy, freedom, and empowerment" by improving access for girls and women to education, reproductive health services, and a legal framework that safeguards women's safety and protection. Angola's National Development Plan (NDP) has gender equity as key objective of its human capital pillar. [2] Both documents defined specific targets (Table 1) to address some of the challenges faced by girls and women, including a drastic reduction in under-16 and under-18 child marriages (by about 7 percentage points) by 2027 and the eradication of under-16 child marriages by 2050. Moreover, authorities are committed to implementing measures to increase women's participation

[1] Prepared by Marco Miguel (AFR). Guidance, support, and comments by Lisa Kolovich, Naomi-Rose Alexander, Vivian Malta, Monique Newiak (all SPR), Virginia Alonso-Albarran (FAD), Marcos Souto and Victor Duarte Lledo (AFR) were greatly appreciated.

[2] Angola: Plano Nacional de Desenvolvimento, 2023-27. Impacto sócioeconómico sustentável.

in political and decision-making positions, and to create conditions to increase the productivity of women in the informal economy through training and access to microcredit programs.

Table 1. Angola: Gender Equity–Policy Targets by Program

Description	2022	NDP (2027)	Long Term Strategy (2050)
Global Gender Gap Index	0.64	0.69	0.81
Net enrolment ratio in primary education	64	69	90
Proportion of seats held by women in national parliament (%)	38	42	50
Women who were first married by age 16 (% of women ages 20-24)	8	2	0
Women who were first married by age 18 (% of women ages 20-24)	30	23	8
Ratio of female to male professional and technical workers	0.53	0.56	0.72
Proportion of women subjected to physical and/or sexual violence in the last 12 months (%)	26	18	10

Source: Plano Nacional de Desenvolvimento, 2023-27

4. In this context, the primary objective of this paper is to offer a quantitative analysis of the impact of reducing gender gaps in education on GDP growth and discuss policies recommendations. The remainder of the paper is divided as follows: the next section presents stylized facts on Angola; section III specifies the model and summarizes the main simulation results. Section IV is reserved for the policy recommendations and conclusion notes.

B. Stylized Facts

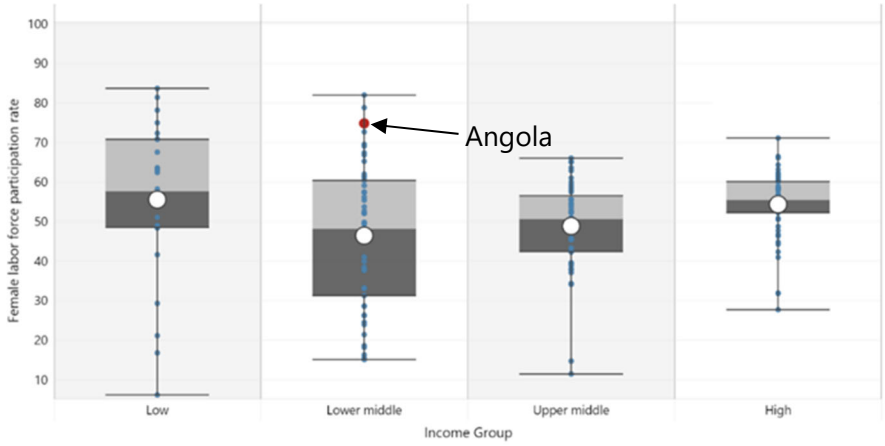
Inequality of Outcomes

5. Female Labor Force Participation (FLFP) in Angola is amongst the highest in the world leading to a relatively small LFP gap. Globally only about 50 percent of the female working age population participates in the labor market compared to 80 percent of male population (Figure 1). At more than 70 percent, FPLP in Angola is particularly high for its income category (Figure 1).[3] As a result, the corresponding gender gap (as measured by the difference between female and male labor force participation) is low (Figure 2). In 2022, the FPLP gender gap reached -4 percentage points (pp), well above the average for sub-Saharan Africa (-12 pp), upper middle-income countries (-17 pp) and the world (-25 pp).

[3] FLFP across income groups has been shown to follow a U-shaped relationship. Low household income, lack of social protection programs in low-income countries lead to high FLFP (Goldin 1994, Newiak and others 2013). As the household income grows, the FPLP tends to reduce as women replace vulnerable employment by non-remunerated work (domestic work, childcare). In high-income countries, as there are more opportunities for women to pursue an education and participate in high productivity activities, more women can enter the labor market.

Figure 1. Female Labor Force Participation Rate, by Income Group (2022)

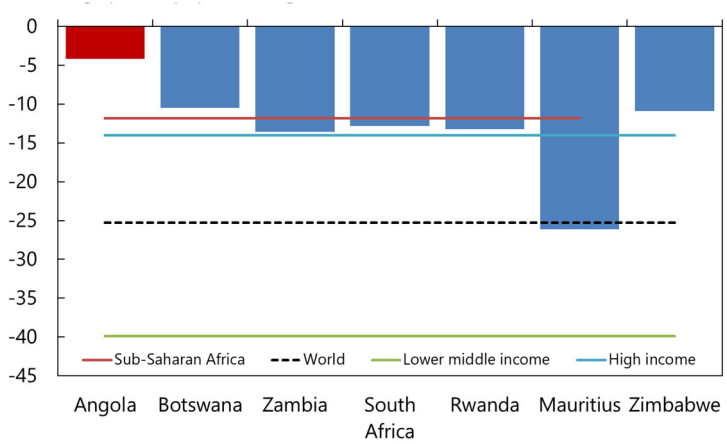
(In percent of female population ages 15+, modeled ILO estimate)



Sources: INE, staff calculations

Figure 2. Labor Force Participation Gap (F-M) 2022

(Percentage points, population ages 15+, modeled ILO estimate)



Sources: World Bank, IMF staff calculations

6. However, female employment is heavily concentrated in the informal sector, undermining Angola's labor productivity and domestic revenue mobilization. With almost 90 percent of women employed in the informal sector (88 percent in 2022)[4],

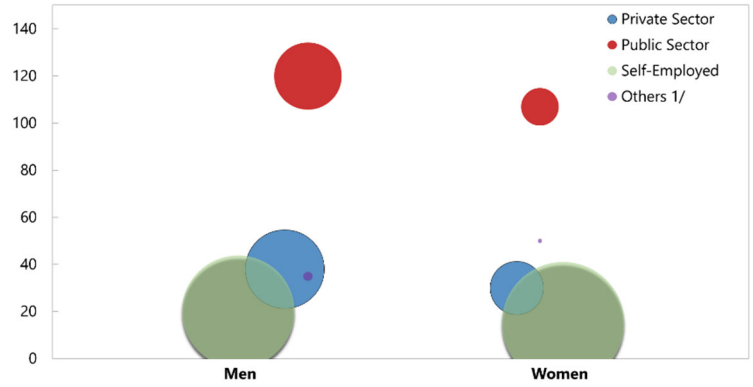
characterized by low labor productivity, lower wages and lack of access to social protection (Malta, et al. 2019). Informal workers often lack access to training, technology, and capital, resulting in suboptimal utilization of human resources and lower output per worker. Additionally, the informal

[4] Source: Angolan National Statistics Institute.

economy predominance poses significant challenges for tax collection efforts and labor productivity enhancement. Due to its cash-based transactions and informal nature, a substantial portion of economic activity in the informal sector remains unreported, leading to revenue leakages and tax evasion (IMF 2017, IMF 2021, Mbaye and Benjamin 2018). Moreover, people and firms in the informal sector typically operates on small-scale and as a result most of them are likely below the threshold required to pay taxes (IMF 2017, IMF 2021). This phenomenon constrains government revenue streams, limiting the fiscal capacity to fund public goods and services, invest in infrastructure, and undertake social welfare programs. Moreover, the informal sector's lower labor productivity compared to formal counterparts, hampers overall economic efficiency and competitiveness (IMF 2017, Amin, Ohnsorge e Okou 2019).

7. Angola's overall income gap between men and women stood at 22 percent, with women earnings 78 cents for every kwanza earned by men. A closer look at sources of income reveals that women only earn less than half of men's wages when employed (working for others), while when self-employed the difference decreases slightly to 21 percent. The income gap is partially explained by the fact that women work is mostly concentrated in informal and lower-paid sectors, such as agriculture and retail, while men are employed in higher-paying jobs in public administration, financial and real estate, and the army (Figure 3).

Figure 3. Median Wages by Sector (2022)
(In thousands of Local Currency)



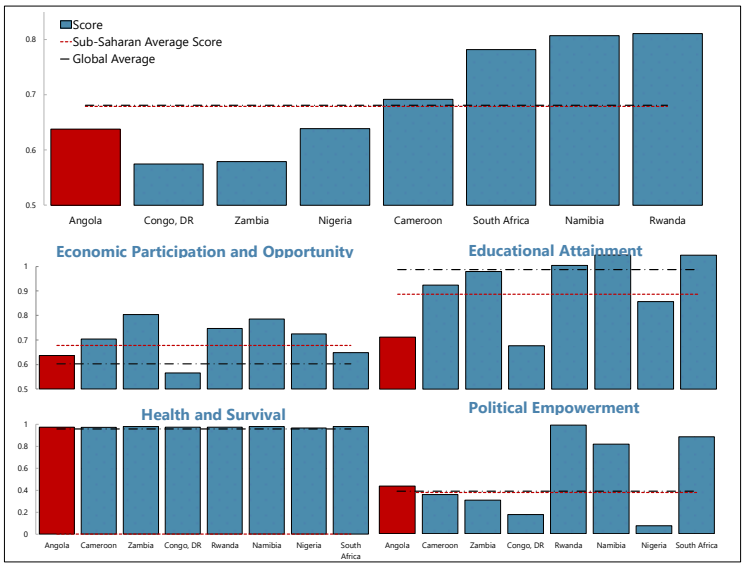
Sources: INE, IMF Staff charts
1/International organizations, embassies, churches and other associations

Inequality of Opportunities

8. Gender disparities in access to education, healthcare, economic opportunities, and political representation remains a challenge in Angola. While Angola has made progress in promoting gender equality through legal reforms and policy initiatives, patriarchal norms, cultural attitudes, institutional and gender-specific barriers continue to impede women's empowerment and undermine their full participation in society (World Bank 2023). Women in Angola are at higher risk of facing food insecurity, the adolescent birth rate (138.4 births per 1,000 women ages 15–19) and child marriage rate (30 percent of women aged 20 to 24 married or in union before age 18) are among the highest in the world (World Bank 2023).

In the Global Gender Gap Index[5] (GGGI), 2022, Angola held the 125th position (out of 146 countries), one of the countries with largest gender gap. Angola scores poorly in Economic Participation and Opportunities and is particularly low in Education Attainment, with a score of 0.69, while its peers (excluding Democratic Republic of Congo) scores are between 0.82–0.99 (Figure 4). Additionally, we find similar results when comparing expected years of education by income groups. In the Sub-Saharan region, the median of expected years of school for high-income countries is 13.1 years, while the corresponding median among low-income countries at 7.1 years. While the overall expected years of school for Angola is only slightly below the median for lower middle-income countries (8.1 years versus 8.7 years), the gender gap in expected years of schooling is striking: women in Angola have on average 7 years while men have 9.2 years of schooling. That is, men expected years of schooling in Angola fall relatively close to the average achieved in upper middle-income countries. For women, on the other hand, expected years of schooling is below the median for low-income countries. Furthermore, data on education from the Angolan National Statistics Institute (INE), shows that in 2019 the literacy rate for women (57.2 percent) was significantly below the rate for men (82.6 percent). Worryingly, the number of women graduating in Science, Technology, Engineering and Mathematics (STEM) fields has fallen in recent years. STEM jobs have been identified as an important driver of innovation and growth (Perri and others, 2015). From 2015 – 2018, there was a sharp increase in the overall number of people in Angola graduating from tertiary education, from 0.09 percent to 0.13 percent of the population ages 15 and older. However, most of the growth was fueled by non-STEM courses, namely environmental protection, social and behavioral sciences, and education. Interestingly, the number of people graduating in STEM professions decreased both in absolute and relative terms in the same period, reducing the weight of STEM professions in total professional graduations from 23 percent in 2015 to 11 percent in 2018. The proportion of females graduating in STEM professions declined by 28 percentage points between 2015 and 2018, from about 33 percent to less than 5 percent, while the proportion for males declined by 25 percentage points, from about 37 percent to 12 percent.

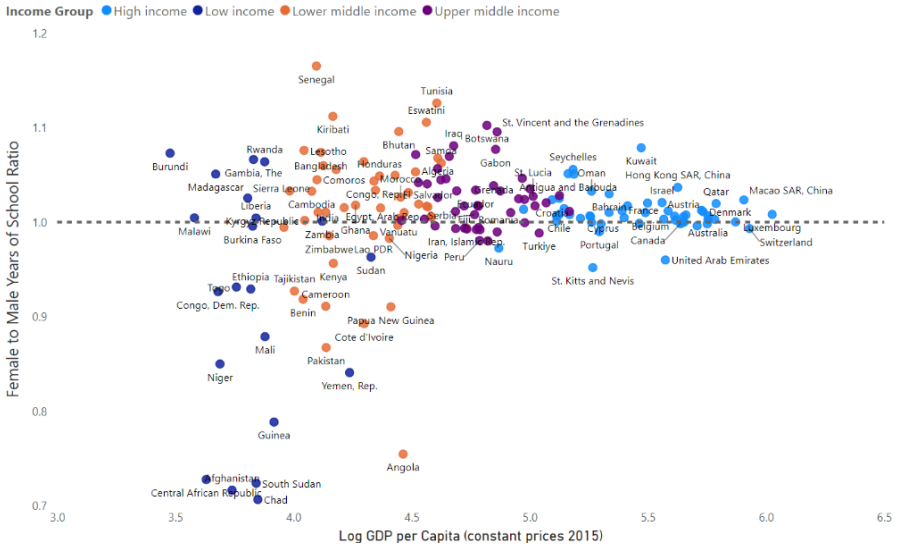
Figure 4. Global Gender Gap Indicator Scores–2022



Sources: World Economic Forum, Global Gender Gap Report-2022, IMF Staff

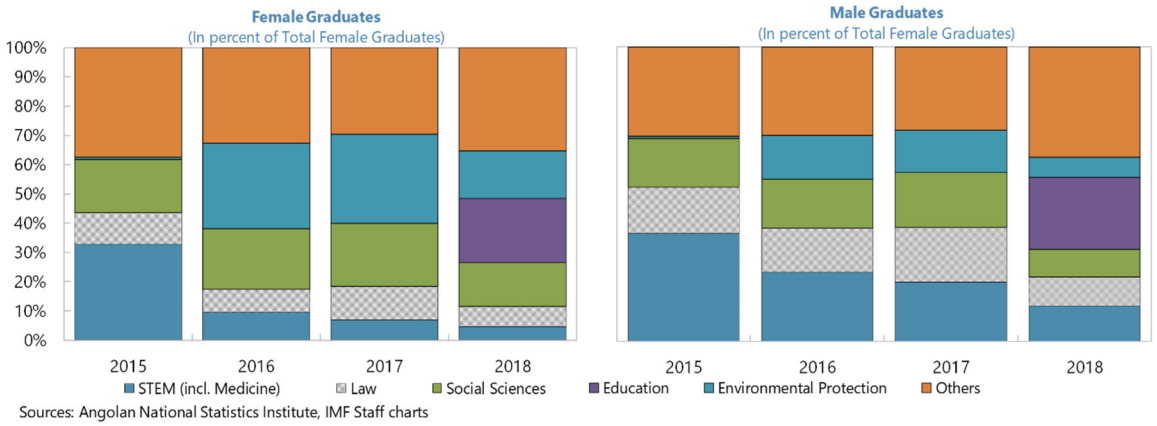
[5] The overall GGGI score is based on the assessment of four indicators on subjects as economic participation, health, education, and political empowerment. The lower is the score, the higher is the gap.

Figure 5. F/M Years of School by Country and Income Group (2020)



Sources: World Bank Development Indicators, IMF Staff calculations

Figure 6. Graduates by Field of Education (UNESCO classification)



Sources: Angolan National Statistics Institute, IMF Staff charts

C. Closing the Gender Gap: The Growth Impact

9. **Model.** To illustrate the impact of closing gender gaps on potential GDP growth, we employ a production function approach to decompose the level of income that is due to productivity,

physical capital, and labor. The framework assumes a standard Cobb-Douglas production function defined as[6]:

$$(1) \qquad Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

Where Y_t is GDP in real terms, A_t is total factor productivity, K_t is the stock of capital, and L_t is effective labor input. To estimate capital stock, we use the perpetual inventory method with a depreciation rate of 0.06. We assume that labor is the sum of both male and female labor input in production and that the employment of women does not affect the employment of men, and vice versa:

$$(2) \qquad L_t = L_t^f + L_t^m$$

In line with Filmer and others, 2020, we construct a learning-adjusted measure of labor input that is composed of labor quantity and quality. The effective labor input of females, *f*, and males, *m*, at time *t* is assumed to be:

$$(3) \qquad L_t^f = e(E_{t-5}^f R_t^f) H_t^f Q_t^f$$

$$(4) \qquad L_t^m = e(E_{t-5}^m R_t^m) H_t^m Q_t^m$$

Where E is the average learning adjusted years of schooling (LAYS), R is the returns to education, H is the hours worked per year and Q is the number of employed females. LAYS combines the quantity of education, as measured by expected years of schooling, and the quality of learning which affects skill level. Contrary to traditional measures of education that focus solely on the number of years spent in school, LAYS incorporates information about learning outcomes into the assessment of education, providing a more robust measure of educational attainment (Filmer, et al. 2020). As the measure includes expected years of schooling, which is the number of years a child of school entrance age is expected to spend at school, we employ a five-year lag to account for the time it takes for a child to finish education and enter the workforce.[7]

10. Scenarios. To look at the impact of closing human capital gender gaps on GDP, we constructed one baseline scenario and two policy scenarios that close the LAYS gender gap between 2023 and 2050 with varying speeds:

- **Baseline:** in this scenario we assume that there is no policy intervention that alters the human capital gap between males and females. LAYS continues on its current growth trajectory and

[6] To estimate potential GDP, Staff first project the real GDP and investment levels until 2050, based on their average historical growth rate. Labor inputs are estimated through the utilization of desegregated historical data on employment by gender. Finally, by applying the HP filter to the series, Staff extracts the trend component, which is used as the baseline scenario for the GDP level.

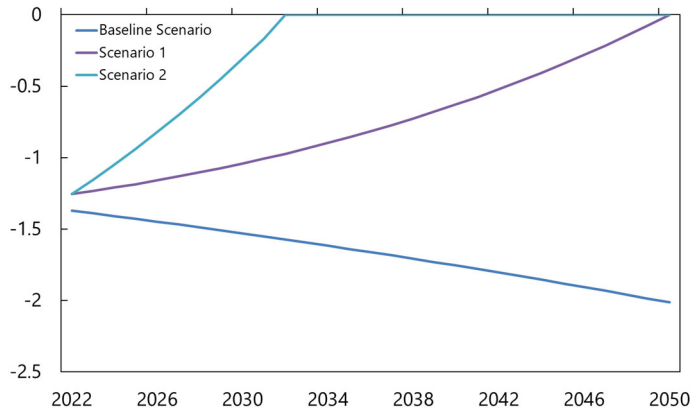
[7] The lag is implemented to account for the impact of policies aimed at improving education on GDP, which we assume would be observable only five years after their implementation.

the LAYS ratio between males and females remains constant. The average LAYS is 6.3 by 2050, with males obtaining 7.3 LAYS and females 5.3 LAYS.

- **Scenario 1:** here we assume that policy focuses on increasing the human capital of females, closing the LAYS gender gap by 2050, while males LAYS continues along the same trajectory as the baseline scenario. The LAYS for both males and females are 7.3 in 2050.

- **Scenario 2:** in the last scenario we assume that there is a more aggressive policy stance towards increasing female human capital, and education gaps are closed in 10 years while male education continues along the baseline trajectory. This results in female LAYS reaching 5.7 by 2032 which closes the education gap, and then both males and females attaining 7.3 LAYS by 2050. is limited for Angola, we construct estimates using the better-populated expected years of schooling from HDI. We take the average ratio of LAYS to EYS for the years available (2017, 2018, 2020) and apply this ratio to EYS data 1990–2021.

Figure 7. Education Gender Gap (F-M)



Sources: IMF Staff Projections

11. Results.

- ***In the baseline scenario***, we assumed that the LAYS Male/Female ratio is equal to the median value of the historical ratio of the indicator and that we would reach a global LAYS of 6.3, which is established in authorities' Angola's long-term strategy (Angola 2050). Under this scenario, global LAYS would increase at a rate of 1.4 percent per year. Since we assumed a constant LAYS ratio, growth rate for male and female LAYS would increase at the same rate as the global LAYS. Therefore, male, and female LAYS would not converge in this scenario, on the contrary, the education gap would increase over time. At the end of the projection period, male LAYS would reach 7.3 years and female LAYS would reach 5.3 years. In this scenario, potential output is estimated to grow at an average rate of 4.1 percent per year.

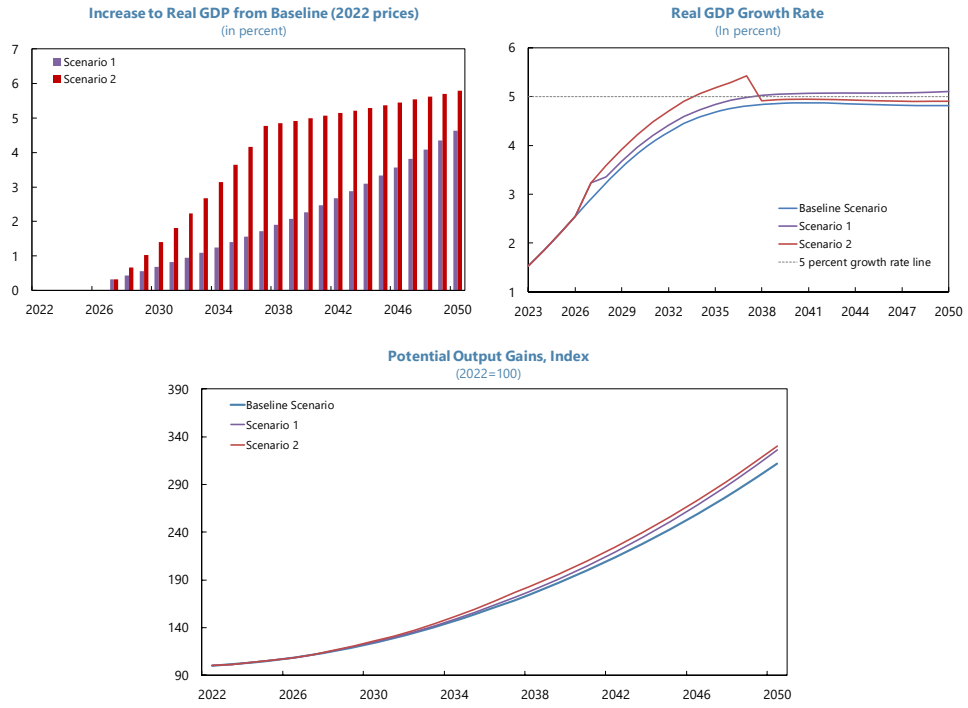
- ***In scenario two***, we assumed the implementation of policies to close the gender education gap by 2050. These policies are specifically designed to improve female LAYS, and does not impact male LAYS, that maintain the same growth rate as in the baseline scenario. Therefore, male and

female LAYS reach 7.3 years by 2050, with female LAYS growing on average annual rate of 2 percent, while male LAYS maintains the baseline scenario growth rate. The higher female LAYS lead to an increase of the potential output by 4.3 percent on average, an increase of 0.17 percentage points compared to the baseline scenario.

- ***In the third scenario***, we assumed a more ambitious policy stance that eliminates the gender education gap within ten years. The target is achieved in 2032 with female LAYS reaching the level of males of 5.7 years. As expected, a faster elimination of the education gap leads to a higher annual potential output growth (4.36 percent) and level, compared to baseline and scenario 1. As would be expected, the earlier the education gap is closed, the sooner the gains to human capital are reflected in greater output. In Scenario 2, we are assuming the elimination of the gap by 2032, in which female and male education would reach a LAYS of 5.7 years, the same level as males in the baseline scenario and would reach 7.3 years by 2050, as in scenario 1.

- ***Bottomline***. As shown by our simulations, reducing the gender education gap can lead to a higher potential output, which is line with the empirical evidence (Kochhar, Jain-Chandra and Newiak 2016). More educated women are more likely to enter the formal market sector and compete for better paying and more productive jobs (Ouedraogo and Gomes 2023).

Figure 8. Simulation Results



Sources: IMF Staff Estimates

12. Further analytical study is needed to analyze the impact of reducing gender education gap on female informal employment. Additionally, due to the difficulties in measuring the impact of the informal economy on GDP and data availability, our simulations focused on the impact of reducing gender gaps in education on the overall economy and likely underestimate the impact it may have in reducing female employment in the informal sector. Although there is a positive impact on GDP growth (improvement of real GDP between 4.6 and 5.7 percent by 2050) when eliminating gender gaps in education, further analysis on the consequence of the high share of informal employment on GDP is needed, including the impact of measures aimed to increase informal economy productivity and macroeconomic gains of measures to increase formalization.

D. Policies to Close Gender Gaps in Angola

13. Gender education gaps, which, as discussed above, are the root cause for gender gaps in income and informal employment, are mostly the result of two main challenges Angolan women face to remain in school (Machado, Kalle and Muller 2023):

a. ***Transaction and opportunity costs***. Although public education is free in Angola, there are additional costs, such as transportation, administrative fees, and other indirect fees (World Bank 2023), that constitute additional burden to poor families. Children, mostly girls, in low-income households are also expected to participate in income generating activities to help the household.

b. ***Early pregnancy***. Adolescent mothers beside facing health risks, also must deal with social stigma and economic difficulties. Angola has one of the highest adolescent fertility rates (138 births per 1000 women[8]) in the world, which is one of the main reason of girls dropping out of school. Due to lack of social safety nets, adolescent mothers are less likely to continue their formal education and are more likely to enter to labor market and usually in unstable and low-quality jobs (Machado, Kalle and Muller 2023).

14. Guided by the latest NDP which has gender equity as one of its main objectives, authorities are working to address these challenges through specific interventions, mostly targeted to young woman in reproductive health and education. [9] In particular**:**

a. **Improvement in reproductive health services (SRH)**, by providing sexual reproductive health services, use of contraceptives, prevention of early marriage, among other services to about 300 thousand adolescent girls and boys.[10]

b. **Expansion of accelerated learning programs,** that allows youth and adults with age/class mismatch to complete primary and secondary education, through daytime and evening classes.

[8] Source: World Bank, World Development Indicators, 2021.

[9] Some of this target measures are being supported by the World Bank through a US$ 250 million project "Girls Empowerment and Learning for All Project".

[10] World Bank has allocated US$ 10 million under the Girls Empowerment and Learning for All Project.

This project will increase the number of people attending the programs by 250 thousand people, to a total of 1 million people by the end of the project in 2025.

c. **Financial incentives for adolescent girls to stay in school,** by granting scholarship for children attending cycle 1 of secondary school and an extra bonus of approximately US$38 (AOA 25,000) for girls registering for the first time in the cycle 1 of secondary school. The scholarship has a duration of three years and payments will be carried out through the Kwenda mechanism. [11]

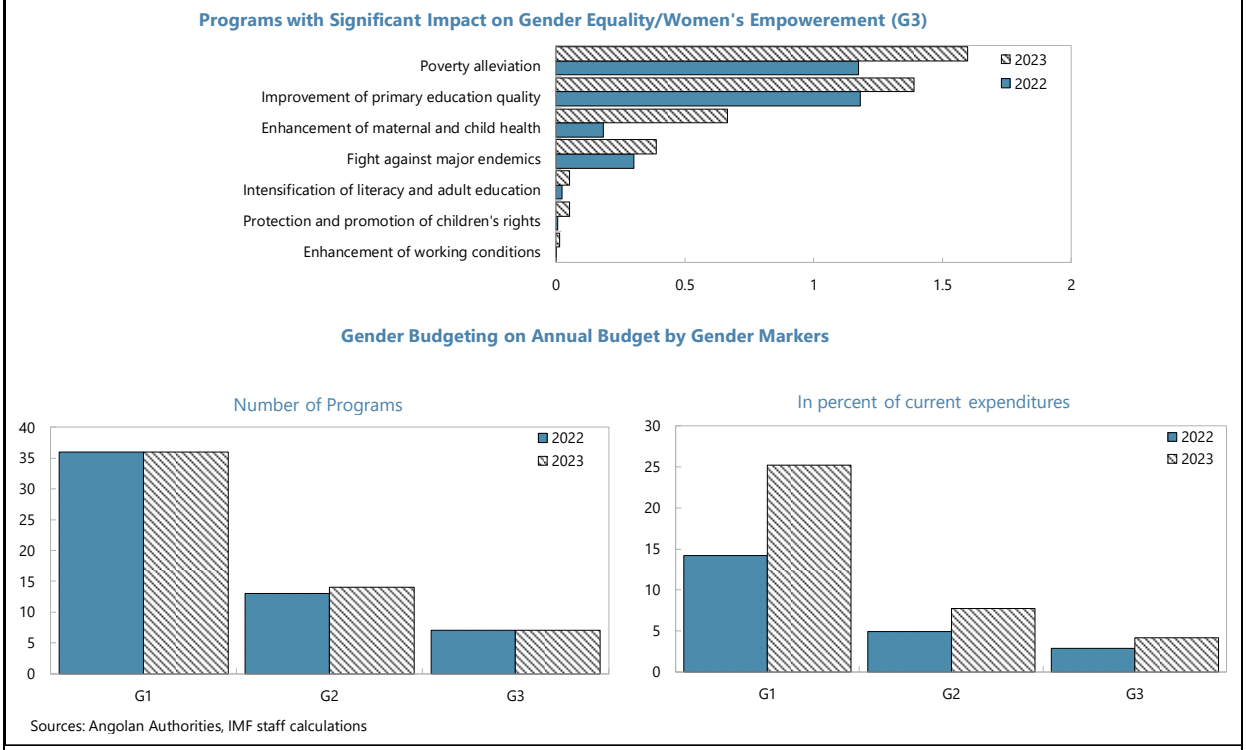
d. **Expand education supply and support high-quality teaching,** by increasing the supply of classrooms either by constructing new schools or rehabilitation and expanding existing schools and strengthening instruments to attract the best candidates.

15. Gender budgeting is becoming an indispensable tool to ensure effective policy interventions across the globe. Gender budgeting (GB) plays an important role in advancing gender equality, by promoting accountability and transparency in fiscal planning and execution. GB uses fiscal policies and public financial management (PFM) tools to promote gender equality (Stotsky, 2006). It is about funding explicit gender equality initiatives such as those described in the previous paragraph and understanding their impact on gender equality and using this information to design and implement more effective gender policies.

16. Gender budgeting in Angola is still at an early stage and sustained progress is needed. Gender markers were first introduced in the 2022 budget to assess the impact of the budget on gender (Orçamento Sensível ao Género), using the Gender Equality Marker (GEM) methodology (UN System 2018). Most of the resources were allocated to programs with limited consideration of gender equality/women's empowerment (G1), with an allocation of 14 percent and 25 percent of the current expenditures in 2022 and 2023, respectively. Allocation of funds to programs that have a significant impact (G2) or has as principal objective (G3) gender equality/women's empowerment increased from 7.8 percent in 2022 to 12 percent of current expenditures in 2023. Furthermore, more than 80 percent of the funds are targeted to programs that have strong impact in reducing gender inequalities, namely poverty, education, and maternal health. The use of gender markers has been paused in the 2024 budget to allow them to be recalibrated and made consistent with the gender filters introduced in the NDP spanning from 2024-27. Immediate next steps should include (i) the prompt resumption in the use of markers in the 2025 budget and their expansion to include all line ministries; (ii) improve the quality of assessments involved in the use of gender markers; (iii) increasing the allocation of budgetary resources to programs with gender impact (in line with NDP priorities); and (iii) strengthen accountability through the preparation of a first gender budget statement as a report with the budget proposal on gender related allocations, expected outcomes in terms of equality, and explaining last year execution. Furthermore, authorities are encouraged to assess the impact of the fiscal systems on gender equality and address any direct or indirect discrimination against women and implement tax policies and incentives to reduce barriers to women's economic participation (Baer, Cotton and Gavin 2023, M. J. Stotsky 1996).

[11] World Bank has allocated US$ 38 million under the Girls Empowerment and Learning for All Project.

Figure 9. Angola: Gender Budgeting



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