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Monetary Policy Shocks and Their Impact on Economic Growth in Angola:  
A Local Projections Approach

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## Abstract

This study examines the impact of monetary policy shocks on macroeconomic variables in Angola using local projections. Analyzing quarterly data from 2012 to 2023, we investigate the responses of GDP, inflation, dollarization, and credit to the private sector to policy interventions. Our findings reveal complex dynamics, GDP growth contracts before showing a delayed positive response, inflation experiences a mixed reaction, while dollarization displays non-linear behavior. The credit channel demonstrates a strong transmission mechanism. These results highlight the challenges of implementing effective monetary policy in Angola's oil-dependent economy, underscoring the need for complementary structural reforms that enhance economic resilience and growth.

Keywords: monetary policy, macroeconomic shocks, policy interventions, local projections, economic growth, financial development

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# **1 Introduction**

The complex relationship between monetary policy and economic growth has long been a subject of intense scrutiny in economics. This study delves into this relationship within the context of Angola, a country that presents a compelling case for analysis. As Africa's second-largest oil exporter and eighth-largest economy, Angola's economic trajectory has significant implications not only for its own development but also for the continent.

Angola exemplifies a modern developmental paradox. Despite experiencing extreme GDP growth rates, particularly in the aftermath of its nearly 30-year civil war, the country continues to grapple with entrenched poverty and widespread inequality. This contradiction stresses the importance of examining the complex interplay between monetary policy interventions and economic outcomes.

The country's heavy reliance on oil exports has rendered it vulnerable to external shocks and the challenges associated with the resource curse and Dutch disease. These vulnerabilities are made even more pronounced by the economy's partial dollarization, making effective monetary policy implementation more difficult. As Angola strives to diversify its economy and achieve more sustainable and inclusive growth, understanding the dynamics of monetary policy transmission becomes crucial.

This paper employs advanced econometric techniques, particularly local projections, to analyze the impacts of monetary policy shocks on key macroeconomic variables in Angola. By focusing on the period from 2012 to 2023, we aim to capture the recent economic dynamics and policy shifts that have shaped the economic landscape. Our analysis considers a range of variables, including GDP growth, inflation, dollarization, and credit to the private sector, providing a comprehensive view of the monetary policy transmission mechanism in Angola.

The findings of this study have significant implications for policymakers and researchers alike. By shedding light on the nuanced and often delayed responses to monetary interventions, we contribute to a more informed approach to economic policy formulation in Angola. Moreover, this research adds to the broader literature on the effect of monetary policy interventions in developing economies.

## **2 Literature Review**

### **2.1 Contextualization**

Angola is a significant player in Africa, as has been previously stated. Its economic influence exceeds its national boundaries, profoundly affecting the developmental trajectory of both its region and the broader African environment. The analysis is especially important now that Angola is starting to diversify its economy,

Historically, Angola's economic prosperity has been intricately linked to its plentiful natural resources, especially oil and diamonds. The nation's transformation from a war-stricken condition to a swiftly expanding economy was prompted not only by the conclusion of the lengthy civil conflict in 2002 but also by escalating oil prices. These factors facilitated significant GDP growth, exceeding 20 percent in 2008. This dependence on oil has rendered Angola susceptible to the vulnerabilities associated with the resource curse and phenomena such as Dutch disease. The economy's problems have led to significant exchange rate volatility and a lack of adequate diversification. This shows how important it is to take effective financial development measures to support long-term economic growth.

In the aftermath of the civil war, Angola has endeavored to reestablish itself as a regional economic powerhouse, utilizing its immense natural resources, especially oil, to stimulate

growth. The path has been characterized by significant achievements and persistent challenges.

In the past few decades, Angola's developmental plans have primarily embraced a top-down, state-centric methodology. This paradigm has resulted in enhancements in vital sectors like life expectancy and infrastructure development, although it has done little to address socioeconomic inequities. The advantages of economic progress are often inequitably allocated, resulting in wealth becoming increasingly concentrated among a small few while significant portions of the population remain underserved.

Angola's economy is predominantly dependent on oil, which constitutes a significant share of its GDP and export earnings. Despite considerable oil revenues, Angola has faced challenges in converting these earnings into sustained and inclusive growth. The accumulation of wealth and resources has hindered grassroots economic development, demanding the need for structural reforms that emphasize equitable distribution and financial accessibility.

There is a consensus on the need for Angola to diversify its economy beyond reliance on oil. This transition is essential for reducing susceptibility to external disruptions and for cultivating a more robust economic structure. Improving financial development is also crucial, as it may drive investment across several industries, foster entrepreneurship, and generate opportunities for labor.

## **2.2 Theoretical Framework**

The relationship between financial development and economic growth in Angola can be examined through three main hypotheses, each offering insights into this interaction. The supply-leading hypothesis posits that financial development acts as a catalyst for economic growth by enhancing resource allocation efficiency and promoting entrepreneurial activities. Alternatively, the demand-following hypothesis suggests that economic growth enhances

financial development by elevating the demand for financial services and institutions. Connecting these hypotheses, the feedback hypothesis presents an integrated viewpoint, suggesting a reciprocal relationship in which financial development and economic growth mutually enhance one another.

Angola's financial and economic landscapes provide a particularly relevant context for examining these frameworks. Its heavy dependence on oil and developmental obstacles offers a unique opportunity to analyze how financial measures might alleviate these vulnerabilities and foster greater economic resilience.

The relationship between monetary policy and macroeconomic outcomes has been thoroughly examined, with many theoretical frameworks proposed explaining the transmission mechanisms. In Angola's context, where economic volatility is pronounced due to external shocks and structural challenges, understanding these mechanisms is critical. It is not only essential for guiding monetary policy but also for developing a comprehensive view of how financial development, economic growth, and monetary policy interact in the country. To this end, econometric methods such as local projections can be particularly useful in analyzing these complex relationships and transmission mechanisms.

These transmission mechanisms of monetary policy operate through various channels, each playing a role in shaping economic outcomes. The interest rate channel influences borrowing costs and investment decisions (Falck, Hoffmann, and Hürtgen 2021), while the credit channel emphasizes the role of financial intermediaries in policy transmission (Miranda-Agrippino and Ricco 2021). In partially dollarized economies like Angola, the exchange rate channel significantly impacts trade balances and inflation. The expectational channel, which focuses on how central banks influence economic behavior through policy signals, may reveal unique dynamics in Angola due to prevalent informational frictions (Falck, Hoffmann, and Hürtgen

2021). Together, these channels form a complex web of interactions that determine the efficacy of monetary policy in Angola's unique economic environment, characterized by limited financial development and high vulnerability to external shocks.

### **2.3 Methodological Strategies**

Jordà's (2005) introduction of local projections offers a strong contender for econometric analysis and alternative to traditional vector autoregressive (VAR) models for estimating impulse responses. This approach is especially beneficial for examining short- to medium-term impacts, making it appropriate for Angola's economic instability and data limitations. Local projections are also robust to model misspecification and accommodate nonlinearities, essential for accurately representing Angola's complicated economic processes.

Local projections have been successfully applied in various contexts to analyze policy impacts. Ramey and Zubairy (2014) used local projections to estimate government spending multipliers under different economic conditions. Tenreyro and Thwaites (2016) adapted local projections with smooth transition regression techniques to examine state-dependent effects of monetary policy shocks. These studies demonstrate local projections' versatility in capturing complex dynamics across different states of an economy. In Angola's context, where economic conditions are volatile due to oil price fluctuations and macroeconomic instability, local projections provide a valuable tool for understanding how policy interventions affect growth.

Expanding upon the local projections framework, Smooth Local Projections (SLP), developed by Barnichon and Brownlees (2019), improves the accuracy of impulse response estimations while preserving flexibility and resilience. SLP simplifies implementation and adapts diverse identification techniques, enabling precise measurement of monetary policy shocks in environments characterized by limited and unpredictable data, such as Angola.

Barnichon and Brownlees (2019) go on to discuss how to select appropriate control variables for different identification strategies. The authors show how to implement recursive identification for identifying structural shocks that will be crucial for properly identifying policy shocks in Angola. Interestingly, the example provided is a similar setup (in terms of variables) to the analysis being conducted here.

Building on these identification strategies, alternative methods like direct projections offer additional tools for analyzing policy impacts in data-limited contexts. Direct projections, formulated by Auerbach and Gorodnichenko (2011), provide an alternate method for forecasting responses to fiscal shocks across several time horizons. This approach is especially beneficial for Angola because of its limited data series. It has been especially helpful in estimating state-dependent fiscal multipliers and enables the analysis of responses to several macroeconomic factors other than GDP. While it was developed for fiscal policy analysis, its principles could be applied to studies on monetary policy.

Koop, Pesaran, and Potter (1996) introduced Generalized Impulse Response Functions (GIRFs) for analyzing nonlinear multivariate models. This approach addresses the limitations of standard IRFs by treating shocks and history in the system as random variables, averaging out future shocks using conditional expectations, and allowing for nonlinear state-dependent responses. GIRFs can be particularly useful for assessing how the impact of policy interventions may vary depending on economic conditions, which could be relevant for Angola's potentially volatile economic environment.

## **2.4 Empirical Evidence**

Empirical research offers significant insights into the relationship between financial development and economic growth in Angola, with recent studies providing nuanced perspectives on monetary policy transmission mechanisms.

Adu, Marbuah, and Mensah (2013) highlight the importance of proxy selection in empirical analysis, revealing that credit to the private sector positively affects growth, while wide money supply fails to adequately reflect GDP shocks. This finding underscores the need for careful consideration of financial indicators when studying Angola's economic dynamics. Andersen and Tarp (2003) challenge the widely held view that financial liberalization and development necessarily lead to economic growth in less developed countries (LDCs), recommending prudent financial sector changes aimed at maintaining economic stability. Given Angola's currency peg to the dollar, their work suggests the potential value of investigating exchange rate shocks on growth.

The relationship between Foreign Direct Investment (FDI) and economic growth, as studied by Andraz and Rodrigues (2010) in Portugal, may offer insights for Angola despite structural differences. Angola's heavy reliance on imports and the crucial role of FDI in its economy warrant exploration of these connections (Uzo et al. 2024).

Recent studies have shed light on the complex dynamics of monetary policy intervention. Miranda-Agrippino and Ricco (2021) find that contractionary monetary shocks reduce output and prices significantly, with a delayed response on labor markets. These findings align with traditional theories but emphasize the importance of frictions in transmission (Jalil and Ma 2008). Their work also highlights the role of informational frictions in shaping economic agents' responses to policy changes, a consideration particularly relevant to Angola's context of asymmetric information between policymakers and the public.

Falck, Hoffmann, and Hürtgen (2021) contribute to this by demonstrating that inflation expectations react differently depending on the level of disagreement among agents. High disagreement can lead to temporary increases in inflation following contractionary shocks, which can potentially complicate stabilization efforts in volatile economies (Ramey 2016).

While not many available, empirical studies specific to Angola and traditional economic theory suggest that the country's reliance on oil exports amplifies the volatility of monetary policy effects through exchange rate fluctuations and credit constraints. This state dependence underscores the unique challenges faced by Angola's policymakers in implementing effective monetary policy.

Considering these findings, our study focuses on the Banco Nacional de Angola's (BNA) policy rate as a primary shock variable, considering its direct effects on GDP growth and inflation. We also incorporate other variables such as the dollarization index and credit to the private sector to capture broader response, aiming to provide a comprehensive analysis of monetary policy interventions in Angola's specific economic context.

## **2.5 Methodological Considerations for Angola**

Angola's unique economic backdrop and data limitations require methodological adjustments. The lack of extensive longitudinal data limits analysis to short- and medium-term insights, which makes local projections particularly valuable. We carefully choose essential variables like GDP growth, policy rates, credit in the private sector, foreign direct investment, and oil indicators to accurately reflect Angola's economic framework.

Robust identification strategies like those proposed by Barnichon and Brownlees (2017) are essential for accurately modeling monetary shocks. To fully understand Angola's unstable economy, it is also important to use methods that take into account nonlinear effects, like SLP and state-dependent models. While long-term projections may be infeasible, estimating responses from one to eight years offers valuable insights that can inform policy decisions.

This literature review underscores the potential of local projections and related methodologies to analyze the impacts of monetary policy on economic growth in Angola. These tools, characterized by robustness and flexibility, are apt for addressing the challenges posed in

Angola.

In the future, researchers could add fiscal policy interventions and use state-dependent models to look at how well dynamic policies work in different economic situations. Furthermore, examining institutional issues and political economy concerns can enhance the understanding of policy outcomes, supporting Angola's sustainable economic development.

### **3 Methodology**

#### **3.1 Data**

The dataset constructed for this analysis consists of quarterly observations from 2012 to 2023, covering various macroeconomic variables essential for assessing the impacts of monetary policy. The principal variables comprise GDP growth (defined as the output variable), inflation, the percentage of dollarization (also known as the dollarization index), credit to the private sector, and the BNA policy rate (identified as the shock variable). This wide array of variables enables a robust analysis of monetary policy shocks and their impact on economic growth.

Following the approach of local projections (Jordà, 2005), the analysis will estimate impulse responses across several horizons, namely  $H = 20$  quarters, limited by the amount of available data. This approach provides numerous benefits compared to traditional VAR models, such as enhanced flexibility, resilience to misspecification, and the capacity to incorporate non-linearities.

## 3.2 Economic Data and Summary Statistics

Table 1: Summary Statistics

Variable	Mean	SD	Min	Max
<i>gdp</i>	0.0126	0.0574	-0.1190	0.1480
$\Delta cpi$	0.1898	0.0786	0.0730	0.3719
$\Delta di$	0.4348	0.0942	0.1212	0.5812
$\Delta lcps$	15.0470	0.2235	14.4666	15.4364
<i>pr</i>	0.1450	0.0371	0.0875	0.2000
<i>shock</i>	0.0026	0.0066	0.0000	0.0300

### 3.2.1 GDP Growth

Economic growth can be defined as the increase in the production of goods and services in an economy over a given period. In this paper, we proxy economic growth using quarterly GDP growth (*gdp*) data. It has also been used in much of the literature in the same manner as a proxy for economic growth, as seen by Al-Yousif (2002), Odhiambo (2004) and Bahadur and Neupane (2006).

The average GDP growth of 1.26% with high volatility (SD of 5.74%) aligns with Angola's economic performance during this period. The country experienced significant fluctuations, including a recovery in 2021/22 after five years of adverse shocks, followed by a slowdown in 2023.

### 3.2.2 Inflation

Inflation ( $\Delta cpi$ ) is the overall rise in the cost of goods and services in the economy, typically quantified by price indices. The consumer price index (CPI) calculates the average change in prices of a representative basket of goods and services for households in a country. While

inflation can be used as the shock variable,  $x_t$  in a local projections model, we use it as an output variable in the context of this paper.

The high average inflation rate of 18.98% reflects Angola's struggles with price stability. This aligns with the information that inflation reached 20.3% YOY in December 2023, interrupting a previous disinflation trend.

### *3.2.3 Dollarization Index*

The concept of dollarization ( $\Delta di$ ) refers to how much the US dollar is used in a foreign economy, in this case Angola, as currency. The data shows that, on average, the percentage of dollarization in Angola is just over 43 percent. The biggest reason why this variable is included in the data is because it can highlight economic vulnerabilities to external shocks. It is also loosely tied to monetary policy, as a higher dollarization index can make it more challenging for a country to conduct independent monetary policy and may indicate a lack of confidence in the local currency. In the case of Angola, the percentage varies wildly from as low as 12 percent to up to nearly 60 percent. It typically increases during times of economic instability and uncertainty, like in 2020 during COVID-19, and decreases in times of more consumer and economic confidence. It also reflects Angola's heavy reliance on oil exports and vulnerability to external shocks, particularly in the oil sector.

### *3.2.4 Credit to the Private Sector*

Credit to the private sector ( $\Delta l cps$ ) is an important economic indicator that monitors the financial resources granted to the private sector by financial institutions. This is another variable that a variation of which is supported in the literature as a decent proxy for economic growth and financial development especially in developing economies. In developing countries, the banking sector has a greater impact on the economy than in developed countries.

As a result, an increase in the measure indicates financial development because credit provided to the private sector induces more investment than credit provided to the public sector (Odhiambo, 2004; Law and Moradbeigi, 2017).

The growth in credit to the private sector (mean of 3.51 million units) suggests efforts to diversify the economy beyond the oil sector. However, this should be analyzed in the context of Angola's high reliance on oil revenues.

### *3.2.5 Policy Rate (Monetary Shock)*

The policy rate shock variable was constructed using a multi-step process. First, we calculated the quarterly first difference of the policy rate and computed its demeaned representation. We then compared this demeaned value to the standard deviation of the policy rate. A shock was identified when the absolute value of the demeaned difference exceeded one standard deviation; otherwise, the shock variable was set to zero. This methodology allows for the identification of significant deviations in the policy rate, effectively capturing monetary policy shocks.

Regarding the underlying variable, the BNA policy rate (*pr*) the average policy rate of 14.5% indicates the central bank's efforts to manage inflation and stabilize the economy. The Bank of Angola (BNA) has actively used monetary policy tools, including raising the policy rate to 18% in response to inflationary pressures.

### 3.3 Model Specification

Using the data, the objectives of this paper, and the conclusions from the literature review, we estimate the following equation for our local projections model.

$$y_{t+h} = \alpha_h + \beta_h x_t + \sum_{i=1}^p \gamma'_{i,h} w_{i,t} + u_{h,t+h}. \quad (1)$$

In this equation,  $y_{t+h}$  represents the dependent variable at horizon  $h$ , while  $x_t$  denotes the shock variable. The term  $w_{i,t}$  encompasses control variables that may include lags of  $y$  and  $x$ . The coefficients to be estimated are  $\alpha_h$ ,  $\beta_h$ , and  $\gamma_{i,h}$ , with  $u_{h,t+h}$  representing the error term. The horizon  $h$  ranges from 0 to  $H$ , where  $H$  is the maximum horizon of 20 quarters considered in the analysis. The time index,  $t$ , spans from 1 to  $T-H$ , where  $T$  denotes the total sample size. This formulation allows for a flexible estimation of impulse responses at different horizons without imposing the dynamic restrictions implicit in VAR models. The impulse response function at horizon  $h$  is given by the estimated  $\beta_h$  coefficients.

## 4 Empirical Analysis

### 4.1 Pre-Estimation

#### 4.1.1 Stationarity Testing

The stationarity analysis of key macroeconomic variables for our local projections model yields important insights for the subsequent impulse response analysis. Our investigation employs both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to examine the stationarity properties of the dependent variables, and a monetary shock.

Before testing for stationarity, a visual inspection of the dependent variables reveals that modifications need to be made so that they can be used in the local projections model. We

differenced and log transformed the credit to private sector variable to better approximate its percentage change, which is often more relevant for economic analysis than absolute changes. The inflation and dollarization variables were also differenced.

There are various benefits to using these transformed variables in econometric models: (1) It contributes to addressing potential non-stationarity issues in the original credit series. (2) It makes it possible to interpret coefficients as either semi-elasticities or elasticities. (3) It can help normalizing the data and reducing heteroscedasticity.

Table 2: Results from stationarity testing (ADF & PP Tests)

Variable	Test	Test Statistic	p-value	Conclusion
<i>gdp</i>	ADF	3.0760	0.0284 **	Reject the null
	PP	-4.462	0.0002 ***	Reject the null
$\Delta cpi$	ADF	-3.0000	0.0349 **	Reject the null
	PP	-4.072	0.0011 ***	Reject the null
$\Delta di$	ADF	-2.5360	0.1069	Fail to reject the null
	PP	-8.457	0.0000 ***	Reject the null
$\Delta lcps$	ADF	-3.9380	0.0018 **	Reject the null
	PP	-5.558	0.0000 ***	Reject the null
<i>shock</i>	ADF	2.847	0.0519 *	Reject the null (at 10% sig.)
	PP	-4.379	0.0003 ***	Reject the null

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The results, as can be seen in *Table 2*, predominantly indicate stationarity across all variables. GDP, which is used in growth form, shows strong evidence of stationarity in both ADF and PP tests. The change in CPI ( $\Delta cpi$ ) exhibits clear stationarity in both tests, consistent with expectations for a first-differenced price index and supporting the inclusion in the model.

The change in the dollarization index ( $\Delta di$ ) presents a different picture. The ADF test failed to reject the null hypothesis, however, the PP test strongly rejects the null. Considering that

we are using the differenced form of this variable, we lean towards treating it as stationary in our analysis. The change in log of credit to private sector ( $\Delta lcps$ ) demonstrates strong stationarity in both tests.

Of particular importance is the stationarity of our shock variable (*shock*). While the ADF test provides only weak evidence of stationarity, the PP test offers strong support. Considering the nature of monetary shocks and the PP test's robustness, we conclude in favor of treating this variable as stationary, which is crucial for the validity of our local projections approach.

These findings have several important implications for our local projections model. The stationarity of all variables, especially when considering the PP test results, reduces the risk of spurious regressions and supports the use of standard inference techniques. This allows for a straightforward interpretation of impulse responses as temporary deviations from long-run means, which is particularly valuable in analyzing the dynamic effects of monetary shocks.

Furthermore, the fact that most of our variables are in differenced or growth rate form aligns with the typical specification of local projections models. This formulation will enable us to capture the effects of shocks on the changes or growth rates of these key economic indicators, providing insights into the dynamic responses of the economy to the identified shocks.

#### *4.1.2 AC and PACF*

Analyzing the autocorrelation (AC) and partial autocorrelation (PAC) functions of the monetary shock variable reveals important insights into its time series characteristics. The autocorrelations decay rapidly, with only the first lag exhibiting a statistically significant correlation. The rapid decay in autocorrelations indicates that the shock variable demonstrates low persistence, aligning with the characteristic of monetary shocks as generally transient disturbances.

The partial autocorrelation function plot supports this interpretation. We see a significant spike at the first lag, followed by generally insignificant partial autocorrelations at higher lags. This pattern is indicative of a first-order autoregressive process, AR(1), or a low-order moving average process. These plots can be viewed in *Figure A1* in the appendix.

The results hold significant implications for the model. Firstly, the rapid decay in AC and PAC implies that the effects of the monetary shock are likely transient. This fits with the assumption in many models that monetary shocks have a transient impact on the economy. Furthermore, the AR(1) structure implied by the PACF supports our treatment of the shock variable as stationary in our model. It suggests that including one lag of the shock variable in our model should be sufficient to capture its dynamic properties. Next, the quick decay of autocorrelation implies that the impulse responses to this shock in our local projections model are likely to show relatively rapid convergence to zero. This will help in identifying the short- to medium-term impacts of monetary shocks on our dependent variables. Lastly, the lack of strong, persistent autocorrelations beyond the first lag supports the treatment of this variable as an exogenous shock in our model.

## 4.2 Results

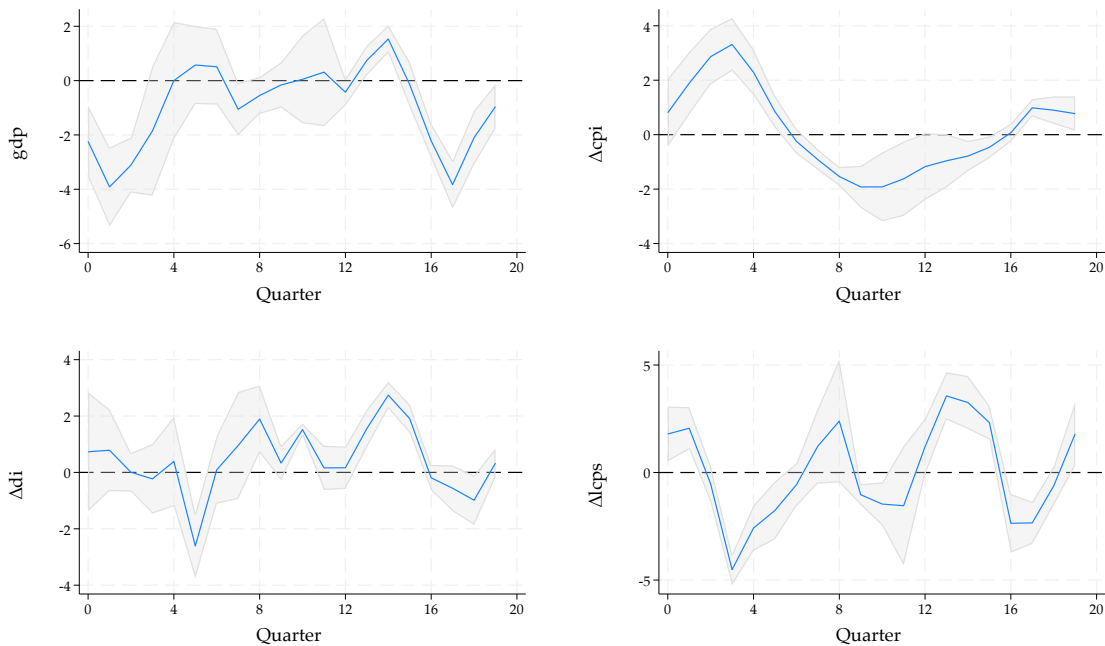
*Table A1* in the appendix presents the estimates for the impulse responses for each variable from  $H = 0, \dots, 20$ . The Newey-West standard errors are also shown below the beta values.

From the results, we can see that *gdp* shows an initial negative impact on the monetary shock in the first three quarters. This suggests that monetary tightening leads to an immediate contraction in economic activity in Angola. However, the effect appears to be temporary, as indicated by the positive and significant coefficient at the 14th quarter (nearly 4 years). As for  $\Delta cpi$ , its response exhibits a more nuanced response to shocks. Initially, we see a positive

effect lasting four quarters. The effect, however, turns negative and significant from the 7th quarter onwards, aligning with the expected disinflationary impact of monetary tightening. Like inflation,  $\Delta di$  also shows a mixed response. There is a significant negative response to the monetary shock in the 5th quarter, but that trend reverses in later quarters. Lastly,  $\Delta cps$  demonstrates a sharp and persistent decline following the monetary shock, particularly in the 3rd and 4th quarters.

The impulse response plots display further information regarding the responses of each variable to the monetary shock throughout the 20-quarter period.

Figure 1: Impulse Response of Macroeconomic Variables to a Monetary Shock

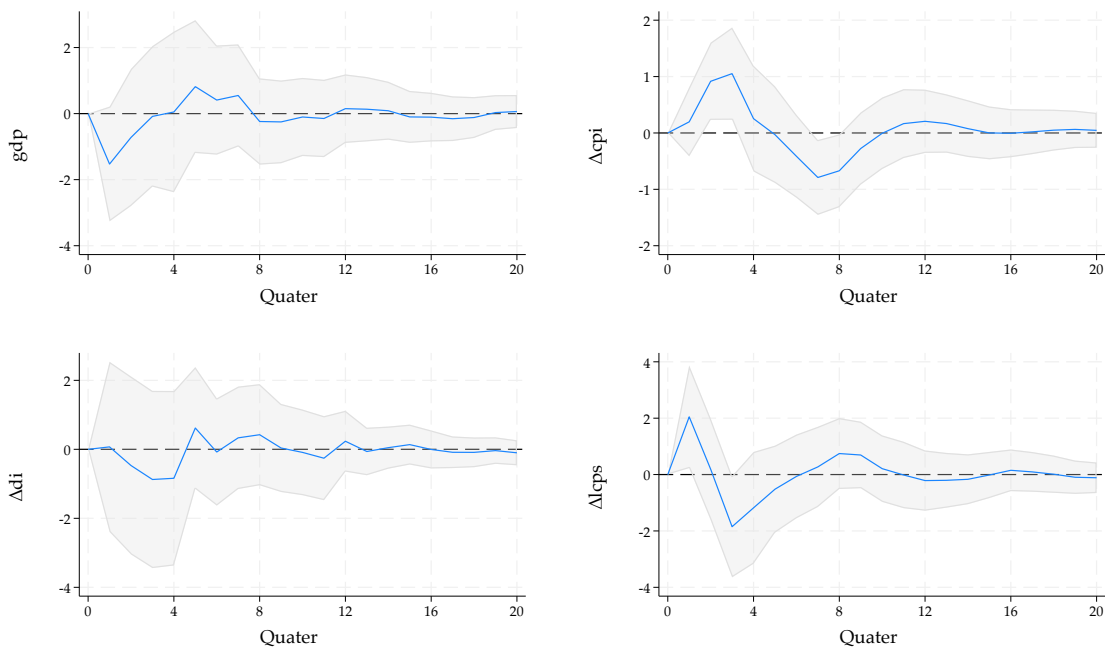


### 4.3 Robustness Checks

The comparison of the VAR and local projections models is a useful robustness test for analyzing monetary policy shocks in Angola. This approach helps to validate the findings and

provides a more complete understanding of the policy transmission mechanisms. The differences in the models highlight the importance of using multiple modeling approaches when analyzing monetary policy in developing economies. The VAR model provides a more structured view of policy interventions, while the local projections offer insights into non-linear and time-varying effects.

Figure 2: VAR Impulse Response of Macroeconomic Variables



Both models show an initial negative impact of a monetary policy shock on *gdp*. The VAR model shows a stronger and longer-lasting negative response that stays negative for about 8–10 quarters (2 years). The local projections model, as previously discussed, exhibits an initial decline but predicts a faster recovery and even a positive response in the future.

The  $\Delta cpi$  response shows differences between the two models. The VAR model suggests a relatively quick decline in inflation following the shock, which aligns with conventional monetary policy theory. The local projections model, on the other hand, suggests an initial

increase in inflation (known as a price puzzle) before a delayed negative response takes over. This discrepancy could be due to the local projections model capturing short-term rigidities or expectation effects not accounted for in the VAR specification.

Following a monetary policy shock, both models predict a rise in  $\Delta di$ , albeit to varying degrees and at different times. The VAR model indicates a more rapid and steady rise, whereas the local projections model predicts a more erratic reaction with both positive and negative swings.

The differences between the two models, particularly in the  $\Delta cpi$  and  $\Delta di$  responses, suggest complex structural features in the Angolan economy or policy intervention mechanisms that are better captured by local projections.

Finally, the response of  $\Delta lcps$  demonstrates consistency between the two models, both indicating a general decline after the shock. However, the local projections model is more nuanced, with some positive effects in later periods, not captured by the VAR model.

## **5 Discussion**

Our analysis yields significant insights into Angola's monetary policy interventions while also underscoring the complexities and challenges policymakers may face.

The delayed positive effect on GDP growth following a monetary policy shock has significant implications for long-term economic planning in Angola. The initial negative impact of monetary tightening on GDP growth, followed by a positive effect after nearly 4 years, suggests a complex dynamic. This pattern has several implications for policymakers. The temporary nature of the contraction suggests that policymakers should be patient when

implementing monetary policies. Short-term economic pain may be necessary for long-term gains. Additionally, the time-varying nature of the GDP response underscores the need for adaptive economic planning.

In the long term, the lag in positive effects suggests that policymakers should focus on structural reforms that can enhance the economy's resilience and responsiveness to policy interventions. This aligns with the country's need to diversify its economy beyond oil dependence (United Nations 2024).

The delayed positive effect implies that policies intended to stimulate the economy in the near future might need to be balanced with long-term sustainability considerations.

While the delayed responses present challenges, it also offers opportunities for Angola's economic planning. For example, the period between the initial contraction and the delayed positive response provides an opportunity for investments in key sectors like education, health, and infrastructure, which can amplify the growth effects in the long run (World Bank 2014).

The nuanced response profile of inflation to a monetary shock aligns with the expected disinflationary impact of monetary tightening. This delayed response emphasizes the time lag baked into monetary policy interventions and highlights the importance of forward-looking policy decisions. Policymakers must consider these lags when formulating strategies to control inflation in Angola.

The dollarization index also experiences a mixed response to the monetary shock. It reveals the difficulties of managing partially dollarized economies. The initial reduction in dollarization followed by a reversal suggests that economic agents in Angola may adjust their behavior over time, potentially shifting towards dollar-denominated assets in the medium

term. This pattern underscores the challenges of implementing effective monetary policy in an environment where currency substitution is prevalent. While the government has taken steps to curb this currency substitution, the data reveals that it is still prevalent and exerts an influence on the economy.

The sharp and persistent decline in credit to the private sector following a monetary policy shock confirms the presence of a strong credit channel in Angola's monetary policy transmission. This sharp decline can significantly hamper private sector investment and economic growth in Angola. It reduces access to credit, thus constraining businesses' ability to invest and tightens consumer credit, leading to reduced household spending.

While these findings offer valuable insights, it is important to interpret the results with caution due to the small sample size used in the analysis. The small sample size may compromise the precision of the estimates and the reliability of long-term projections. Further research with extended time series and additional controls could help validate and refine these results, providing a more robust foundation for policy decisions.

Furthermore, we must also consider contextual factors in light of these results. While they reflect the unique characteristics of Angola's economy, we have yet to explore how Angola's reliance on oil exports might further introduce complications to the insights derived. For example, dependence on oil exports makes Angola highly vulnerable to external shocks, particularly fluctuations in global oil prices. Oil price shocks can also lead to significant exchange rate volatility, complicating the central bank's efforts to maintain price stability. The volatility in oil revenues can lead to unpredictable inflation patterns, making it challenging for the central bank to effectively target inflation. Future research could explore how these contextual factors interact with monetary policy to shape economic outcomes.

## 6 Conclusion

This study provides valuable insights into the dynamics of monetary policy interventions in Angola, utilizing local projection to analyze the effects of monetary shocks on key macroeconomic variables. The findings reveal complex and evolving responses that underscore the challenges faced by policymakers in implementing effective monetary strategies in Angola.

The analysis reveals that monetary policy shocks have complex effects on Angola's economy. GDP growth initially contracts before showing a positive response, while inflation exhibits a mixed response with an initial increase followed by a disinflationary effect. The dollarization index displays a non-linear response, and credit to the private sector experiences a sharp and persistent decline. These findings underscore the intricate nature of monetary policy interventions in Angola's economic context.

These results have useful implications for policymaking in Angola. They emphasize the need for patience and persistence in monetary policy implementation, as well as the importance of complementary structural reforms to enhance economic resilience. The complex inflation dynamics and dollarization response highlight the challenges of inflation targeting and the need for measures to build confidence in the Kwanza. Additionally, the strong credit channel effect suggests that policymakers should carefully consider the impact of monetary tightening on private sector investment and growth.

While this study provides valuable insights, it also highlights areas for future research. The limited sample size and Angola's unique economic structure, particularly its reliance on oil exports, call for further investigation with extended time series and additional control variables. Future studies could explore the interaction between monetary policy and oil price

shocks, as well as the role of institutional factors in shaping policy outcomes.

As Angola continues its efforts to diversify its economy and enhance its resilience to external shocks, a nuanced understanding of these monetary policy dynamics will be crucial for fostering sustainable economic growth and stability.

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## Appendix

### Tables

Table A1: Estimates of responses of macroeconomic variables to a monetary shock

<b>H</b>	<i>gdp</i>	$\Delta cpi$	$\Delta di$	$\Delta lcps$
$\beta$ for $h_0$	-2.2414 ***	0.8048	0.7332	1.7928 ***
<i>SE</i>	(0.6719)	(0.6355)	(1.0752)	(0.6506)
$h_1$	-3.914 ***	1.8906 ***	0.7874	2.0591 ***
	(0.7379)	(0.5846)	(0.7387)	(0.5007)
$h_2$	-3.109 ***	2.8667 ***	0.0051	-0.5291
	(0.5176)	(0.5217)	(0.3493)	(0.4348)
$h_3$	-1.8531	3.3153 ***	-0.2278	-4.5148 ***
	(1.2177)	(0.4939)	(0.6309)	(0.3693)
$h_4$	-0.0001	2.2929 ***	0.3890	-2.5833
	(1.1014)	(0.4274)	(0.8087)	(0.5408)
$h_5$	0.5751	0.8429 ***	-2.6106 ***	-1.7583 **
	(0.7324)	(0.3002)	(0.5856)	(0.6851)
$h_6$	0.5105	-0.2423	0.0928	-0.5680
	(0.7110)	(0.2335)	(0.6146)	(0.5076)
$h_7$	-1.053 **	-0.9177 ***	0.9560	1.2284
	(0.4928)	(0.1920)	(0.9674)	(0.8890)
$h_8$	-0.5484	-1.5350 ***	1.8934 ***	2.3927
	(0.3461)	(0.1782)	(0.6082)	(1.4573)
$h_9$	-0.1599	-1.9182 ***	0.3330	-1.0302 ***
	(0.4261)	(0.3944)	(0.3105)	(0.2448)
$h_{10}$	0.0481	-1.9184 ***	1.5200 ***	-1.4640 ***
	(0.8244)	(0.6432)	(0.1103)	(0.5138)
$h_{11}$	0.3124	-1.6211 **	0.1612	-1.5428
	(1.0156)	(0.6959)	(0.4006)	(1.4134)
$h_{12}$	-0.4254	-1.1733 *	0.1667	1.2022 *
	(0.2516)	(0.6245)	(0.3831)	(0.6676)
$h_{13}$	0.7455 ***	-0.9584 *	1.5572 ***	3.5636 ***
	(0.2777)	(0.4997)	(0.3410)	(0.5620)

<i>h14</i>	1.5321 *** (0.2573)	-0.7850 *** (0.2825)	2.7418 *** (0.2407)	3.2548 *** (0.6283)
<i>h15</i>	-0.1466 (0.4251)	-0.4636 ** (0.2023)	1.9071 *** (0.2560)	2.3210 *** (0.4018)
<i>h16</i>	2.2150 *** (0.3231)	0.0728 (0.1671)	-0.1904 (0.2320)	-2.3604 *** (0.6989)
<i>h17</i>	-3.8293 *** (0.4521)	0.9874 *** (0.1622)	-0.5610 (0.4139)	-2.3408 *** (0.4974)
<i>h18</i>	-2.1023 *** (0.5063)	0.8988 *** (0.2572)	-0.9859 ** (0.4479)	-0.6216 (0.4596)
<i>h19</i>	-0.9529 ** (0.4166)	0.7735 ** (0.3212)	0.3337 (0.2622)	1.7980 ** (0.7549)

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\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Figures

Figure A1: AC and PAC Test for the shock variable

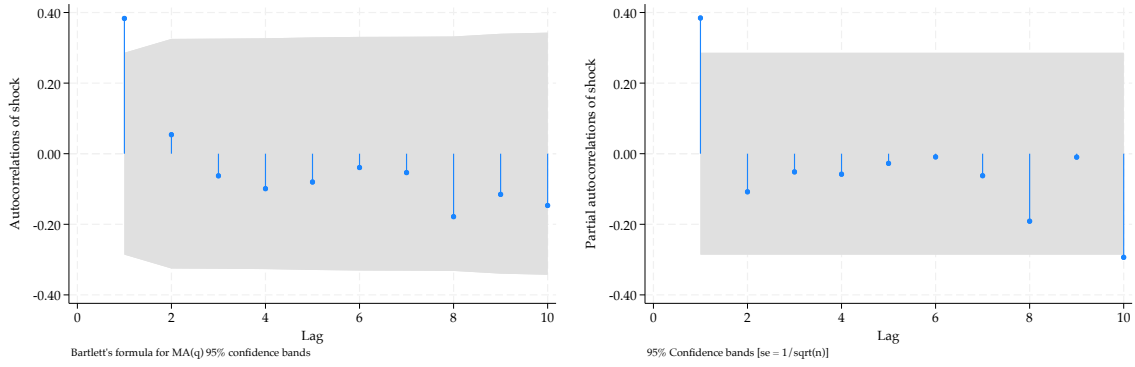


Figure A2: Overlaid Comparison of LP and VAR Impulse Responses

