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Measuring Monetary Policy Stance in Sub-Saharan African Emerging and Frontier Markets

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Measuring Monetary Policy Stance in Sub-Saharan African Emerging and Frontier Markets

Prepared by Johanna Tiedemann, Olivier Bizimana, and Shant Arzoumanian *

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ABSTRACT: This paper assesses the stance of monetary policy in eleven Sub-Saharan African (SSA) emerging and frontier market economies. We estimate neutral real interest rates using a range of methodologies, and find a broadly declining trend in most economies since the Global Financial Crisis, consistent with patterns observed in advanced and major emerging market economies. We document significant heterogeneity in monetary policy stances—measured by the interest rate gap—even during common global shocks. We also examine the consistency between signals from the intended monetary policy stance and broader financial conditions. To this end, we construct financial conditions indices (FCIs) and analyze their relationship with interest rate gaps. We find that this relationship strengthens during periods of highly accommodative or restrictive monetary stances, particularly in economies that have adopted or are transitioning to inflation-targeting frameworks. Moreover, contractionary monetary shocks tighten financial conditions more in these economies than in those operating under other regimes.

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WORKING PAPERS

Measuring Monetary Policy Stance in Sub-Saharan African Emerging and Frontier Markets

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Contents

I. Introduction

In sub-Saharan Africa (SSA), analysts and policymakers have traditionally focused on the nominal policy rate as the primary instrument for signaling the stance of monetary policy. However, comparatively less attention has been devoted to systematically assessing the stance itself and the effectiveness of its transmission mechanism. More broadly, in low-income countries (LICs), including SSA economies, issues associated with monetary policy assessment remain largely underexplored. In contrast, in advanced economies (AEs) and major emerging market economies (EMEs), the assessment of the stance of monetary policy is more regularly communicated by central banks and has been extensively studied in the academic literature.

The inflation surge of 2021-23 has brought renewed attention to these issues, reigniting debate on how best to assess the stance of monetary policy. In response to global supply-driven inflationary pressures, many SSA central banks implemented significant monetary tightening.[2] By 2023, policy rates in SSA had reached decade-highs, raising concerns that monetary policy could become overly restrictive, particularly as global supply shocks began to subside in late 2023. Yet, inflation remained elevated in parts of the region, suggesting that monetary policy may still have been accommodative and that further tightening could be required to prevent inflation expectations from becoming unanchored. Conversely, as inflation pressures ease, a key question is how low interest rates should be set and how quickly monetary policy shocks transmit to the economy. More fundamentally, what level of interest rates should economic agents expect in the medium to long term?

This paper seeks to address these questions for SSA economies by estimating the neutral real interest rate (or r-star), a benchmark widely used to assess the stance of monetary policy.[3] We define the neutral real interest rate as the level of the real policy rate consistent with output at potential and inflation at target, once cyclical shocks have dissipated (Laubach and Williams, 2003; Mendes, 2014).[4] This is a medium- to long-run concept, as it refers to the real interest rate expected to prevail once the economy has emerged from cyclical fluctuations and is expanding at its potential rate. As an unobservable, medium- to longer-run anchor, the true value of the neutral rate is subject to considerable uncertainty. The gap between the ex-ante real interest rate—defined as the nominal policy rate adjusted for expected inflation—and the neutral rate (i.e., the real interest rate gap) provides a standard metric for evaluating the monetary policy stance. A real interest rate below (above) the neutral rate is indicative of an expansionary (restrictive) policy stance.

[2] For discussions on the inflation surge of 2021–23 in SSA countries, see, among others, Tiedemann et al. (2024), and Andriantomanga et al. (2023).

[3] The neutral interest rate in major advanced and emerging market economies has been extensively researched. For empirical studies on major advanced economies, see, among others, Laubach and Williams (2003); Holston et al. (2017, 2020); and IMF (2023).

[4] The neutral rate does not have a unique definition, as economists and monetary policymakers generally use various concepts. In the empirical literature, the terms “neutral”, “natural” or “equilibrium” interest rate are sometimes used interchangeably. In this paper, we only use the term “neutral” rate of interest. For a discussion on the distinction between these concepts, see, for example, Obstfeld (2023), who distinguishes between the natural rate (the real interest rate prevailing in an equilibrium with flexible prices) and the neutral rate (the real policy rate that eliminates inflationary or deflationary pressures), noting, however, that they are conceptually closely related and empirically highly correlated.

While the neutral rate serves as a useful benchmark, it may provide an incomplete view of the policy stance in the presence of impaired transmission mechanisms. The policy rate influences economic activity and inflation by affecting short- and long-term market rates, bank interest rates, credit, asset prices, and exchange rates—collectively known as financial conditions—which constitute the first stage of the transmission mechanism.[5] Typically, in the absence of frictions, this stage unfolds relatively swiftly due to the forward-looking behavior of financial markets. However, when frictions are present, the transmission of the policy instrument to financial conditions can be weakened, masking the role of the policy rate as a clear signal of the monetary policy stance.

This paper complements neutral rate estimates with a quantitative assessment of the interaction between the policy rate and broader financial conditions. Monitoring financial conditions is especially important in contexts where the link between policy rates and financial variables is unstable or unpredictable (Dudley, 2010). This is often the case in SSA economies, where traditional transmission channels—including interest rates, credit, asset prices, exchange rates, and expectations—are impeded by structural factors such as weak institutions, underdeveloped financial markets, limited competition in the banking sector, and excess reserves (see, Mishra et al., 2010, 2014; Christensen, 2011; Saxegaard, 2006).

To our knowledge, this paper provides the first empirical assessment of the monetary policy stance across SSA economies while accounting for its consistency with broader financial conditions. We focus on a selected group of SSA emerging and frontier market economies (SSA EFMs), where central banks primarily use the policy rate as the main signaling tool of the stance of monetary policy, and price stability is either the primary or a key policy objective.[6] Accordingly, the monetary policy framework of these countries can reasonably be approximated by a Taylor-type rule, where the interest rate responds to the output gap and inflation deviations from an explicit or implicit target.

This paper seeks to address the following questions:

- What is the neutral real interest rate in SSA economies?
- How has the monetary policy stance evolved during major global shocks?
- Is the stance of monetary policy consistent with broader financial conditions?
- How does monetary policy affect financial conditions in SSA economies?
- What are the implications for monetary transmission and the effectiveness of monetary policy?

Key findings. The paper's main findings, which address these questions, are as follows:

We first estimate a range of neutral interest rates for individual SSA EFM economies using six commonly applied methods from the literature, while acknowledging that point estimates are subject to considerable uncertainty. Although the estimates vary across methodologies within each economy and differ significantly across SSA economies, they exhibit broadly similar trends, with only minor deviations. Given this consistency, we rely on the mean of all estimated neutral rates within each economy for the subsequent analysis. Our findings indicate that in three-quarters of the countries, neutral rate estimates peaked around 2007 before declining—albeit to varying degrees—during the 2008–09 Global Financial

[5] The second stage of transmission occurs when these financial conditions influence economic activity and inflation.

[6] The classification of Emerging and Frontier Markets is based on the grouping of SSA economies included in J. P. Morgan's Next Generation Market Index.

Crisis (GFC), followed by a further decline during the pandemic. We also find that, in most SSA economies, neutral rate estimates remain higher than those in AEs. Moreover, the downward trend observed in SSA economies since the GFC is broadly consistent with findings from studies on AEs and major EMEs.

We then calculate the real interest rate gap—the deviation of the ex-ante real interest rate from the neutral real interest rate—as a measure of the monetary policy stance. The estimates reveal substantial variation in monetary policy stances across the region, even during periods of common shocks. For example, during the GFC, seven central banks pursued a loose policy stance, while four maintained a tighter approach. About half of the economies adopted tighter stances during the commodity price slump and China's economic slowdown in 2014–15. In contrast, policy remained broadly accommodative across the region during the pandemic. By the end of 2023, half of the central banks had adopted restrictive stances, while monetary policy remained accommodative in the rest.

We also examine the consistency between signals from the intended monetary policy stance and broader financial conditions to account for the fact that impaired transmission channels in SSA economies weaken the link between the policy rate and financial conditions. This, in turn, reduces the usefulness of the neutral rate as a stand-alone benchmark for assessing the monetary policy stance. To address this limitation, we first develop financial conditions indexes (FCIs) for SSA economies by summarizing a range of financial indicators into a single composite measure. We then analyze the empirical relationship between financial conditions and interest rate gaps. Our findings indicate that the relationship between interest rate gaps and FCIs is strongest during periods of highly restrictive (or accommodative) monetary policy—i.e., when interest rate gaps are large—and when financial conditions are exceptionally tight (or loose). This relatively strong relationship is particularly evident in about half of SSA economies that have adopted, or are transitioning to, a formal inflation-targeting framework, with contemporaneous or leading correlation coefficients of approximately 0.6.

To complete our analysis, we estimate the response of FCIs to monetary policy shocks. To mitigate potential biases arising from endogenous and anticipatory elements in conventional measures of monetary policy shocks, we employ a two-step approach. First, we identify monetary policy shocks using a methodology inspired by Romer and Romer (2004). Second, we estimate the impulse response functions of FCIs to these identified shocks using the local projection framework of Jordà (2005). Our findings indicate that contractionary monetary policy shocks generally lead to tighter financial conditions, consistent with evidence from other regions. The magnitude and persistence of this tightening vary across economies: contractionary shocks tend to result in larger, faster, and more persistent tightening in economies that have adopted, or are transitioning toward, formal inflation-targeting frameworks. In the two monetary unions with exchange rate anchors, the effects are relatively strong but delayed. By contrast, the impact is typically short-lived or more muted in economies operating under monetary aggregate-targeting frameworks or eclectic regimes.

However, differences in monetary policy frameworks alone may not fully account for these results, as most frameworks evolved over the sample period. The relatively strong transmission observed in economies adopting or transitioning to inflation-targeting regimes may partly reflect concurrent reforms to strengthen operational frameworks—such as the adoption of interest rate-based operating procedures—and the presence of comparatively better-developed financial infrastructure relative to regional peers.

Related literature. This paper relates to three distinct strands of literature on: (i) the neutral interest rate, (ii) financial conditions indices, and (iii) the transmission of monetary policy to financial conditions in low-income countries (LICs). Studies focusing on SSA economies remain scarce or, in some cases, entirely absent. We provide a non-exhaustive overview of recent cross-country empirical literature on these topics for EMEs and, where available, for SSA economies.

First, we contribute to the literature estimating neutral interest rates for EMEs in SSA, which has primarily focused on inflation-targeting economies in the rest of the world. For example, Rush (2021) estimates neutral real interest rates for 20 emerging market and developing economies (EMDEs) using three modeling approaches: the Laubach and Williams (2003) model adapted for open economies, a dynamic Taylor Rule, and a time-varying parameter vector autoregressive model. His findings suggest that neutral rates in inflation-targeting EMDEs have broadly followed the downward trend of the U.S. neutral rate over the past two decades. He also highlights that monetary policy stances, measured by the interest rate gap, have generally been countercyclical in these economies, though there is considerable uncertainty surrounding neutral rate estimates, complicating the assessment of the policy stance. Magud (2012) estimates neutral interest rates for 10 inflation-targeting Latin American countries using multiple methodologies, including consumption-smoothing models, the uncovered interest parity condition, filtering methods, a dynamic Taylor Rule, and the Laubach and Williams (2003) model. He finds a declining trend in neutral rate estimates, with more economically and financially developed economies exhibiting lower neutral rates. Studies focusing specifically on SSA economies remain scarce. To our knowledge, no study has systematically assessed the monetary policy stance across multiple SSA economies. Existing studies on individual SSA economies focus primarily on South Africa. For example, Kuhn et al. (2019) estimate the neutral rate for South Africa using an open-economy version of the Laubach and Williams (2003) model and find that South Africa’s neutral rate has declined since the GFC, albeit less sharply than in the United States and other AEs. To the best of our knowledge, our study is the first to provide neutral interest rate estimates and a thorough assessment of the monetary policy stance for a group of SSA economies.

Second, to incorporate financial conditions into the assessment of the monetary policy stance, our paper builds on the growing literature on financial conditions indices (FCIs), which has expanded since the GFC, particularly for AEs. However, studies on FCIs for EMEs remain relatively limited. For example, Brandao-Marques and Perez Ruiz (2017) construct FCIs for six large, financially integrated Latin American economies using a time-varying parameter factor-augmented vector autoregressive (TVP-FAVAR) model. They find that FCIs are influenced by global financial cycles, commodity price cycles, and country-specific episodes of financial distress. Similarly, IMF (2017) develops FCIs for both major advanced and emerging economies and finds that emerging market FCIs are more sensitive to global financial conditions but less responsive to changes in domestic monetary policy stances. Studies on FCIs for SSA economies are particularly limited. One exception is EIB (2023), which develops an FCI for Africa based on monthly data from four major African economies (Egypt, Nigeria, Kenya, and South Africa). The study constructs country-level FCIs using a simple average approach and aggregates them into a regional FCI using a weighted-sum approach based on GDP shares. Findings suggest that country-level FCIs tend to either lead or track real economic activity, though with notable variations. A principal component analysis yields broadly similar results for some countries but large deviations for others during certain periods. For individual SSA economies, Gumata et al. (2012) construct two FCIs for South Africa using a broad set of global and domestic financial indicators, applying both principal component analysis and the Kalman filter. They find that FCIs have significant predictive power for near-term GDP growth.

Similarly, Kabundi and Mbelu (2021) develop an FCI for South Africa using a time-varying factor model, showing that FCIs capture both global and country-specific financial risks. Their impulse-response analysis using a TVP-FAVAR model suggests that a tightening of FCIs reduces GDP growth and inflation.

Third, we contribute to the literature on the transmission of monetary policy to financial conditions in LICs. Most existing studies focus on a single transmission channel or a limited aspect of the first stage of transmission, rather than evaluating its impact on overall financial conditions. Mishra et al. (2010) argue that the bank lending channel is likely the dominant transmission mechanism in LICs. Their analysis shows that correlations between the policy instrument and money markets, as well as between money markets and lending rates, are weaker in LICs than in advanced and emerging economies. Mishra et al. (2014), using a structural panel VAR approach covering advanced, emerging, and LICs, find that monetary policy shocks transmit less effectively to bank lending rates in LICs due to weaker institutional environments, underdeveloped financial structures, and concentrated banking systems. Similarly, Berg et al. (2013) take a narrative approach to examine a major monetary policy tightening episode in 2011 across four East African Community countries (Kenya, Uganda, Tanzania, and Rwanda). They find that policy rate changes affected lending rates, exchange rates, output, and inflation, though with varying degrees of effectiveness. We are also the first to evaluate the transmission of monetary policy to broader financial conditions in SSA economies using identified shocks.

The paper is structured as follows. Section 2 outlines the empirical approach, presents estimates of neutral interest rates using six methodologies commonly applied in the literature, and assesses the stance of monetary policy. Section 3 briefly discusses the construction of FCIs for SSA economies, examines the consistency of the monetary policy stance with broader financial conditions, explores the identification of monetary policy shocks, and analyzes the response of financial conditions to these shocks using local projection methods (Jordà, 2005). Section 4 concludes by summarizing the key findings and policy implications.

II. Estimating the Neutral Interest Rates for SSA Economies

Since the neutral rate is not directly observable, it must be estimated or inferred from the movements of observable variables, such as market interest rates, inflation, and output, using theoretical or empirical models. These estimates, however, are often sensitive to model specifications and subject to considerable uncertainty, complicating the selection of a reliable measure for assessing the stance of monetary policy.[7] This challenge is even greater in SSA economies, where the relatively poor quality and limited availability of data—particularly at high frequency—hamper the application of empirical analyses that rely on methods imposing economic structure. In light of these constraints, we employ a range of empirical approaches commonly found in the literature to estimate the neutral rate, including univariate time series methods, reduced-form econometric models, and semi-structural models. By generating a range of estimates, we aim to provide a more pragmatic basis for assessing the stance of monetary

[7] The most commonly used approaches highlight significant uncertainty surrounding estimates of neutral interest rates for advanced economies (see, among others, Laubach and Williams, 2003; Holston et al., 2017), with even greater uncertainty for emerging and developing economies (e.g., Rush, 2021).

policy. Combining multiple approaches is a standard strategy for mitigating uncertainty surrounding neutral rate estimates arising from differences in methodology and input data (e.g., McCririck and Rees, 2017; Meyer et al., 2022; Cacciatore et al., 2024).

This section outlines our empirical strategy to evaluate the monetary policy stance in SSA economies. We begin by briefly describing the data and the methodologies used to estimate the neutral real interest rate, with particular emphasis on the identifying assumptions underlying these alternative estimation approaches. We then present our estimation results and discuss the assessment of the monetary policy stance in the region.

A. Data

The economies considered include South Africa, as the only SSA emerging market economy; nine frontier market economies—Ghana, Kenya, Mauritius, Mozambique, Nigeria, Tanzania, Uganda, and Zambia—and two monetary unions—the Central African Economic and Monetary Union (CEMAC) and the West African Economic and Monetary Union (WAEMU).[8] Five of these SSA EFMs are classified as having an inflation-targeting framework (Ghana, Kenya, Mauritius, Uganda, and South Africa) as of end-2023, although most adopted formal inflation-targeting regimes at different points during the sample period.[9] Two economies (Nigeria and Tanzania) target monetary aggregates, while two others (Mozambique and Zambia) follow eclectic frameworks, monitoring various indicators when conducting monetary policy.[10] The two monetary unions have their currencies pegged to the euro.[11] However, their central banks—BEAC and BCEAO—retain some scope to conduct independent monetary policy, owing to relatively limited capital mobility and financial integration.

The empirical analysis relies on quarterly data spanning from the first quarter of 2002 to the fourth quarter of 2023 for the SSA economies covered, subject to data availability. Where quarterly data were unavailable, annual data were interpolated using a quadratic interpolation method. Table C.3 provides further details on data sources and definitions.

The nominal policy rate serves as the short-term interest rate in our analysis. Ex ante short-term real interest rates are calculated as the nominal policy rate minus one-year-ahead headline inflation expectations. Since inflation expectations are not directly observable, they are often approximated using survey-based measures or market-derived estimates. However, for most SSA economies, such measures are not available over an extended historical period, if at all. To address this limitation, our analysis proxies inflation expectations using one-year CPI inflation forecasts from the IMF's World Economic Outlook (WEO), which are consistently available for all selected economies. The forecasts from the IMF's WEO are particularly suitable, as they offer long coverage and are available for all countries in our

[8] CEMAC consists of Cameroon, the Republic of Congo, the Central African Republic (C.A.R.), Chad, Equatorial Guinea and Gabon. WAEMU members are Benin, Burkina Faso, Côte D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. Within these monetary unions, Gabon (CEMAC), along with Côte D'Ivoire and Senegal (WAEMU), are classified as frontier market economies.

[9] South Africa officially adopted an inflation targeting framework in 2000; Ghana in 2007; Uganda in 2011; Kenya adopted a forward-looking monetary policy framework—incorporating elements of inflation targeting—in 2011; and Mauritius adopted an inflation targeting framework in 2023.

[10] The central bank of Mozambique is currently transitioning toward inflation targeting.

[11] For further details on classification of exchange rate arrangements and monetary frameworks for the selected economies, see Table C.2.

sample. To ensure robustness, we compare this measure with alternative indicators based on different proxies for inflation expectations. Specifically, ex-ante real interest rates are also computed using three-year-ahead inflation expectations and the four-quarter moving average of past inflation. Figure A.1 illustrates the sensitivity of ex-ante real interest rates to these alternative measures of inflation expectations.[12] Other data used in the analysis are introduced within the context of each method presented in the paper.

B. Estimation methods

We consider six distinct but complementary approaches to estimate the neutral real interest rate, each differing primarily in the degree of economic structure imposed: (i) sample averages, which assume the neutral rate remains relatively constant over time; (ii) univariate filters, which infer the neutral rate as the trend component of the actual real interest rate; (iii) a simple Taylor rule, which derives the neutral rate based on the central bank's response to deviations of output from its potential and inflation from its target; (iv) a reduced-form model, which relates the neutral rate to the growth rate of potential output and global interest rates; (v) a time-varying parameter vector autoregressive (TVP-VAR) model, which captures co-movements among key macroeconomic variables and uses the model's five-year-ahead forecasts of the real interest rate to estimate the neutral rate; and (vi) a semi-structural model, which imposes more economic structure by leveraging movements in inflation, output, and interest rates to estimate the real neutral rate. In all six approaches, the neutral real interest rate is defined from a medium- to long-run perspective, as it refers—implicitly or explicitly—to the level of the real interest rate expected to prevail once the output gap has closed.

The neutral interest rate is estimated for each SSA economy using quarterly data covering the period from 2002Q1 to 2023Q4, where data are available.

Historical averages

As an initial approximation, the neutral rate can be estimated by averaging the ex-ante short-term real interest rate over a relatively long period, typically a business cycle.[13] This straightforward approach assumes that the neutral real interest rate remains relatively constant over time and is generally reliable during periods without a sustained trend in inflation (Laubach and Williams, 2016). While inflation in most SSA economies has exhibited varying degrees of volatility over the past two decades, it has not experienced prolonged upward or downward trends. Nevertheless, inflation levels have gradually decreased over time. Specifically, inflation dynamics appear to have shifted following the GFC, with lower average inflation rates compared to the preceding decade.[14]

[12] It is important to note that the method used to estimate expected inflation can have significant implications for the assessment of the policy stance, including the magnitude—and even the sign—of the interest rate gap. As shown in Appendix Figure A1, ex ante real rates are generally less volatile than ex post real rates across all countries, reflecting the smoother evolution of expected inflation relative to actual inflation, particularly during episodes of economic shocks.

[13] This approach implicitly assumes that, over a sufficiently long sample period, resource slack averages out to zero, suggesting that the sample average of the real interest rate equals the neutral rate.

[14] To account for lower inflation in the post-GFC period, we also calculate the average ex ante real interest rate for two sub-periods: 2002–09, which includes the GFC, and 2010 to the present. These sub-period averages are then compared with the full-sample mean to provide additional insights.

The sample average method also presents conceptual limitations. Most notably, the choice of the sample period can significantly influence the estimate, as persistent deviations may exist between the observed long-run average and the true neutral rate. Moreover, the historical average rate that balanced aggregate demand and supply in the past may not correspond to the rate appropriate for current cyclical conditions (Ferguson, 2004).

Univariate statistical filters

Long-term averages, however, do not capture the fact that the real neutral interest rate can be influenced by large and persistent shocks. To account for these persistent changes, another straightforward method involves extracting the trend component (as a proxy for the neutral rate) from the observed short-term real interest rate using univariate filters. We employ two widely used filters in empirical research: the Hodrick-Prescott (HP) filter with tail correction and the Christiano-Fitzgerald (CF) filter.[15]

Similar to sample averages, these simple statistical approaches provide reasonable estimates during periods of relatively stable inflation and output growth. However, they tend to introduce biases when inflation or output varies significantly—underestimating the neutral rate during periods of rising inflation and overestimating it during periods of rapidly falling inflation. Another shortcoming of this approach is its weak theoretical foundation. Since it relies solely on the short-term real interest rate as an input, there is no guarantee that the estimated trend component of the real interest rate corresponds to a state in which output is at its potential level.

Recursive Taylor rule

The third method estimates the neutral interest rate using a standard central bank reaction function, in which the policy rate adjusts in response to deviations of output from its potential level and inflation from its target—whether the target is explicitly stated or implicitly inferred.

More specifically, we consider the following Taylor rule specification:

$$i_t = \rho i_{t-1} + (1-\rho)[r^* + \pi_t^* + \alpha(\pi_t - \pi_t^*) + \beta \tilde{y}_t] + \xi_t, \tag{1}$$

where i is the nominal short term policy rate, which responds to the deviation of inflation (π) from the central bank's desired level or inflation target (π^*)—the inflation gap—and to the output gap ($\hat{y}$). The output gap ($\tilde{y}_t$) is defined as the difference between the log of output (y_t) and the log of potential output (y_t^*), estimated as the Hodrick-Prescott (HP)-filtered log of output.[16]

To measure the inflation target, we use the announced official target (or the midpoint of the target range) for inflation-targeting countries, the explicit price stability objective for countries with such a mandate, and the sample average inflation rate (as an implicit objective) for countries without an explicitly declared quantitative objective.

[15] For the HP filter, we apply the standard smoothing parameter (lambda) of 1,600 for quarterly data and extend the sample period to 2027Q4 using projections from an ARIMA model to address the endpoint bias inherent in filtering methods. For the CF filter, we use an asymmetric band-pass filter to isolate the cyclical component between 6 and 32 quarters (equivalent to 1.5 to 8 years, based on the dataset frequency). This range reflects the standard assumption regarding the typical duration of a business cycle.

[16] The end-of-sample problem of the HP-filter is mitigated by adding three years of forecasts from the WEO to the series of real GDP.

The coefficient ρ captures the degree of inertia in the policy rate, reflecting the central bank's tendency to adjust rates gradually in response to changes in the inflation gap and output gap.[17] The real neutral interest rate r^* corresponds to the rate that prevails when inflation is at the desired level, and the output gap is closed. The coefficients α and β represent the responsiveness of policy to the inflation gap and the output gap, respectively.

The standard Taylor rule formulation assumes that the neutral rate (r^*) is constant over time. To allow for time variation in r^*, we estimate equation (1) recursively using rolling windows of 32 quarters, based on quarterly data from 2002Q1 to 2023Q4. The initial estimation covers the period from 2002Q1 to 2009Q4, using OLS. Subsequently, we re-estimate the rules by adding one observation at a time, quarter-by-quarter, until the end of the sample.

Although the monetary policy framework of some of the SSA economies may be better approximated by augmented rules incorporating additional economic indicators, such as the exchange rate, this straightforward formulation indirectly captures the influence of such variables through their effects on inflation and output. In particular, Taylor (2001) discusses extensions of the Taylor Rule for open economies that explicitly incorporate the exchange rate. He finds that such augmented rules do not significantly improve the stabilization of inflation and output and, in some cases, perform worse than simpler rules that exclude the exchange rate.

However, in the context of EMEs, estimating Taylor rules poses several challenges. These include sensitivity to alternative specifications and estimation methods, as well as instability in the estimated parameters—particularly in countries that have experienced significant changes in their monetary policy regimes (e.g., Mohanty and Klau, 2004).

Reduced-form model

As a fourth approach, and following Mendes (2014), we use a reduced-form framework that incorporates an endogenous risk premium dependent on net foreign asset positions, allowing both domestic and global factors to influence the domestic neutral rate. In open economies, such as those in SSA, savings do not need to be equal to investment, as the difference—the current account deficit—can be financed by foreign capital inflows. However, the domestic neutral rate may still diverge from the global neutral rate due to the presence of a country-specific risk premium.

The reduced-form equation is derived from the following three conditions:

(i) The balance of payments identity:

$$S_t - I_t = NX_t + r_t^w NFA_t, \tag{2}$$

(ii) The NFA accumulation equation:

$$NFA_t = (1 + r_t^w) NFA_{t-1} + NX_t, \tag{3}$$

(iii) The interest parity condition:

$$r_t = r_t^w + E_t \Delta q_{t+1} + (\theta_0 - \theta_1 nfa_t), \tag{4}$$

[17] Empirical estimates consistently find that central banks across a wide range of countries exhibit inertia in their policy responses (see, e.g., Goodhart 1999).

where *S* represents national savings, *I* is investment, *NX* denotes net exports, r_t^w is the world interest rate, *NFA* is the net foreign assets position, *q* is the exchange rate. The term $(\theta_0 - \theta_1 nfa_t)$ represents the risk premium, which depends on the NFA-to-GDP ratio, $nfa_t = NFA/Y$.

In the long run, the savings-to-output ratio $s = S/Y$ and the investment-to-output ratio $i = I/Y$ are assumed to follow the linear behavioral relationships:

$$s = \alpha_s + \beta_{s,r} r \quad (5)$$

$$i = \alpha_i + \beta_{s,r} r + \beta_{i,g} g, \quad (6)$$

where *g* represents the growth rate of potential output.

For simplicity, Mendes (2014) assumes that $\theta_0 = 0$. Solving the steady state of the system—combining equation (2) through (4) with the linear approximations for *s*avings and investment from equations (5) and (6) —yields the following reduced-form equation:

$$r = \alpha + \beta_0 g + \beta_1 r^w \quad (7)$$

Equation (7) is estimated using OLS. Potential growth (*g*) corresponds to the growth rate of the HP-filtered trend component of real GDP. We use the ex ante real short-term interest rate as the measure of *r* and the U.S. real federal funds rate as the proxy for r_t^w. The estimated parameters are then used to compute the domestic neutral real interest rate.

This approach has several drawbacks, including its sensitivity to the estimation sample period and the fact that the underlying structural parameters are not uniquely identified (Mendes, 2014).

Time-varying parameter vector autoregressive (TVP-VAR) model

Following Lubik and Matthes (2015), the fifth approach to estimating the neutral interest rate employs a vector autoregressive model with time-varying parameters (TVP-VAR). The TVP-VAR is a time-series model that explains the evolution of economic variables as a function of their own lagged values and random shocks. Unlike standard VAR models, the parameters of the TVP-VAR—i.e., the lag coefficients and the variance of the shocks—are allowed to vary over time. This makes the framework flexible and capable of capturing potential non-linear behaviors in macroeconomic time series (Lubik and Matthes, 2015).

The model is specified as follows:

$$Y_{it} = \theta_t X_{it} + \varepsilon_t \quad (8)$$

$$\theta_t = \theta_{t-1} + \upsilon_t, \quad (9)$$

where Y_{it} is an $Nx1$ vector of endogenous variables, θ_t is a matrix of time-varying coefficients, X_{it} is a matrix of lagged dependent variables (including an intercept), and ε_t and υ_t is a time varying i.i.d. error.

In their original TVP-VAR model for the US economy, Lubik and Matthes (2015) include three variables: real GDP growth, inflation, and the short-term real interest rate. To account for the small-open economy characteristics of SSA economies, we extend the model by including the real effective exchange rate, with two lags. The model is estimated for each SSA economy using Bayesian methods and quarterly data spanning the period from 2002Q1 to 2023Q4. The neutral real interest rate is derived from the model's five-year-ahead forecasts of the real interest rate.

The TVP-VAR model also has several shortcomings. It is a purely statistical and nonstructural approach, as its estimates are not explicitly linked to underlying economic relationships derived from macroeconomic theory. Moreover, the model's specification is sensitive to assumptions about its flexibility, including the degree of parameter variability, and is affected by real-time data issues such as measurement error (Lubik and Matthes, 2023).

A semi-structural model

The sixth approach is based on a semi-structural model, building on the widely used Laubach and Williams framework (Laubach and Williams, 2003; and Holston, Laubach, and Williams, 2017; hereafter HLW). The HLW framework is a linearized New Keynesian model that links the output gap to the real interest rate (IS curve), and to inflation dynamics (Phillips curve). We modify the original HLW framework to account for small-open economy characteristics of SSA economies by incorporating the real effective exchange rate into both the IS and the Phillips curves.

The model is summarized by the following equations:

$$\tilde{y}_t = \alpha_{\tilde{y},1}\tilde{y}_{t-1} + \alpha_{\tilde{y},2}\tilde{y}_{t-2} - \frac{\alpha_r}{2}\sum_{j=1}^{2}\left(r_{t-j} - r^*_{t-j}\right) + \alpha_q(q_t - q^*_t) + \varepsilon_{\tilde{y},t} \quad (10)$$

$$\pi_t = \beta_\pi \pi_{t-1} + (1-\beta_\pi)\pi_{t-2,4} + \beta_{\tilde{y}}\tilde{y}_{t-1} + \beta_q(q_t - q^*_t) + \varepsilon_{\pi,t} \quad (11)$$

$$y^*_t = y^*_{t-1} + g_{t-1} + \varepsilon_{y^*,t} \quad (12)$$

$$g_t = g_{t-1} + \varepsilon_{g,t} \quad (13)$$

$$r^*_t = g_t + z_t \quad (14)$$

$$z_t = z_{t-1} + \varepsilon_{z,t} \quad (15)$$

Equation (10) is the IS curve, which links the output gap ($\tilde{y}_t = y_t - y^*_t$) to the interest rate gap. Here, y_t is actual output, and y^*_t is potential output. r_t and $r^*{}_t$ denote the actual short-term interest rate and the neutral rate, respectively. The term $q_t - q^*{}_t$ represents the deviation of the real effective exchange rate (q_t) from its equilibrium level (q^*_t).[18] In a small-open economy framework, the real exchange rate gap captures the country's competitiveness. An appreciation of the exchange rate makes domestic goods more expensive relative to foreign goods, potentially reducing exports and slowing economic activity. Therefore, the coefficient α_q is expected to be negative. The exchange rate gap is treated as an exogenous variable.

Equation (11) describes the Phillips curve, which relates inflation to the output gap and the real exchange rate. π_t represents the inflation rate, $\pi_{t-2,4}$ is the average of the second and fourth lags of inflation. In this framework, the exchange rate affects inflation both directly—through its cyclical deviations—and indirectly, via the output gap. An appreciation of the exchange rate reduces the price of imported goods, lowering inflation. Hence, the coefficient β_q is expected to be negative.

Equation (12) models' potential output as a random walk with a drift (g), which represents the trend of potential output growth. This drift follows a random walk process in Equation (13). The neutral real

[18] The explicit inclusion of the exchange rate in a semi-structural model, in the spirit of the Laubach and Williams framework, to account for a small-open economy, is extensively discussed by Berger and Kempa (2014) in the context of Canada. Other studies have also incorporated the real exchange rate into the Laubach and Williams framework for emerging and developing economies (e.g., Rush, 2021; Kuhn et al., 2019; and Magud and Tsounta, 2012).

interest rate is modelled in equation (14) as a function of the trend growth in potential output and a latent component (z_t) that captures other unspecified determinants of r_t^*. Equation (15) assumes that z_t also follows a random walk process.

We impose that $\alpha_r < 0$ (IS curve slope) and $\beta_y > 0$ (Phillips curve slope). The unobservable variables in the model include potential output, its trend growth rate, and the neutral interest rate. Observable variables include real output, inflation, the ex-ante real interest rate, the real effective exchange rate, and its trend. Unlike the HLW framework, we compute the ex-ante real interest rate using our own measure of one-year-ahead inflation expectations.[19] The trend of the real effective exchange rate is extracted using the HP filter. The model is estimated for each SSA economy using the maximum likelihood methods and the Kalman filter, based on quarterly data from 2002Q1 to 2023Q4.[20]

Despite its popularity, the HLW approach also presents several challenges. In the case of the United States, various econometric issues have been raised regarding the semi-structural model, including potential misspecification of one of its key parameters—the "other factor" z_t —which influences the trend estimate of the neutral rate, and the extreme sensitivity of the model to the starting date of the estimation sample (e.g., Buncic, 2021). In addition, estimates are sensitive to the assumptions underlying the model's economic relationships. For instance, Fiorentini et al. (2018) show that the precision of the estimates deteriorates when either the output gap is unresponsive to the real interest rate gap (a flat IS curve) or inflation is unresponsive to the output gap (a flat Phillips curve). These cases—empirically relevant according to a wide range of estimates in the literature—make it more difficult to identify the unobserved growth and non-growth components of the neutral rate from the data.

Combining methods to address model uncertainty in neutral rate estimation

To summarize, each of the methods discussed above has its own strengths and weaknesses. Some provide more direct estimates of the neutral real interest rate than others, and they vary in the extent to which they rely on theoretical assumptions imposed by researchers. Ultimately, selecting the most appropriate measure involves a significant degree of judgment. For our analysis, we combine six distinct and complementary methods—incorporating both time-series models and semi-structural estimation—which helps mitigate the risks associated with model misspecification. This approach is particularly relevant in the context of SSA economies, where limited data availability and the poor quality of high-frequency indicators complicate the identification of macroeconomic relationships. These constraints make it difficult to assess whether theoretical relationships between variables hold empirically, especially when the underlying data are uncertain and key concepts—such as the output gap and the ex-ante real interest rate—are themselves imprecisely measured.

C. Empirical results

We present estimates of the neutral interest rate and assess the monetary policy stance using different methodologies for each SSA economy. To address model uncertainty, we compute a simple average across the six estimation methods to derive central estimates of the neutral rate, which serve as a

[19] Holston et al. (2017) proxy inflation expectations using an average of inflation over the prior four quarters.

[20] To address the so-called "pile-up" problem inherent in this estimation method, which biases estimates of the standard deviations of the innovations to the z_t component of the neutral rate and the output trend growth rate (σ_z and σ_g respectively) towards zero, we replicate the three-step process outlined in Holston et al. (2017).

benchmark for evaluating the monetary policy stance.[21] The analysis focuses on periods of recent global economic shocks to enable cross-country comparisons: the GFC (2008-09), the China slowdown (2016), the COVID-19 crisis (2020), and the economic fallout from Russia's invasion of Ukraine (2022–23). Central bank responses to these shocks were shaped by a range of factors, including heterogeneous effects on terms of trade, capital flows, exchange rate pressures, and the degree of inflation and output pass-through (see stylized fact analysis in Box 1).

Neutral real interest rate estimates

Figure 1 displays the range of neutral rate estimates generated by each methodology across the 11 economies over the period 2003Q1-2023Q4. Despite methodological differences, the estimated r-star trends are broadly consistent across methods within each country, although divergences in point estimates remain.[22]

Our analysis relies on the average of the r-star estimates across all methodologies for each country, which serves as our preferred measure of the neutral rate throughout the paper.[23] Since the alternative estimates yield broadly similar trajectories, using the average enhances confidence in the overall signal they convey. A limitation of this approach is that it does not allow us to identify the underlying drivers of the neutral rate, which some methods—such as the HLW framework—can capture by imposing economic structure. We leave this issue for future work, as the primary objective of this paper is to provide benchmark r-star estimates for assessing the stance of monetary policy.

Table A.1 displays the estimates of r-star and the average of the point estimates from all methods at the end of three subperiods: pre-GFC (2007Q4), pre-COVID (2019Q4) and post-COVID (2023Q4).

- *The level of r-star.* Estimates of the neutral rate vary across methodologies within each economy, sometimes showing a wide range over certain periods. The estimated levels of r-star also differ significantly across SSA economies (see Table A.1). For example, as of 2023Q4, some countries, such as Mauritius, have a negative average neutral rate, while others, like Ghana and Mozambique have a much higher neutral rate, nearing 6-8 percent.

- *Trends of estimated r-star*. Estimates of the neutral rate from the various methods reveal broadly similar paths across different economies, with marginal divergences (Figure A.2). The average r-star estimates for three-quarters of the countries have peaked around 2007 and declined to varying degrees during the GFC, with the exception of Ghana, Kenya and Mozambique, where r-star exhibited some

[21] Several central banks adopt this approach to mitigate risks related to model misspecification. For example, the Bank of Canada, the Reserve Bank of Australia, and Norges Bank combine estimates from multiple models—typically using averages or ranges—to derive a central estimate of the neutral real interest rate. Similarly, other central banks that publish estimates of the neutral rate often underscore the uncertainty surrounding these estimates by presenting ranges based on various estimation methods. For example, the U.S. Federal Reserve (FRB, 2018) reports a range based on seven different estimates of the neutral rate, derived using methodologies from various studies.

[22] As robustness checks, we estimate alternative model specifications, including a Taylor rule augmented with the exchange rate gap and the monetary aggregate gap, as well as the original LBW model. In addition, we estimate the TVP-VAR model for SSA economies using a three-variable specification, applying the same priors as Lubik and Matthes (2015) for the U.S. and a six-year forecast horizon. The results are available upon request.

[23] It should be noted that the neutral rate from all methods is estimated with considerable uncertainty. Estimates of r-star with confidence bands from the Taylor rule, reduced-form model, HLW framework, TVP-VAR model are not reported for the sake of brevity but available upon request from the authors.

resilience. The neutral rates across countries remained relatively stable in the years following the GFC and even increased in some economies around 2017–19 (CEMAC, Ghana, Mozambique). R-star estimates declined during the pandemic crisis with varying degrees across economies, with steep downward trends in some economies, such as Mauritius, Tanzania, and Zambia.

- *International comparison.* Figure A.3 illustrates the average r-star estimates from different methods, compared with the average r-star for the United States and the euro area—based on Holston et al. (2017)—used as a proxy for AEs. Notably, estimated neutral rates in SSA generally follow the trajectory of the average r-star for the US and euro area—both of which have declined to historically low levels in recent years—although SSA levels remain higher. In about a quarter of SSA economies (including CEMAC, WAEMU, and South Africa), the estimated r-stars have dropped to levels broadly comparable to those of AEs. Empirical studies on AEs and some EMEs have documented a secular decline in r-star over the past three decades, particularly since the GFC, often attributed to weaker growth prospects and demographic shifts.[24] These studies generally conclude that the synchronized decline in the neutral interest rate likely reflects the influence of global common factors.

- *Post-pandemic r-star.* Since the pandemic shock, r-star estimates have varied across countries, ranging between -0.8 percent and 4.6 percent as of end-2023 (Table A.1). In some economies, such as CEMAC, Mauritius, Nigeria and WAEMU, average r-star levels remained very low, hovering around their pandemic-crisis levels. In contrast, in countries like Kenya, South Africa and Zambia, r-star has partially rebounded toward pre-crisis levels. Meanwhile, in some economies—particularly those that initially had very high neutral rates, such as Ghana—r-start estimates have continued to decline.

Stance of monetary policy

To assess the stance of monetary policy, we calculate the real interest rate gap—the deviation of the ex-ante real interest rate from the neutral real interest rate. A positive interest rate gap—where the neutral rate is below the actual real rate—typically indicates a restrictive stance, whereas a negative gap—where the neutral rate exceeds the actual real rate—signals an accommodative stance.[25]

Figure 2 illustrates the evolution of the average interest rate gap across methods (excluding the Taylor rule) for each economy from 2003Q1 to 2023Q4, with the sample period varying depending on data availability. The average interest rate gap is calculated as the difference between the mean of the point estimates of r-star from all methods—the preferred measure—and the actual ex ante short-term real interest rate. The results show considerable variation in monetary policy stances across the region, even during episodes where economies faced similar shocks. For example, during the GFC of 2008–09, most countries adopted a loose monetary policy stance, while a few (e.g., CEMAC, Ghana, South Africa and Zambia) maintained a tighter approach. In the post-crisis years (2010–11), policies were broadly accommodative across the region, reflecting the lagged effects of the impact of the GFC, which indirectly impacted SSA economies through spillovers from AEs and EMDEs. However, some countries (e.g.,

[24] For cross country studies on potential drivers of the neutral interest rate, see, among others, IMF (2023) and Holston et. al. (2017) for advanced economies (Canada, the euro area, the United Kingdom and the United States). For emerging market economies, see, among others, Ruch (2019) for a group of inflation-targeting countries, Magud and Tsounta (2012) for a group of Latin America economies, or Kuhn et al. (2019) for South Africa.

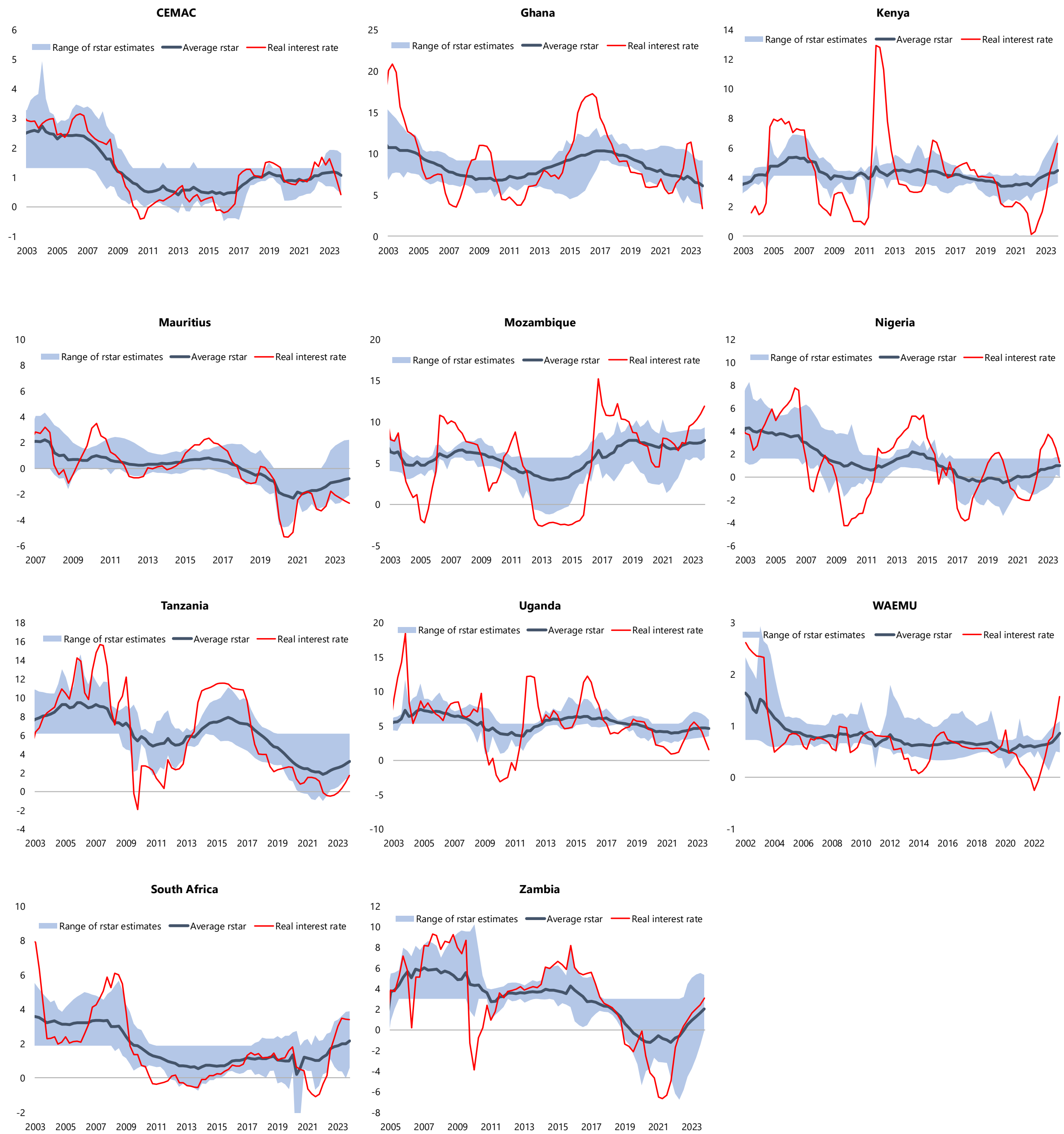
[25] For a discussion of a basic practical framework to assess the monetary policy stance, see, for example, Olamide and Nguyen (2025).

Ghana, Mauritius, Tanzania, South Africa, Zambia), adopted tighter policy stances during the commodity price slump and China's economic slowdown in 2014–15.

As summarized in Table A.2, monetary policy stances before the pandemic (2019Q4) were largely neutral in most countries, with a few exceptions.[26] Ghana and Tanzania implemented expansionary policy stances, while Nigeria and South Africa adopted restrictive stances. During the pandemic, monetary policy stances were predominantly accommodative across the region. By the end of 2023, half of the countries (Kenya, Mozambique, South Africa, WAEMU, and Zambia) had adopted restrictive policy stances, while others (CEMAC, Ghana, Mauritius, Tanzania, and Uganda) maintained broadly accommodative stances, and Nigeria's stance was neutral.

[26] In this paper, a neutral monetary policy stance is defined as an interest rate gap within the range of -0.5 to 0.5 percentage points.

Figure 1: Neutral Real Interest Rates



Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The average r-star is the mean of all the estimated r-stars across methodologies, excluding the Taylor rule. The shaded area shows the range between the highest and lowest r-star estimates from the different methodologies. The ex-ante real interest rate is measured as the nominal policy rate minus the one-year ahead expectations of headline inflation. Inflation expectations are proxied by the one-year-ahead CPI inflation forecasts from the IMF's World Economic Outlook.

Figure 2: Interest Rate Gaps

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The average interest rate gap is calculated as the difference between the actual ex ante real interest rate and the mean of all the estimated r-stars, excluding the Taylor rule. The red (green) shaded area indicates tighter (looser) policy stance.

III. Mapping Monetary Policy Stance to Financial Conditions

In this section, we acknowledge the limitations of the neutral rate as a stand-alone benchmark, particularly given the well-documented impairments in monetary policy transmission mechanisms in SSA economies. We further assess the consistency between the intended monetary policy stance and broader financial conditions. Measuring financial conditions is inherently challenging, as they encompass a wide range of indicators reflecting various dimensions of the financial system and the transmission process. In AEs and major EMEs, studies commonly use a financial conditions index (FCI) to summarize these indicators into a single composite measure.[27] Following similar methodologies, we construct FCIs for each SSA economy by aggregating data from key segments of their financial systems. We then use these FCIs to analyze the empirical relationship between financial conditions and interest rate gaps over the past two decades. Finally, we estimate the response of financial conditions to monetary policy shocks using the local projection method (Jordà, 2005).

A. Interest rate gaps and financial conditions indices

SSA Financial conditions indices (FCIs)

FCIs have been developed for major AEs, including by central banks, investment banks, academics, and other institutions.[28] However, no such measure exists for the selected SSA economies. To fill this gap, we construct our own FCIs using a simple weighted-average approach. Financial variables are grouped into four broad categories: price indicators (e.g., various bank interest rates, government security yields), quantity indicators (e.g., monetary and credit aggregates), foreign exchange market indicators, and global financial factors (e.g., the VIX volatility index and the EMBI sovereign spread index). These categories capture the wide array of channels through which monetary policy and financial dynamics influence economic activity.

The selection of financial variables is guided by their ability to capture both upstream and downstream effects of monetary policy transmission. Upstream channels include interest rate, asset price, and exchange rate effects, while downstream effects reflect credit conditions—specifically, the cost and volume of credit extended to firms and households (i.e., credit channels). In addition, global financial variables are incorporated to account for the influence of the external environment on domestic financial conditions.

To ensure consistency in interpretation, the financial variables are transformed where necessary so that higher values indicate tighter financial conditions. Price indicators are included in levels, while quantity indicators—which tend to exhibit trends—are expressed in growth rates (e.g., credit and monetary aggregates). All variables are standardized to have zero mean and unit standard deviation over the sample period, facilitating comparability across series with different units and volatilities. For robustness,

[27] For AEs and EMEs, FCIs are also used to gauge the effects of monetary policy on financial conditions. For a recent analysis on the effects of monetary policy on FCIs, see for example, Avalos et al. (2023).

[28] For a discussion on well-established FCIs for AEs, see for example, Hatzius et al. (2010).

we compare our baseline (equal-weight) FCIs with alternative versions constructed using principal component analysis (PCA), a widely used method in the literature (see Figures B.2 and B.3).

Overall, the constructed FCIs exhibit broadly similar dynamics across SSA economies, capturing major episodes of global shocks while also reflecting country-specific volatility. These idiosyncrasies likely stem from differences in domestic financial variables, economic structures, and exposure to shocks (see Figure B.1). Further details on the construction, evolution, and robustness of the FCIs are provided in Annex B.

Consistency between the monetary policy stance and financial conditions

As a preliminary step, we analyze how periods characterized by a tight or loose monetary policy stance have coincided with changes in financial conditions over the past two decades. Specifically, we compare the evolution of interest rate gaps for individual SSA economies with the trajectory of FCIs. While FCIs are influenced by a range of economic and financial factors beyond monetary policy, they represent the first stage of the transmission mechanism. Thus, changes in policy rates are expected to influence financial conditions, and variations in the interest rate gap should ideally coincide with or precede future developments in FCIs. Typically, an increase (decrease) in the interest rate gap—indicating a tightening (loosening) of the monetary stance—is expected to precede or coincide with rising (falling) FCIs, where an increase denotes tighter financial conditions.

Figure 3 plots the interest rate gap against FCIs excluding the policy rate—i.e., removing the direct contribution of policy rates.[29] The two series suggest that positive (or negative) interest rate gaps coincided with tighter (or looser) financial conditions only in a limited number of economies, and such instances were infrequent. Systematic relationships are not apparent across countries, except during episodes of large interest rate gaps, which tended to coincide with significant shifts in FCIs. For instance, during the 2008–09 GFC, episodes of large positive interest rate gaps—reflecting a tighter monetary stance—were associated with tighter FCIs in roughly one-third of the sample (e.g., Ghana, South Africa, and Zambia). Similarly, the post-GFC period saw most countries maintaining accommodative policies through 2014–15, coinciding with looser financial conditions in roughly 40 percent of economies (e.g., CEMAC, Ghana, Mozambique, and South Africa). During the pandemic crisis, looser monetary policy was broadly associated with easier financial conditions, whereas the tightening cycles of 2021–23 corresponded with tighter financial conditions in only a quarter of the economies (e.g., Ghana, WAEMU, and South Africa).

Simple pairwise correlations between interest rate gaps and FCIs confirm the relatively weak systematic links. The results indicate that the anticipated strong empirical relationship between the monetary policy stance and financial conditions is not uniform across the region. Contemporaneous correlations between the interest rate gap and FCIs over the full sample period range between 0.2 and 0.6 (Figure A.4). Strong links appear in about half of the SSA economies that have adopted, or are transitioning to, a formal inflation-targeting framework (e.g., Ghana, Kenya, Uganda, South Africa, and Mozambique), where correlation coefficients are contemporaneous or slightly leading, at around 0.6. In other economies,

[29] To investigate the impact of monetary policy on financial conditions, we construct a financial conditions index which excludes the policy rate. Figure 3 displays the FCIs along the index without the policy rates. The two series appear to track each other closely. This alignment occurs because, by construction, the policy rate carries a smaller weight in the baseline FCI as it is only one of 12 financial indicators. In economies with limited financial data, particularly interest rates—such as CEMAC—marginal differences between the two indices appear in certain periods.

correlations are positive but weak, at approximately 0.2. These weak linkages may point to an ineffective transmission mechanism at the initial stage of monetary policy transmission in some countries.

B. Monetary policy transmission to financial conditions

Correlation analysis between the policy rate (or the interest rate gap) and the FCI is of limited usefulness in understanding their relationship, as it does not capture causal effects. In contrast, local projection methods (Jordà, 2005) can provide estimates of the effects of monetary policy shocks on financial conditions. As the first stage in the transmission mechanism, financial conditions are expected to respond relatively quickly to such shocks, consistent with the forward-looking nature of financial variables. In AEs and major EMEs, where financial markets are more developed, financial conditions typically react immediately to policy rate changes, with peak effects materializing within the first year (see, e.g., Avalos et al., 2023). In contrast, in many SSA economies, underdeveloped financial markets and structural impediments weaken the transmission of monetary policy instruments to the broader financial system, and thus a more muted response of financial conditions is to be expected.

Identifying monetary policy shocks

Empirical analysis of monetary policy transmission often faces challenges in separating exogenous policy actions from those driven by economic conditions. This difficulty arises because central banks adjust policy rates in response to observed or anticipated macroeconomic developments. In AEs and some major EMEs, various methods have been developed to identify monetary policy shocks while accounting for the endogenous and anticipatory components of policy decisions. These methods recognize that financial markets often price in expected policy moves based on economic conditions and respond mainly to unanticipated, exogenous monetary policy shocks. To identify these unanticipated shifts in monetary policy, researchers often rely on high-frequency financial market data around policy announcements—the high-frequency identification approach (e.g., Gertler and Karadi, 2015)—or use information extracted from central bank communications—the narrative approach (e.g., Romer and Romer, 2004).[30] However, these methods are difficult to implement in SSA economies due to limited high-frequency financial data, reflecting underdeveloped financial markets. In addition, central bank records and forecasts are often unavailable or inconsistent, further constraining the use of the narrative approach.

Our empirical identification strategy assumes that the financial sector fully anticipates systematic monetary policy actions based on economic conditions and reacts primarily to unexpected monetary policy shocks. Indeed, most monetary policy decisions follow a rule—i.e., changes in policy instruments generally reflect systematic responses to current or expected economic developments. When central banks are credible and communicate effectively, financial sector agents internalize this policy rule and form expectations accordingly. Identifying the impact of monetary policy thus requires isolating the component of policy actions that is exogenous to the systematic response.

To address this endogeneity, we follow Romer and Romer (2004) and construct a series of identified monetary policy shocks using quarterly data. Specifically, we regress changes in the monetary policy rate on central bank observations and projections of key macroeconomic variables (e.g., GDP growth and

[30] For an overview of the literature on the identification of monetary policy shocks, see Ramey (2016). For recent studies on the effects of monetary policy transmission on financial conditions in emerging markets using analysts' forecast of policy interest rates, see, among others, Checo et al. (2024).

inflation). The residuals from this regression, which capture the non-systematic component of policy actions, serve as our measure of exogenous monetary policy shocks for the subsequent impulse response analysis.

Specifically, we estimate the following Taylor-style rule specification:

$$\Delta i_t = \alpha + \gamma_1 E_t \Delta y_{t+4} + \gamma_2 E_t \pi_{t+4} + \sum_{j=1}^{l} \gamma_{3,j}\, \Delta y_{t-j} + \sum_{j=1}^{l} \gamma_{4,j}\, \pi_{t-j} + \sum_{j=1}^{l} \gamma_{6,j}\, i_{t-j} + \sum_{j=1}^{l} \gamma_{6,j}\, \Delta NEER_{t-j} + \varepsilon_t, \quad (16)$$

where $E_t \Delta y_{t+4}$ and $E_t \pi_{t+4}$ denote the one-year ahead real GDP growth and inflation, respectively. Central bank projections, as in the approach of Romer and Romer (2004), are not publicly available with sufficiently long time-series data at a quarterly frequency. Similarly, other commonly used surveys in the literature, such as Consensus Forecasts or Bloomberg Forecasts, are unavailable for most countries. To address this limitation, we rely on the one-year ahead forecasts from the IMF's WEO.[31]

The baseline specification includes the previous quarter's interest rate (i_{t-j}), two quarters' lags of GDP growth (Δy_{t-j}) and inflation (π_{t-j}). We also control for the previous quarter's change in the nominal effective exchange rate ($\Delta NEER_{t-j}$), assuming it influences policy rate decisions—i.e., some central banks, in practice, monitor exchange rate fluctuations. By regressing the change in the policy rate on current and projected macroeconomic variables, we estimate the systematic or anticipated component of monetary policy. The residuals (ε_t) in regression (16) are a measure of the identified monetary policy shock, which captures the unpredictable components of monetary policy given the available information about current and future economic conditions.

The effects of monetary policy shocks on FCIs

The identified shocks from the previous analysis are then used to estimate the effects of monetary policy on financial conditions across economies using the local projections method proposed by Jordà (2005).

Specifically, we estimate impulse-response functions using the following specification:

$$FCI_{t+h} - FCI_{t-1} = \alpha_h + \sum_{j=1}^{l} \gamma_j^h FCI_{t-j} + \sum_{j=0}^{l} \beta_j^h\, MP_{t-j} + \sum_{j=0}^{l} \theta_j^h\, X_{t-j} + \varepsilon_{t+h}^h, \quad (17)$$

where FCI_{t+h} represents the financial conditions index (excluding the policy rate) *h*-periods ahead.[32] MP_t denotes the identified monetary policy shock. The estimated coefficient β_0^h captures the impact of monetary policy shocks on the FCI over the subsequent-*h* period horizon. X_t is a vector of control variables to ensure the results are not driven by factors unrelated to changes in the policy rate. These control variables comprise four lagged values of changes in oil prices and commodity prices excluding fuel, as well as four lagged values of the dependent variable and the monetary policy shocks. ε_{t+h}^h represents the error term.

Equation (17) is estimated for each horizon *h* = {0,1,2,…,8}, separately for each economy, using the ordinary least squares estimator. The impulse response functions are derived from the estimated

[31] By using the IMF WEO projections, we implicitly assume that central banks and the IMF operate with a similar information set relevant to monetary policy decisions.

[32] We have rescaled the normalized FCI by adding 100, resulting in a mean of 100 and a variance of one, to facilitate the interpretation of the impulse responses.

coefficients β_0^h. The confidence bands are constructed using Newey-West standard errors, which are robust to serial correlation and heteroskedasticity in the error terms, for each horizon h of the β_h coefficients.

C. Estimation results

Responses of FCIs to exogenous monetary policy shocks

Figure 4 presents the impulse responses of the FCIs (excluding the policy rate) to identified monetary policy shocks. As documented in the literature, financial conditions tighten in response to a contractionary monetary policy shock. The effects are positive, statistically significant, and vary in persistence across economies.[33]

The speed and magnitude of financial tightening differ across economies. FCIs respond almost immediately to monetary policy shocks, with additional tightening in subsequent quarters, particularly in economies with inflation-targeting frameworks (e.g., South Africa, Ghana, Kenya, Mauritius, and Uganda). In some of these economies (e.g., South Africa and Mauritius), the impact is relatively large and persistent. A 100-basis-point monetary policy shock increases FCIs by 0.5 to 1 index point at its peak, typically occurring between three and six quarters after the shock, and remains evident up to two years later.

Monetary policy shocks also have relatively strong effects in some economies with monetary aggregate-targeting regimes (e.g., Tanzania), resembling the responses observed in inflation-targeting economies, although the magnitude is smaller. By contrast, in economies with other monetary policy frameworks, the effects tend to be smaller, short-lived, or very muted (e.g., Mozambique, Zambia). Finally, in the two monetary unions that maintain an exchange rate anchor, the estimated FCI response is statistically significant, relatively large, but gradual.

Responses of FCIs to actual policy rate changes

In our baseline specification, we assumed that the financial sector anticipates monetary policy decisions that are systematically driven by economic conditions and responds primarily to unexpected monetary policy shocks. To validate our identification strategy, we re-estimate the impulse responses of FCIs using changes in the actual policy rate rather than our measure of policy shocks—effectively treating policy rate changes as exogenous.

Figure 5 shows the local projection estimates of FCI responses to both a 100-basis-point change in the actual policy rate and our measure of monetary policy shocks, over a horizon of up to eight quarters for each economy.

For most countries, the results are qualitatively similar to those obtained using our measure of monetary policy shocks. This suggests that in these economies, anticipatory central bank actions are relatively limited. However, in about one-third of the sample—particularly Ghana, Mauritius, and Zambia—the estimated effects based on the actual policy rate are weaker and more gradual than those based on our

[33] Our results are robust to the inclusion of various control variables (including the U.S. policy interest rate), alternative specifications of the FCIs excluding global factors, and different lag lengths. Results are available upon request.

monetary policy shock series. This indicates that endogenous developments and anticipatory components may obscure the true effects of monetary policy on financial conditions in these cases.

By contrast, in some other economies—notably Nigeria—the estimated response of financial conditions to actual policy rate changes is somewhat stronger than that observed using our identified shocks. This suggests that our measure of monetary policy shocks may underestimate the true effects of monetary policy—either because actual policy rate changes are largely exogenous in these economies, or because our identification method is less effective in these contexts.

Caveats

It is plausible that endogeneity and anticipatory biases do not significantly affect the estimated transmission of monetary policy to broader financial conditions in some SSA economies. This may reflect the fact that monetary policy changes are not easily anticipated by financial sector agents, for several reasons.

- First, central bank actions in many SSA economies are less predictable, reflecting evolving monetary policy frameworks marked by limited analytical capacity, weak communication, low credibility, and the absence of timely, high-frequency data.[34] In such settings, the private sector typically has limited access to information about monetary policy decisions prior to their announcement.
- Second, the role of asset prices—which might capture anticipatory policy actions—is limited, as our FCIs include only a narrow set of financial market indicators (e.g., government bill and bond yields), consistent with low levels of domestic financial development.
- Third, SSA economies are particularly vulnerable to supply shocks due to the large share of food in consumption, the importance of agriculture (which makes them highly exposed to weather-related events), and dependence on imported food and fuel. These factors contribute to elevated inflation volatility, complicating central banks' trade-offs and reducing the predictability of policy responses.

The strength of monetary policy transmission to financial conditions also depends on the composition of the FCI. Our results suggest that transmission is stronger in economies where FCIs include indicators that capture upstream channels of transmission (e.g., Ghana, South Africa, Kenya, Mauritius, Tanzania, Uganda, and Zambia). This is expected, as upstream financial variables—such as government security yields—typically respond more quickly to policy shocks through expectations. In contrast, downstream indicators—such as bank interest rates and credit—adjust more slowly due to banks' pricing and lending behavior. In some economies (e.g., CEMAC), the transmission of monetary policy shocks is relatively slow because FCIs exclude key upstream variables, particularly market interest rates. This weakens the interest rate channel and dampens expectations, leaving the index dominated by quantity-based indicators that capture slow-moving downstream effects.

Finally, differences in monetary policy frameworks may not fully explain these findings. While the estimated response of FCIs to monetary policy shocks tends to be stronger and more persistent in

[34] While inflation-targeting central banks generally have stronger policy frameworks and a more established track records of policy implementation, these frameworks are relatively recent in SSA, with the exception of South Africa. For a broader discussion on the evolution of monetary policy frameworks in low- and lower-middle income countries, including SSA economies, see IMF (2015).

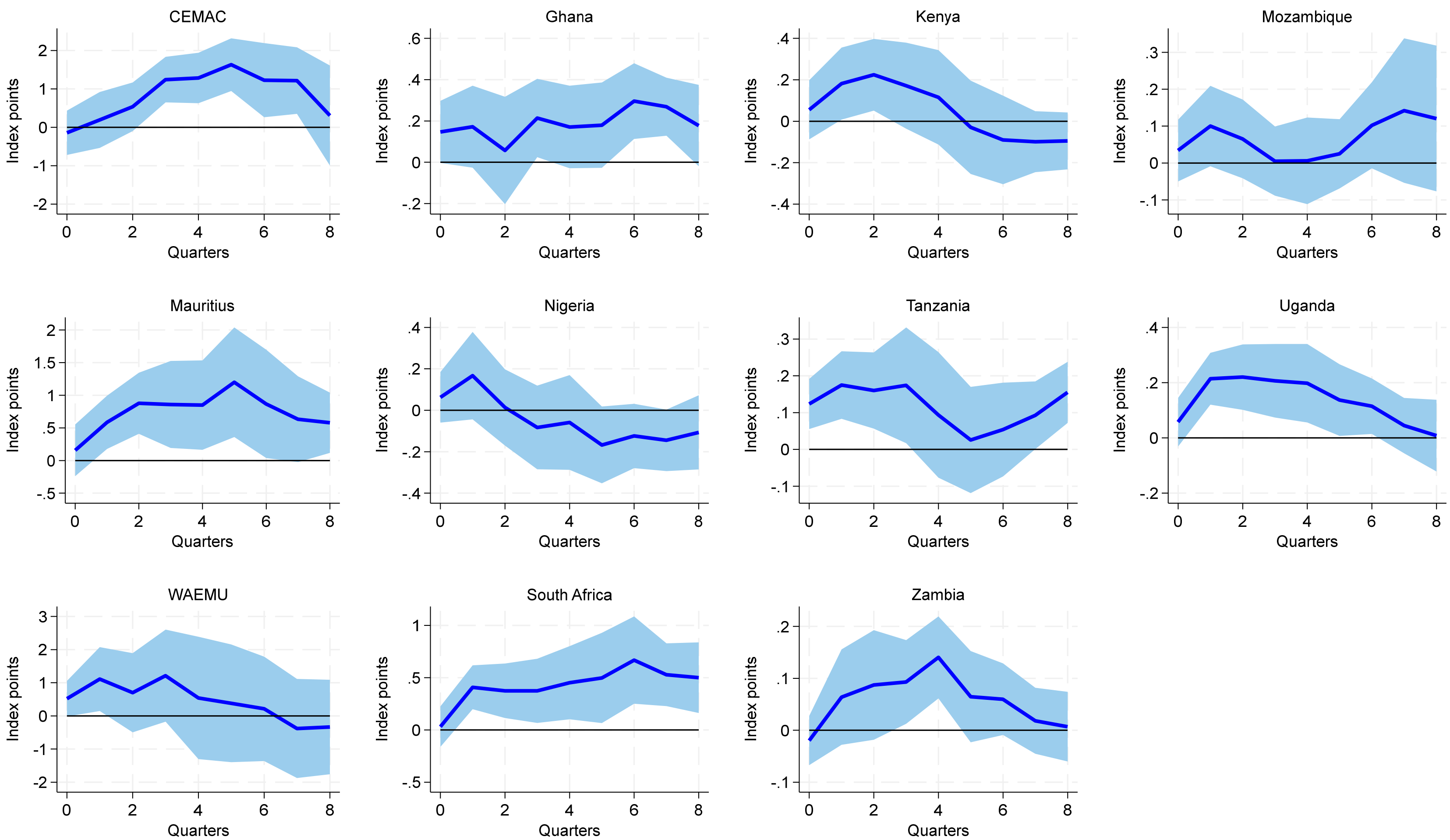
economies with inflation-targeting regimes, most of these (e.g., Ghana, Uganda, Kenya, and Mauritius) only transitioned to such frameworks in the past two decades. As such, their policy frameworks have been evolving over our sample period. The observed strong transmission may therefore also reflect improvements in their operational frameworks during their transition—such as the adoption of interest rate-based operating frameworks—and more developed financial infrastructure compared to regional peers.

Figure 3: Financial Conditions and Interest Rate Gaps

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The average interest rate gap is calculated as the difference between the actual ex-ante real interest rate and the mean of all the estimated r-stars, excluding the estimate based on the Taylor rule. FCI-EW is an index constructed using the equal-weights approach, while FCI-EW ex. Policy rate refers to the index that excludes the policy rate.

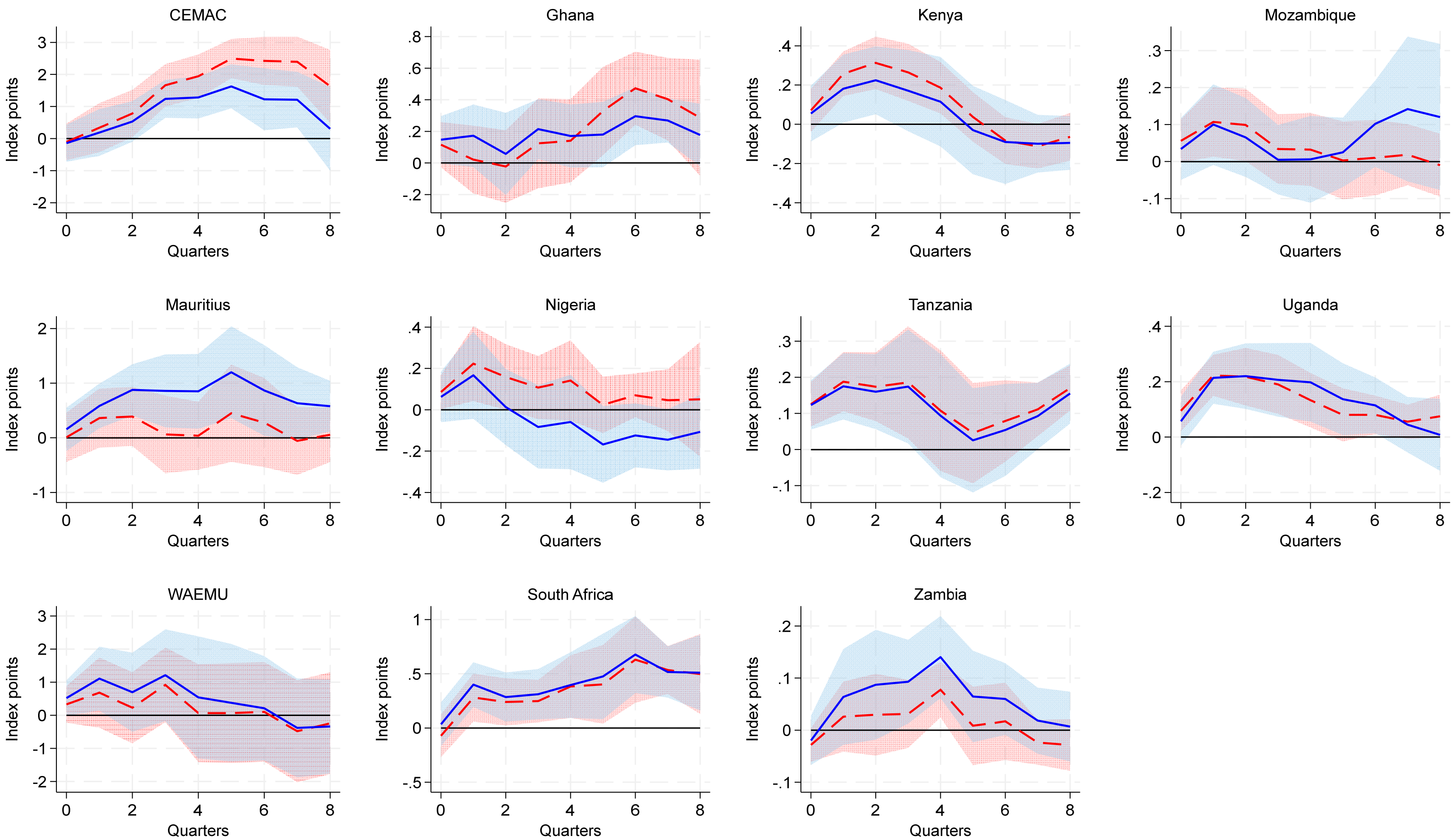
Figure 4: Impulse Responses of FCI to Monetary Policy Shocks



Source: Authors' calculations.

Notes: The figures show local projections impulse response functions of the FCI (excluding the policy rate) to a one-percentage-point monetary policy shock over the 8 quarters following the shock. Monetary policy shocks are identified following Romer and Romer (2004). The shaded areas represent the 90 percent confidence bands.

Figure 5: Impulse Responses of FCI to Monetary Policy Tightening



Source: Authors' calculations.

Notes: The figures show local projections impulse response functions of the FCI (excluding the policy rate) to a one-percentage-point monetary policy tightening. The thick blue line shows the response to a one-percentage-point contractionary monetary policy shock, while the red dashed line depicts the response to a one-percentage-point increase in the actual policy rate over the eight quarters following the shock. Monetary policy shocks are identified following Romer and Romer (2004). The shaded areas represent the 90 percent confidence bands.

IV. Conclusion

This paper is among the first to empirically assess the stance of monetary policy in SSA, addressing an important gap in the literature. Measuring the policy stance in the region poses unique challenges due to impaired transmission mechanisms, which weaken the relationship between the policy rate and financial conditions. Relying solely on the neutral rate may therefore provide an incomplete picture of the monetary stance, highlighting the need for a broader approach. We argue that a comprehensive assessment of the monetary policy stance in SSA economies requires considering the interaction between the policy rate and overall financial conditions.

Building on this motivation, we estimate neutral interest rates using six common techniques from the literature and conduct a thorough analysis of the policy stance, explicitly accounting for the weak relationship between policy rates and financial conditions in SSA economies. Our findings show that in most countries, neutral rate estimates peaked around 2007, declining during the GFC and again during the pandemic. This pattern is consistent with findings from studies on AEs and major EMEs. Moreover, neutral rate estimates in most SSA economies remain higher than those observed in AEs.

Examining the average interest rate gap across methodologies, we find substantial variation across the region, even during similar global shocks. For instance, during the GFC, about two-thirds of SSA central banks maintained an accommodative policy stance. In contrast, about half pursued tighter policies during the 2014-15 commodity price slump and China's economic slowdown, and again by the end of 2023. During the pandemic, however, monetary policy remained broadly accommodative across the region.

To further assess the consistency of signals from the intended monetary policy stance, we construct FCIs for SSA economies and compare them with interest rate gaps. The results reveal a relatively strong relationship between the monetary policy stance and financial conditions in about half of SSA economies, particularly those that have adopted or are transitioning to an inflation-targeting framework. This relationship is especially pronounced during periods of strongly restrictive or accommodative monetary policy stances and exceptionally tight or loose financial conditions.

To deepen our understanding of the first stage of the monetary transmission, we identify monetary policy shocks using the approach inspired by Romer and Romer (2004) and estimate their effects on financial conditions. Using these shocks, we estimate impulse-response functions of FCIs within a local projection framework. Our findings confirm that monetary policy significantly influences financial conditions in many SSA economies. Specifically, contractionary monetary policy shocks lead to tighter financial conditions, with effects that are larger, faster, and more persistent, particularly in economies that have adopted or are transitioning to a formal inflation-targeting framework. In the two monetary unions that have an exchange rate anchor (CEMAC and WAEMU), the impact is also relatively strong but delayed. By contrast, in economies that follow monetary aggregate targeting or rely on other indicators to conduct monetary policy, the effects tend to be short-lived or more muted.

Further work is needed to establish a clearer link between the strength of monetary policy transmission to financial conditions and the structural impediments in SSA emerging and frontier market economies—particularly weaknesses in their financial systems and monetary policy frameworks.[35]

Our analysis represents an important step toward better assessing the monetary policy stance in SSA and setting the stage for further research. As a next step, we plan to examine the effects of monetary shocks on specific transmission channels and the real economy.[36] This extension will not only refine our findings but also provide deeper insights into the effectiveness of monetary policy transmission in SSA.

[35] Mishra and Montiel (2012) review the literature on the effectiveness of the bank lending channel in low-income countries and highlight important differences in the transmission of monetary policy across SSA economies, reflecting variations in monetary policy frameworks and financial structures.

[36] See Tiedemann et al. (forthcoming).

Box 1. Trade-Offs Faced by SSA EFM Central Banks Amid Global Shocks

This box examines the trade-offs faced by central banks across SSA EFMs during recent global economic shocks. Our stylized-fact analysis focuses on the behavior of policy rates during four major global episodes that significantly affected domestic economic conditions. These include the Global Financial Crisis (2008–09), the China slowdown (2016), the COVID-19 crisis (2020), and the economic fallout from Russia's invasion of Ukraine (2022–23). The scatter plots in Box 1.1 illustrate changes in policy rates relative to the output gap and inflation gap during these episodes, highlighting the diversity in monetary policy responses across the region, despite facing similar external shocks.

- **Global Financial Crisis (2008-09):** For most SSA economies, the GFC was transmitted indirectly and with some delay, primarily through spillover effects of the global recession on export demand, commodity prices, tourism receipts, remittances, and foreign direct investment. However, economies with stronger financial linkages to international capital markets—such as South Africa—were more severely affected, as the crisis also transmitted through portfolio flows and disrupted their banking systems (see, for example, Christensen, 2011). Most central banks responded by loosening monetary policy to mitigate the impact of the shock, lowering policy rates even in countries with positive output gaps and relatively high inflation (e.g., Uganda, Zambia). Ghana was a notable exception: its central bank raised the policy rate amid high inflation, despite a negative output gap.

- **China's Slowdown (2016):** Central banks' responses varied widely, reflecting the differentiated impact of the shock across countries. The slowdown contributed to a slump in commodity prices, a decline in China's demand for African exports, and weaker capital inflows. Commodity-exporting countries with flexible exchange rates (e.g., Ghana, South Africa, and Zambia) experienced substantial currency depreciations (see, for example, Christensen, 2016). In response, central banks in these economies raised policy rates to counter rising inflation and currency pressures, particularly where output gaps were positive (e.g., Mozambique, Nigeria, South Africa, Zambia). Ghana, despite facing a negative output gap, also raised policy rates due to persistently high inflation. In contrast, central banks in countries with limited inflationary pressures (e.g., CEMAC and Mauritius), lowered their policy rates, while others (e.g., WAEMU and Tanzania) left rates broadly unchanged.

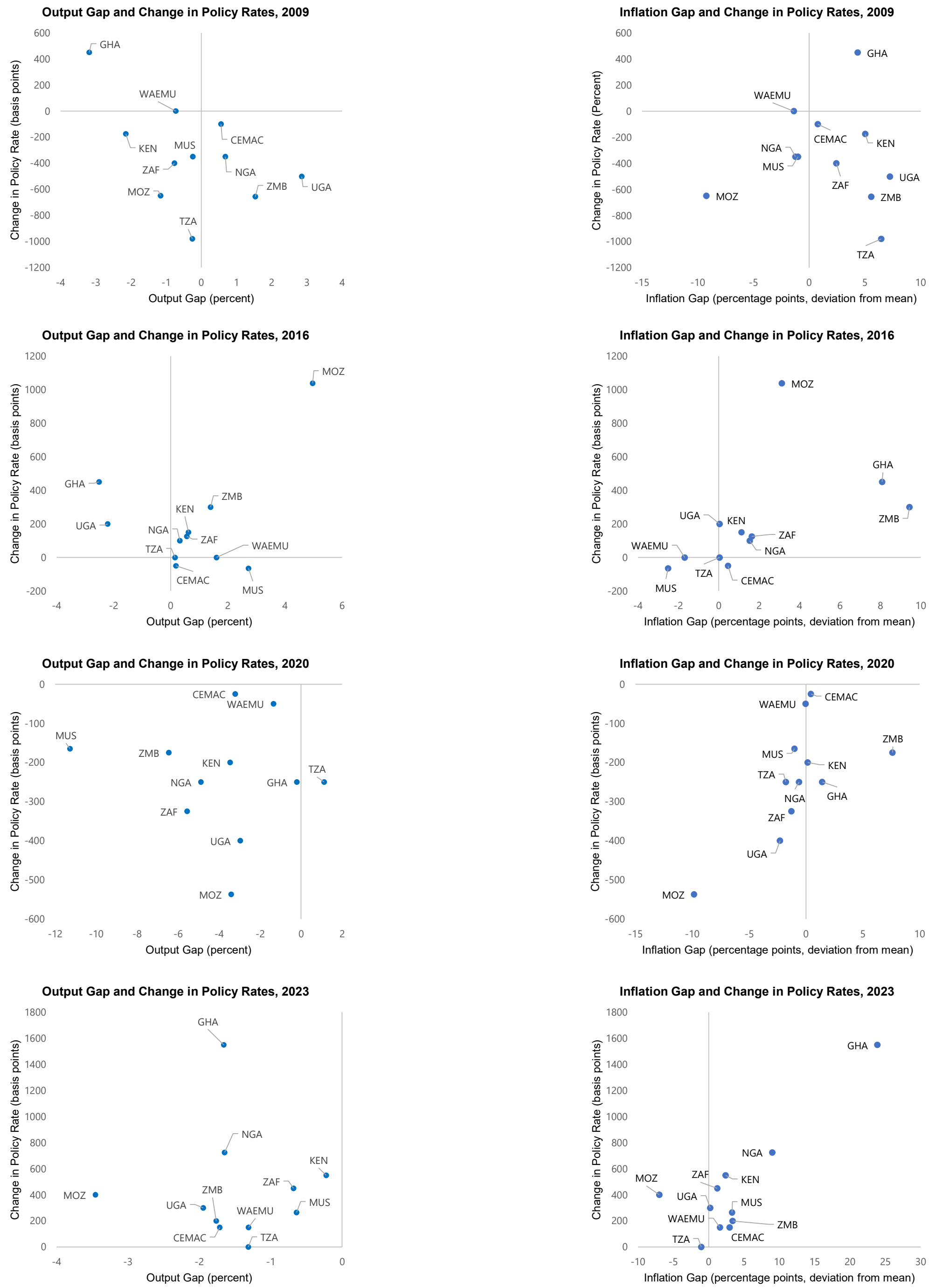
- **COVID Crisis (2020):** In response to the recessionary shock triggered by the pandemic, central banks across SSA cut policy rates—even in the face of elevated inflation, as economic activity contracted sharply due to the simultaneous demand and supply shocks. Many also implemented complementary monetary measures, including liquidity support through open market operations and purchases of government securities in secondary markets.

- **Economic Fallout of Russia's Invasion of Ukraine (2022-23):** Central banks across SSA raised policy rates to address persistent inflation, despite negative output gaps. Inflationary pressures were driven by global food and energy price spikes, initially caused by COVID-era supply chain disruptions and later exacerbated by Russia's invasion of Ukraine, which significantly disrupted global agricultural commodity markets—particularly for cereals and fertilizers (Tiedemann et al., 2024). As the inflation surge was predominantly driven by global supply-side factors, policy tightening focused on preventing inflation expectations from becoming unanchored. Ghana stood out with the steepest rate hikes, reflecting surging inflation, while Tanzania kept rates unchanged in line with relatively stable price dynamics.

This stylized fact analysis suggests that, when faced with the trade-off between inflation and growth, SSA central banks tended to prioritize price stability during global supply shocks (e.g., Russia's invasion of Ukraine), reflecting the persistence of inflationary pressures. Conversely, during global demand shocks (e.g., the GFC, COVID-19), growth stabilization took precedence, with most central banks adopting countercyclical policies. When the impact of global shocks varied across countries, monetary policy responses reflected each country's specific exposure to external spillovers—such as differences between resource-intensive exporters (e.g., South Africa, Ghana, Zambia) and others (e.g., WAEMU). For instance, monetary policy in commodity-exporting countries tightened in response to a negative terms-of-trade shock (e.g., China's Slowdown), focusing on the need to control inflation and prevent an excessive weakening of the exchange rate.

In sum, SSA countries are small open economies, although most exhibit relatively limited financial integration with global markets. This makes monetary policy trade-offs particularly complex when responding to global shocks. Central banks' responses to recent exogenous shocks have been shaped by a range of factors, including heterogeneous effects on terms of trade, capital flows, exchange rate pressures, and the degree of pass-through to inflation and output. Policy responses also varied depending on whether countries were oil exporters (e.g., CEMAC, Nigeria), non-oil resource exporters (e.g., Ghana, Tanzania, South Africa, Zambia), or had stronger financial linkages to international capital markets (e.g., Ghana, South Africa). Monetary policy reactions also reflected differences in institutional frameworks and operational mandates across the region.

Box 1.1. Monetary Policy Rate Changes During Global Shocks



Sources: Haver, Authors' calculations.

Notes: The output gap is calculated as the deviation of the log of real GDP from its trend, estimated using the Hodrick-Prescott (HP) filter.
The inflation gap is defined as the difference between the actual inflation rate and the official target for inflation-targeting countries, or the explicit price stability objective for countries with such a goal. For countries without an explicitly declared quantitative objective, the inflation target is proxied by the sample average inflation rate. The change in the policy rate reflects the difference in the main policy rate between the indicated year and two years earlier.

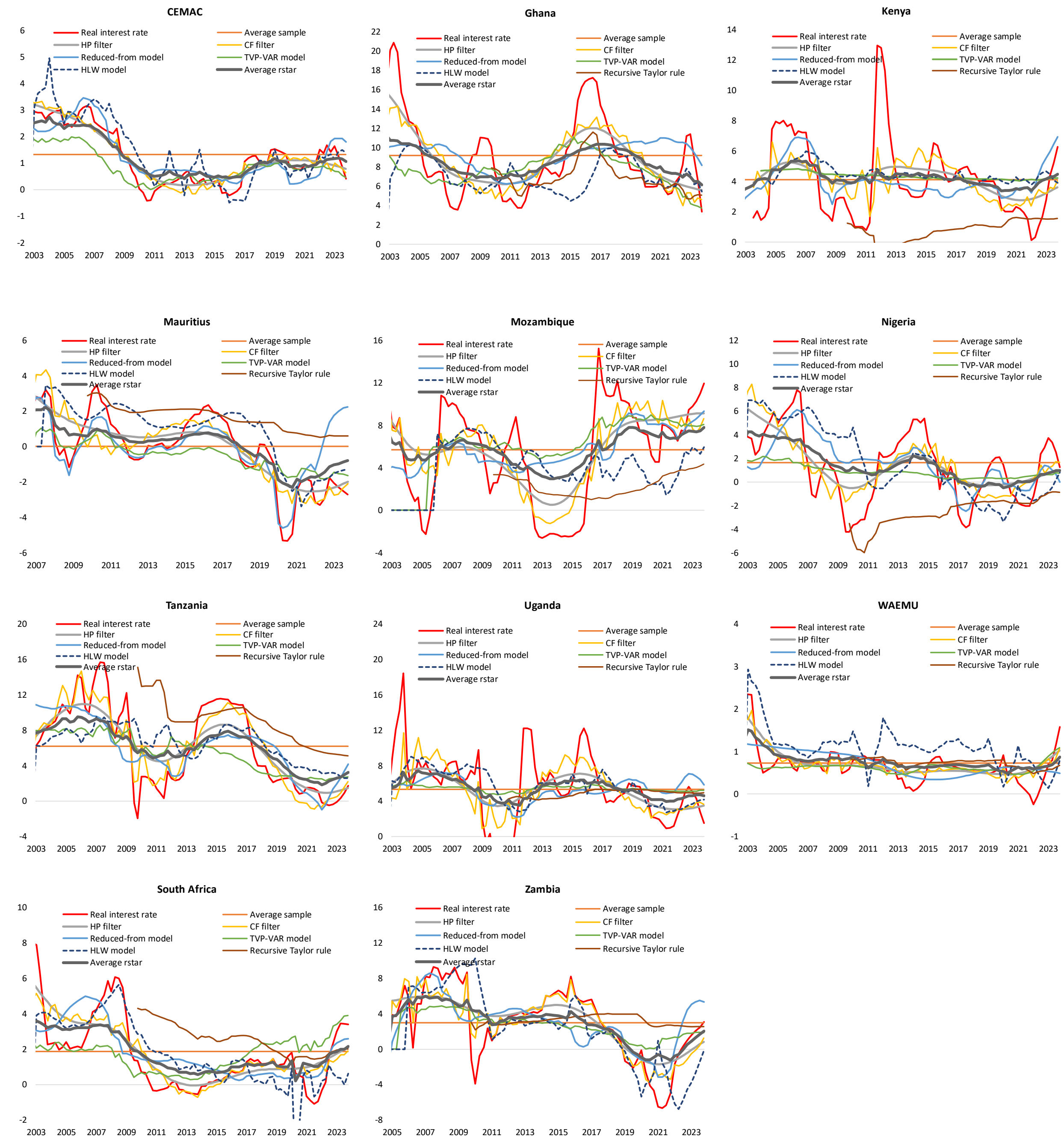
Annex A. Additional Figures and Tables

Figure A.1: Short-Term Real Interest Rates Using Different Measures of Inflation Expectations

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The ex-ante short-term real interest rates are measured as the nominal policy rates minus the one-year-ahead and three-year-ahead expectations of headline inflation. Inflation expectations are proxied by the one-year and three-year-ahead CPI inflation forecasts from the IMF's World Economic Outlook. Alternatively, real interest rates are also calculated using the four-quarter moving average of past inflation as a proxy for inflation expectations.

Figure A.2: Estimates of the Neutral Real Interest Rates- Summary of Different Methods



Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The sample average is calculated by averaging the short-term real interest rate over the period 2003Q1–2023Q4. Univariate filters (Hodrick-Prescott filter with tail correction and Christiano-Fitzgerald filter) estimate the neutral rate as the trend of the actual real interest rate. The r-star from the Taylor rule is generated through recursive estimation over the period 2009Q4–2023Q4. The reduced-form model is based on Mendes (2014), linking the neutral rate to potential growth and the world interest rate. The time-varying parameter vector autoregressive (TVP-VAR) model is based on Lubik and Matthes (2015) and is modified to include the real effective exchange rate (REER). The HLW model, a semi-structural model based on Holston et al. (2017), is also modified to include the REER. The "average of methods" refers to the mean of all estimated r-stars across methodologies, excluding the Taylor rule.

Table A.1: Summary of Neutral Real Interest Rate Estimates by Methodology

	Sample average	*HP filter*			*CF filter*			*Taylor rule*			*Reduced-form model*			*TVP-VAR model*			*HLW model*			*Average of methods*		
	2003-23	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4	2007Q4	2019Q4	2023Q4
CEMAC	1.32	1.91	1.10	0.78	1.93	1.33	0.63	-	-0.68	0.78	2.61	0.73	1.80	1.00	0.99	0.46	2.97	0.83	1.39	1.95	1.05	1.06
Ghana	9.20	6.87	8.43	5.62	6.78	9.46	4.62	-	6.88	5.05	8.93	10.62	8.16	6.37	7.85	3.73	5.97	7.60	5.42	7.35	8.86	6.12
Kenya	4.11	4.50	3.14	3.61	5.66	2.70	4.02	-	0.97	1.55	5.49	3.48	6.94	4.57	4.13	4.22	5.64	4.20	3.91	4.99	3.63	4.47
Mauritius	0.00	2.14	-1.74	-1.98	3.89	-1.33	-2.10	-	1.36	0.60	1.79	-1.90	2.22	0.98	-1.00	-1.63	3.26	-0.09	-1.29	2.01	-1.01	-0.80
Mozambique	5.69	5.96	8.46	9.10	7.59	9.70	8.62	-	2.03	4.34	6.15	8.87	9.30	6.71	8.50	8.08	7.52	3.65	5.93	6.60	7.48	7.79
Nigeria	1.62	1.12	-0.25	0.97	1.06	-1.23	1.68	-	-1.61	-0.89	4.05	0.94	0.01	1.14	0.28	0.75	5.01	-2.63	0.79	2.33	-0.21	0.97
South Africa	1.88	3.25	0.89	2.07	3.95	1.03	1.89	-	1.48	2.01	3.98	0.38	2.58	2.19	2.46	3.89	4.88	-0.65	0.60	3.35	1.00	2.15
Tanzania	6.15	9.59	2.74	1.49	11.69	1.22	2.18	-	7.41	5.08	8.27	3.91	4.17	8.24	2.82	2.70	8.98	4.50	2.61	8.82	3.56	3.21
Uganda	5.29	5.61	3.98	3.48	5.84	2.74	3.66	-	5.25	4.92	6.55	5.99	5.85	5.49	5.36	5.20	7.75	4.57	4.15	6.09	4.65	4.60
WAEMU	0.73	0.67	0.46	1.02	0.76	0.38	1.06	-	0.80	0.67	1.00	0.61	0.49	0.65	0.55	1.09	1.05	0.52	0.78	0.81	0.54	0.86
Zambia	3.00	5.90	-0.89	0.85	6.43	-1.77	1.24	-	3.95	2.55	8.13	-0.94	5.33	4.83	0.40	1.86	7.00	-3.33	-0.10	5.88	-0.59	2.03

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The sample average is calculated by averaging the short-term real interest rate over the period 2003Q1–2023Q4. Univariate filters (Hodrick-Prescott filter with tail correction and Christiano-Fitzgerald filter) estimate the neutral rate as the trend of the actual real interest rate. The r-star from the Taylor rule is generated through recursive estimation over the period 2009Q4–2023Q4. The reduced-form model is based on Mendes (2014), linking the neutral rate to potential growth and the world interest rate. The time-varying parameter vector autoregressive (TVP-VAR) model is based on Lubik and Matthes (2015) and is modified to include the real effective exchange rate (REER). The HLW model, a semi-structural model based on Holston et al. (2017), is also modified to include the REER. The "average of methods" refers to the mean of all estimated r-stars across methodologies, excluding the Taylor rule.

Table A.2: Summary of Interest Rate Gap Estimates by Methodology

	Sample averages			*HP filter*			*CF filter*			*Taylor rule*			*Reduced-form model*			*TVP-VAR model*			*HLW model*			*Average of methods*		
	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4	2007 Q4	2019 Q4	2023 Q4
CEMAC	0.91	0.01	-0.91	0.31	0.23	-0.38	0.29	0.00	-0.23	-	2.01	-0.38	-0.39	0.59	-1.05	1.22	0.34	0.31	-0.74	0.50	-0.62	0.27	0.28	-0.66
Ghana	-4.58	-1.65	-5.82	-2.26	-0.88	-2.24	-2.16	-1.91	-1.24	-	0.67	-1.67	-4.31	-3.07	-4.78	-1.76	-0.30	-0.35	-1.36	-0.06	-2.05	-2.74	-1.31	-2.75
Kenya	0.26	-0.61	2.17	-0.13	0.35	2.66	-1.30	0.79	2.25	-	2.53	4.73	-1.12	0.02	-0.66	-0.21	-0.63	2.06	-1.27	-0.70	2.36	-0.63	-0.13	1.81
Mauritius	2.79	-0.92	-2.70	0.65	0.82	-0.71	-1.10	0.41	-0.60	-	-2.28	-3.29	1.00	0.98	-4.92	1.81	0.08	-1.06	-0.47	-0.84	-1.41	0.78	0.09	-1.90
Mozambique	2.93	1.55	6.23	2.66	-1.22	2.82	1.03	-2.46	3.30	-	5.20	7.58	2.47	-1.63	2.62	1.92	-1.26	3.84	1.10	3.58	5.99	2.02	-0.24	4.13
Nigeria	-1.49	0.49	-0.38	-0.99	2.36	0.27	-0.92	3.34	-0.44	-	3.72	2.14	-3.92	1.17	1.23	-1.01	1.83	0.49	-4.88	4.74	2.32	-2.20	2.32	0.27
South Africa	3.98	-0.30	1.51	2.61	0.69	1.32	1.91	0.54	1.50	-	0.10	1.38	1.88	1.19	0.81	3.67	-0.89	-0.50	0.98	2.23	2.79	2.50	0.58	1.24
Tanzania	7.22	-3.55	-4.43	3.78	-0.14	0.23	1.68	1.38	-0.46	-	-4.80	-3.36	5.10	-1.30	-2.45	5.13	-0.22	-0.98	4.39	-1.90	-0.89	4.55	-0.95	-1.50
Uganda	0.99	-0.80	-3.77	0.67	0.51	-1.96	0.44	1.75	-2.14	-	-0.76	-3.40	-0.27	-1.49	-4.33	0.78	-0.87	-3.68	-1.47	-0.08	-2.64	0.19	-0.16	-3.09
WAEMU	-0.06	-0.11	0.84	0.01	0.16	0.56	-0.09	0.25	0.51	-	-0.18	0.90	-0.32	0.01	0.66	0.03	0.07	0.13	-0.38	0.10	0.62	-0.14	0.08	0.71
Zambia	6.14	-4.13	0.09	3.24	-0.25	2.24	2.71	0.63	1.85	-	-5.08	0.54	1.01	-0.20	-2.24	4.31	-1.54	1.23	2.14	2.19	3.19	3.26	-0.55	1.06

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The average of the methods is the real interest rate gap, defined as the difference between the ex-ante real interest rate and the mean of all the estimated r-stars, excluding the Taylor rule. The interest rate gap for each methodology is calculated for the end of three subperiods: pre-GFC (2007Q4), pre-COVID (2019Q4), and post-COVID (2023Q4). The interest rate gap calculated using the Taylor rule is based on r-star estimates generated from recursive estimation over the period 2009Q4–2023Q4. A positive interest rate gap (red) indicates that the neutral rate is below the actual real rate, suggesting a restrictive monetary stance. Conversely, a negative interest rate gap (green) signals that the neutral rate is above the actual real rate, indicating an accommodative stance. A neutral monetary policy stance (yellow) is defined as an interest rate gap within the range of -0.5 to 0.5 percentage points.

Table A.3: Estimated Taylor Rule

VARIABLES	(1) CEMAC	(2) GHA	(3) KEN	(4) MOZ	(5) MUS	(6) NGA	(7) TZA	(8) UGA	(9) WAEMU	(10) ZAF	(11) ZMB
Lag 1 of nominal policy rate	0.969***	0.884***	0.804***	0.863***	0.763***	0.904***	0.938***	0.625***	0.928***	0.914***	0.775***
	(0.0169)	(0.0323)	(0.0446)	(0.0318)	(0.0379)	(0.0336)	(0.0381)	(0.0700)	(0.0225)	(0.0255)	(0.0680)
Inflation gap	0.00652	0.0673***	0.207***	0.232***	0.0345*	0.0620***	0.00260	0.243***	0.0317***	0.0603**	0.0496
	(0.0105)	(0.0155)	(0.0293)	(0.0309)	(0.0205)	(0.0214)	(0.0480)	(0.0542)	(0.00723)	(0.0265)	(0.0448)
Output gap	-0.0146	-0.000895	0.310***	0.00807	0.0445**	0.0666	0.183	-0.0144	0.0303*	0.125***	0.0419
	(0.0154)	(0.0789)	(0.0928)	(0.142)	(0.0216)	(0.0734)	(0.279)	(0.173)	(0.0173)	(0.0296)	(0.167)
Constant	0.120	1.633***	1.317***	1.678***	0.963***	1.183***	0.662	3.697***	0.192***	0.561***	2.308***
	(0.0757)	(0.558)	(0.425)	(0.400)	(0.189)	(0.430)	(0.439)	(0.754)	(0.0695)	(0.192)	(0.787)
Observations	91	95	85	76	72	87	95	96	92	98	78
R-squared	0.975	0.948	0.844	0.937	0.890	0.915	0.878	0.672	0.953	0.949	0.670

Notes: The table reports the results of estimating a Taylor rule using ordinary least squares (OLS) for the following regression:
$i_t = \alpha + \beta_i i_{t-1} + \beta_\pi(\pi_t - \pi_t^*) + \beta_y \tilde{y}_t + \varepsilon_t$, where i is the nominal short term policy rate, π is the inflation rate, and π^* denotes the central bank's desired level or inflation target. y_t is the log of output, and y_t^* is the log of potential output, estimated as the Hodrick-Prescott (HP)-filtered log of real GDP.
The constant neutral interest rate is obtained by mapping the estimates from this equation to equation (1).
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: Estimated Reduced-Form Model

VARIABLES	(1) CEMAC	(2) GHA	(3) KEN	(4) MOZ	(5) MUS	(6) NGA	(7) TZA	(8) UGA	(9) WAEMU	(10) ZAF	(11) ZMB
Trend GDP growth	0.369***	-1.022***	1.903*	-0.773***	0.778***	0.134	5.573***	-0.156	-0.207***	0.777***	0.425**
	(0.0310)	(0.319)	(1.018)	(0.245)	(0.134)	(0.115)	(0.670)	(0.325)	(0.0373)	(0.135)	(0.184)
ex ante US real policy rate	0.319***	0.223	0.412***	0.469*	0.609***	0.487***	0.632***	0.424***	0.00258	0.334***	0.625***
	(0.0308)	(0.143)	(0.111)	(0.253)	(0.105)	(0.105)	(0.152)	(0.151)	(0.0297)	(0.0988)	(0.116)
Constant	0.529***	16.58***	-3.036	12.29***	-0.275	5.539***	-25.87***	7.878***	1.620***	1.497***	5.011***
	(0.129)	(2.341)	(4.599)	(1.957)	(0.583)	(1.430)	(4.131)	(2.217)	(0.166)	(0.548)	(1.539)
Observations	88	88	82	88	70	88	88	88	88	88	76
R-squared	0.757	0.114	0.182	0.130	0.508	0.336	0.492	0.086	0.272	0.397	0.456

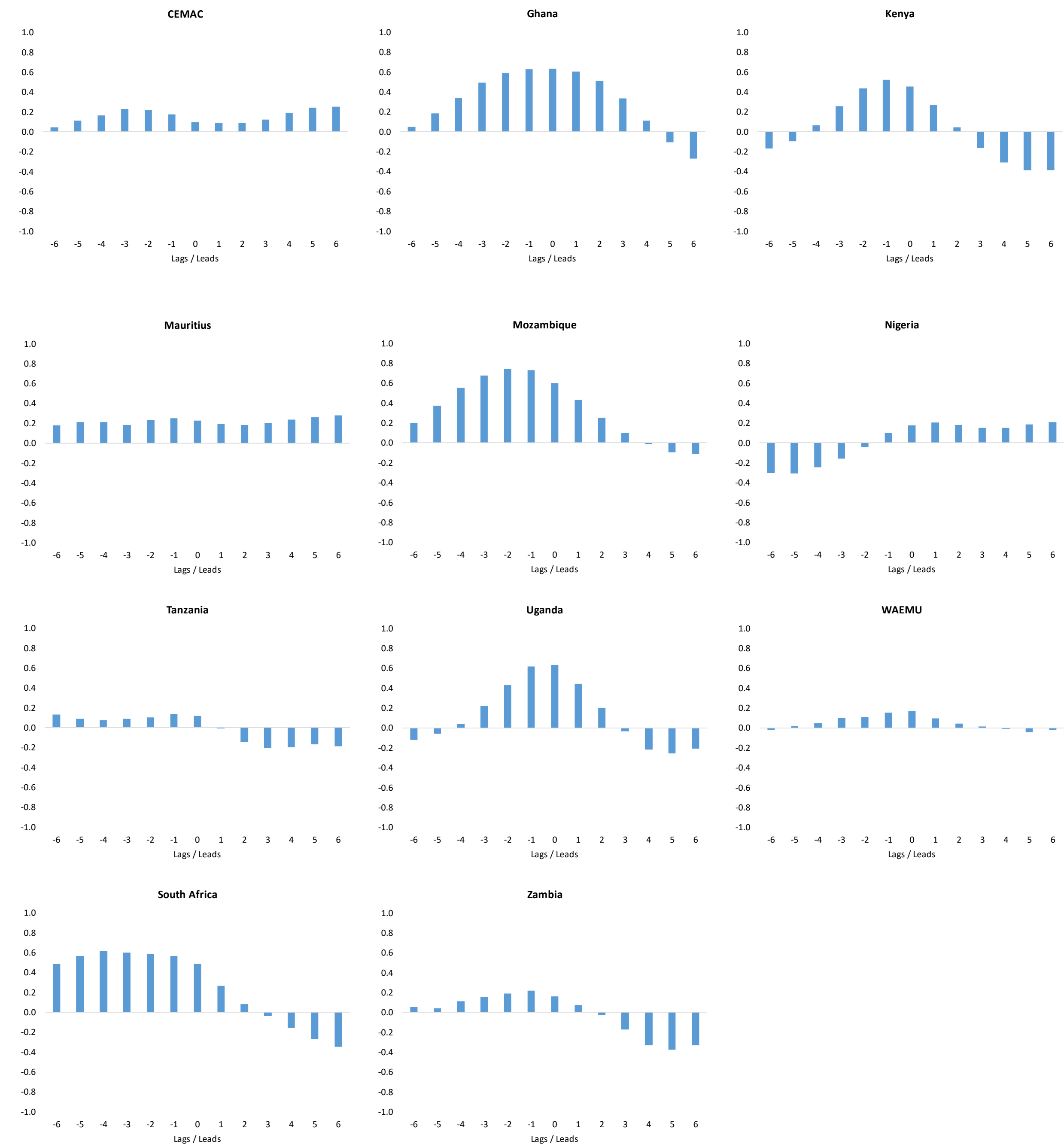
Notes: The table reports the results of estimating the following reduced-form equation using ordinary least squares (OLS): $r = \alpha + \beta_0 g + \beta_1 r^w$,
where *g* denotes the growth rate of the HP-filtered trend component of real GDP (potential growth), *r* is the ex-ante real short-term interest rate, and the U.S. real federal funds rate is used as the proxy for r_t^w.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Figure A.3: Estimates of the Neutral Real Interest Rates – International Comparison

Sources: IMF World Economic Outlook; IMF International Financial Statistics; The Federal Reserve Bank of New York; Haver and authors' calculations.

Notes: The average r-star is the mean of all the estimated r-stars across methodologies, excluding the Taylor rule.US/Euro area refers to the average of r-star for the United States and the euro area, based on Holston et. al. (2017) with updated estimates from the Federal Reserve Bank of New York.

Figure A.4: Cross-Correlations of Interest Rate Gaps and FCIs



Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The blue bars represent the correlation coefficients between the FCIs (excluding the monetary policy rates) and several lags and leads of the average interest rate gaps.

Annex B. Financial Conditions Indices for SSA

In this annex, we construct financial conditions indices (FCIs) that aggregate data from a broad set of indicators across key segments of SSA economies' financial systems.[37] These indices provide a quantitative measure of overall financial conditions and offer insights into the broader context of the monetary policy stance.

B.1. The selected financial variables

We consider a broader set of financial indicators for constructing FCIs. These typically include fundamental variables that trace the transmission mechanism of monetary policy—such as interest rates, exchange rates, and asset prices—together with additional financial variables that capture the specific structure of the economy's financial system. In small, open economies with primarily bank-based financial systems, such as those in SSA, appropriate indicators include exchange rates and banking sector variables (e.g., credit conditions for firms and households) to assess overall financial conditions. Monetary aggregates, in particular, offer valuable insights into financial conditions in economies with limited financial markets or relatively limited experience with interest rates playing a market-clearing role (IMF, 2015).

Our objective is to construct FCIs that reflect the availability and terms of financing for economic agents in SSA. Drawing on the literature, the selected financial variables aim to ensure broad coverage of financial systems in these economies while capturing the multiple channels through which monetary policy affects economic activity. Details on data sources and transformations are provided in Table C.3.

The selected variables primarily reflect the structure of financial systems in the region, which are largely bank-based. While domestic bond markets constitute an important source of public sector financing, secondary markets for government securities, as well as stock markets, remain underdeveloped in most SSA countries. A few SSA governments issue debt on international capital markets, but the volumes have generally been modest. Despite these structural constraints, SSA economies remain sensitive to global financial conditions—either directly through capital flows (e.g., foreign direct investment) or indirectly through global growth and commodity prices.

For the construction of the FCIs, we group the variables into four categories (see Table B.1): price indicators, quantity indicators, the foreign exchange market, and global financial conditions. These categories capture the diverse channels through which monetary policy and financial dynamics affect the economy.

- *Price indicators:* These include various interest rates, such as the policy rate, bank deposit and lending rates, and short- and long-term government securities yields. Higher interest rates typically imply higher borrowing costs for both the private and public sectors, resulting in tighter financial conditions.

[37] The FCI can be viewed as an extension of a standard Monetary Conditions Index (MCI), which has been widely used as a composite measure of the stance of monetary policy in several advanced economies. For early research on FCIs, see, among others, Goodhart and Hofmann (2001).

- Q*uantity indicators:* These variables capture credit volumes and measures of money supply. Faster growth in credit or monetary aggregates signals looser financial conditions, reflecting the credit channel. This also accounts for adjustments in credit supply by banks through non-price mechanisms, such as lending terms or borrower-specific spreads (bank lending channel).
- F*oreign exchange market:* Movements in the nominal effective exchange rate influence financial conditions. Generally, currency appreciation is associated with tighter financial conditions in SSA economies. However, the exchange rate's role in the FCI can be ambiguous. For instance, in economies with significant foreign-currency borrowing, depreciation raises debt service in local currency, tightening financial conditions. Conversely, appreciation may signal large capital inflows, easing financial conditions. The exchange rate also operates through the trade channel: depreciation can boost demand for domestic goods but may weigh on import-dependent firms.
- *Global financial factors: These* are proxied by risk indicators capturing tensions in global financial markets. The US Volatility Index (VIX) reflects capital flow risks to SSA economies. A rising VIX generally signals heightened uncertainty and risk aversion, reducing capital inflows and tightening financial conditions. We also include the Emerging Market Bond Index (EMBI) spread to capture sovereign risk sentiment. Although EMBI data are not available for all countries, we use the aggregate EMBI sovereign spread index. Higher EMBI spreads indicate increased sovereign risk and tighter financial conditions.

Table B.1: Financial Conditions Index Components

Indicators	Expected effect on financial conditions	Availability
Price indicators		
Policy rate	+	CEMAC, GHA, KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Lending rate	+	KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Deposit rate	+	GHA, KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Government treasury bill yield	+	GHA, KEN, MUS, MOZ, NGA, TZA, UGA, ZAF, ZMB
Government bond yield	+	GHA, KEN, MUS, NGA, TZA, UGA, ZAF, ZMB
Quantity indicators		
Monetary base	-	CEMAC, GHA, KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Broad money	-	
Credit to the private sector	-	
Credit to government	-	
Foreign exchange market		
Nominal effective exchange rate	+	CEMAC, GHA, KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Global financial indicators		
Volatility index, VIX	+	CEMAC, GHA, KEN, MUS, MOZ, NGA, TZA, UGA, WAEMU, ZAF, ZMB
Emerging market bond spreads, EMBI	+	

Notes. A positive (negative) sign indicates a tightening (easing) in the FCI. An increase (decrease) in the nominal effective exchange rate indicates an appreciation (depreciation) of the national currency.

B.2. An Index of Financial Conditions

While FCIs have been largely developed for major AEs and EMEs, empirical studies on financial conditions for LICs—and SSA economies in particular—remain very scarce.[38] This scarcity is primarily due to limited availability and reliability of high frequency data in many countries in the region, especially LICs.

There are various methods used in the literature to aggregate financial variables into a single indicator—the financial conditions index (FCI). These methods mainly differ in how they estimate the weights assigned to the respective financial variables in an FCI. Broadly, they fall into two categories: the weighted-sum approach and principal-components analysis (PCA).[39]

In the weighted-sum approach, the weights of each financial variable are determined based on their estimated relative impacts on real GDP. These weights are typically derived from econometric methods, including reduced-form aggregate demand equations, VAR impulse responses, or simulations using large-scale macroeconometric models. In contrast, PCA extracts a common factor from a large set of

[38] For recent studies on FCIs for major advanced and emerging market economies, see for example IMF (2017).

[39] For example, see Hatzius et al. (2010), among others, for a discussion of different approaches to constructing popular FCIs.

financial variables. This common factor, which captures the largest shared variance across the variables, is used as the FCI. PCA is particularly useful for constructing an index when dealing with a large number of financial indicators.

A simple approach: Equal-weights FCI (hereafter, FCI-EW)

To construct the FCIs for SSA economies, we employ a simple weighted-average approach. [40] The variables are transformed, where necessary, so that higher values in any series indicate tighter financial conditions. For example, the signs of quantity indicators are reversed by assigning them a negative sign. This transformation is essential to ensure that the evolution of financial conditions is consistent with the direction of the index. This method is appealing due to its simplicity, ease of computation, and interpretability. Moreover, using econometric evaluation methods based on a large sample of AEs and EMs, Arrigoni et al. (2022) demonstrate that FCIs constructed by averaging financial variables with equal weights perform as well as, or sometimes better than, those created using more sophisticated statistical methods (e.g., principal components analysis).

This approach is particularly suitable for SSA economies, where limited historical data availability and irregularities, especially in high-frequency data, can introduce significant uncertainties into weight estimation using conventional econometric methods. However, the effectiveness of this method heavily depends on the selection of variables included in the index. Additionally, this method may inadvertently assign greater weight to global variables, which could be inappropriate given the limited financial integration of many SSA economies.

Price indicators are included in the FCI in levels, while the quantity indicators, which tend to exhibit trends, are expressed in growth rates (e.g., credit and monetary aggregates). Each financial variable (after transformation for the quantity indicators) is standardized by subtracting its mean and dividing by its standard deviation, ensuring zero mean and unit standard deviation over the sample period. This standardization enables comparability between variables measured on different scales and with different levels of volatility. Consequently, the variation of each variable can be interpreted in terms of standard deviations from its mean value (z-score). Since all variables are measured on the same scale, such as interest rate and credit indicators, changes in one variable can be directly compared to changes in another.

The overall FCI is also standardized, meaning it cannot be interpreted as an absolute measure of financial conditions. Instead, it represents a relative measure, where a value of zero reflects the average or "normal" financial conditions over a specific historical period, corresponding to neutral financial conditions. These conditions, however, may not necessarily equate to neutrality for economic activity. Similarly, positive FCI values indicate tighter-than-average financial conditions, while negative values denote looser-than-average financial conditions. While the dataset presented in Table B.1 contains 12 variables, the number of financial indicators included in each country's FCI varies depending on data availability.

[40] For studies that use a similar approach, see, for example, among others, Rosenberg (2009) for advanced economies. For a similar method applied to SSA economies, see EIB (2023), where each country's FCI includes seven variables: credit growth (both the private and public sectors), the corporate lending spread, the 12-month change in the nominal exchange rate against the US dollar, the 12-month change in the policy rate, the 12-month change in the stock market, and inflation.

Robustness check: Principal component analysis-FCI (hereafter FCI-PCA)

As a robustness check, we construct the financial conditions index using principal component analysis (PCA), a method widely adopted in the literature.[41] PCA extracts the common movement (the so-called "factor") from the observed financial variables and combines them into a single index using a weighted average of the identified factors. The weights (or factor "loadings") represent each factor's contribution to explaining the average variation in the financial indicators. Consistent with common practice, we interpret the first principal component, which explains the largest portion of the total variance in the dataset, as the financial conditions index (FCI-PCA).[42] The first principal component accounts for approximately 23 to 40 percent of the total variance across different economies (see Table B.2). Finally, we compare the signal from our baseline method—the weighted-average approach—with that of the FCI constructed through PCA to assess robustness.

B.3. Interpreting financial conditions indices for SSA

FCIs during recent global shocks

Figure B.1 presents the FCIs for all countries on a quarterly basis from 2003Q1 to 2023Q4. Broadly, the FCIs reveal similar dynamics in financial condition cycles across SSA economies. However, country-specific volatilities are apparent during certain periods, likely reflecting the influence of domestic financial variables, idiosyncratic shocks, and differences in economic structure (e.g., oil importers vs. oil exporters, or resource-intensive vs. non- resource-intensive exporters).[43] Nonetheless, the FCIs consistently capture the key episodes of global shocks. Most notably, financial conditions tightened sharply during the GFC of 2008-09, driven by a substantial rise in global financial risk indicators, such as the VIX and EMBI sovereign spreads.

Following the GFC, financial conditions generally became expansionary across most countries. However, the euro area sovereign debt crisis (2011–13) led to a tightening of FCIs in some countries, including Kenya, Mozambique, Mauritius, Tanzania, and Uganda. This tightening was driven by higher interest rates, weaker growth in monetary and credit aggregates, and appreciating exchange rates. Another significant episode occurred during 2016–17, when FCIs spiked due to China's economic slowdown and the slump in commodity prices. Similarly, during the COVID-19 pandemic, financial conditions initially loosened in 2020–21, as lower interest rates, depreciating exchange rates, and stronger growth in monetary and credit aggregates offset the tightening effects of elevated global financial risks.

Post-pandemic, FCIs tightened in most countries, particularly in 2023, as surging inflation prompted monetary tightening, and to some extent, slower growth in monetary aggregates. However, financial conditions have eased in some countries, such as Mozambique, Tanzania, and Zambia.

[41] See Hatzius et al. (2010) for a detailed discussion of the construction of FCIs using principal component analysis.

[42] In constructing the FCI-PCA, the data were transformed to reflect their impact on financial conditions, with quantity indicators included in the index with a negative sign.

[43] It should be noted that financial condition cycles in CEMAC are primarily driven by monetary and credit aggregates, as the FCI does not include interest rates other than the policy rate.

Robustness: Comparison of FCI-PCA and equal-weighted FCI (FCI-EW)

Figure B.2 shows the FCI-PCA and contributions from underlying financial variables for each country. Figure B.3 compares the baseline equal-weighted FCI (FCI-EW) with the FCI-PCA. The two series exhibit a high correlation across all economies, consistently capturing the main episodes of variation in financial conditions, including periods of loosening and tightening. Marginal divergences arise in certain periods, reflecting differences in the magnitude—and occasionally the sign—of the factor loadings in the FCI-PCA compared to the weights used in the benchmark FCI-EW.

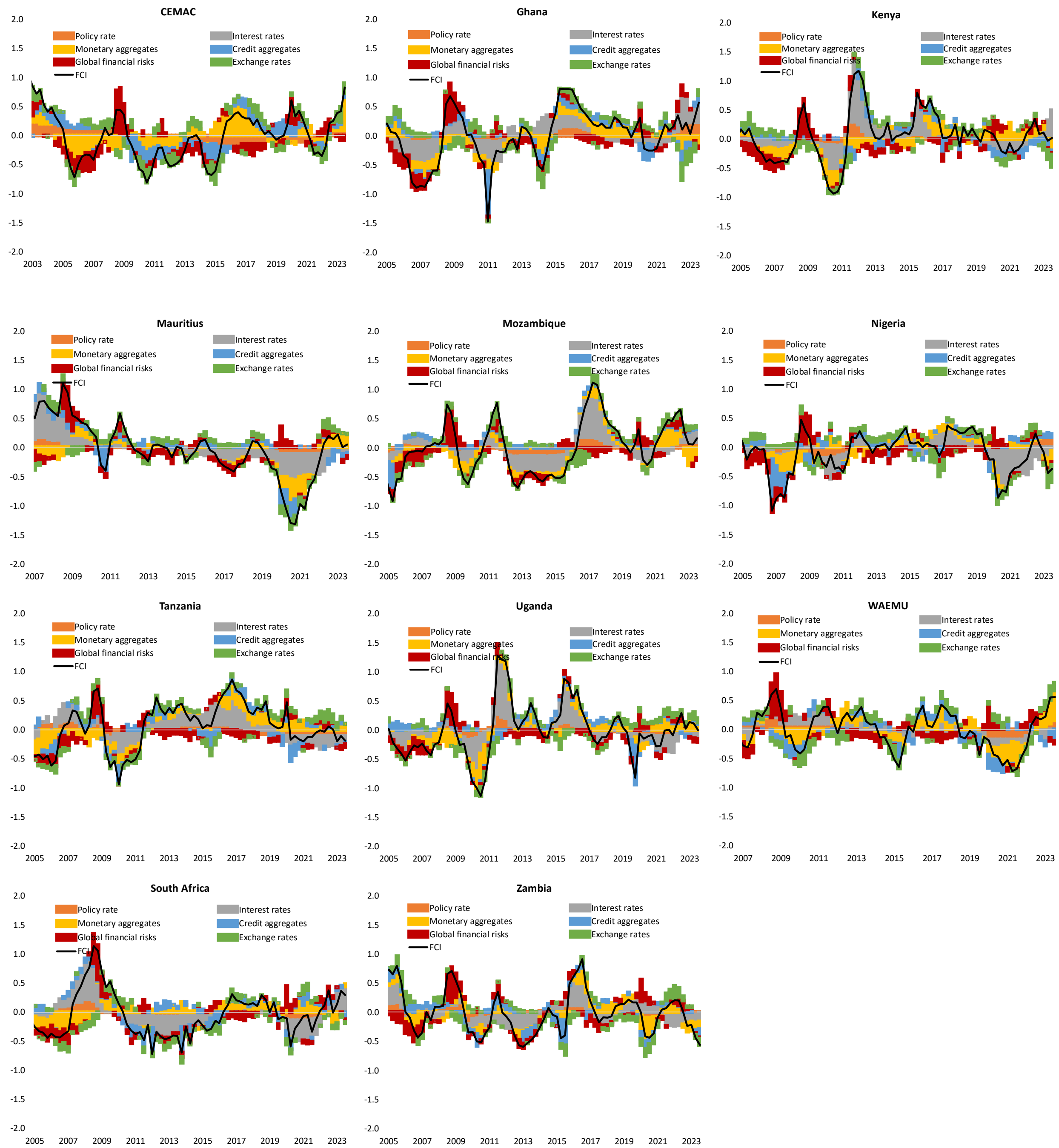
Comparison with other emerging market economies

To assess the extent to which SSA FCIs capture global financial shocks, each country's index is compared with widely used measures for EMDEs. Figure B.4 contrasts the trends in FCIs for SSA economies with the IMF's GFSR Emerging Market Excluding China Index and the Goldman Sachs Emerging Market Index. The comparison reveals that financial conditions in most SSA countries are relatively correlated with those of other EMDEs, though there are slight variations in the magnitude of their responses to global shocks.

Notably, financial conditions tightened more sharply in other EMDEs than in SSA economies during the GFC. The relatively moderate impact on SSA likely reflects the limited financial integration of most SSA economies with global markets (see Christensen 2011; Christensen and Upper 2017). In contrast, the indices for other EMDEs do not exhibit tightening during the euro area debt crisis or the 2016–17 slowdown in China and the slump in commodity prices.

Finally, the EMDE indices show a tightening of financial conditions during the pandemic crisis, followed by a subsequent loosening. More recently, the tightening of monetary policy has been accompanied by a more pronounced tightening of broader financial conditions in other EMDEs compared to SSA economies.

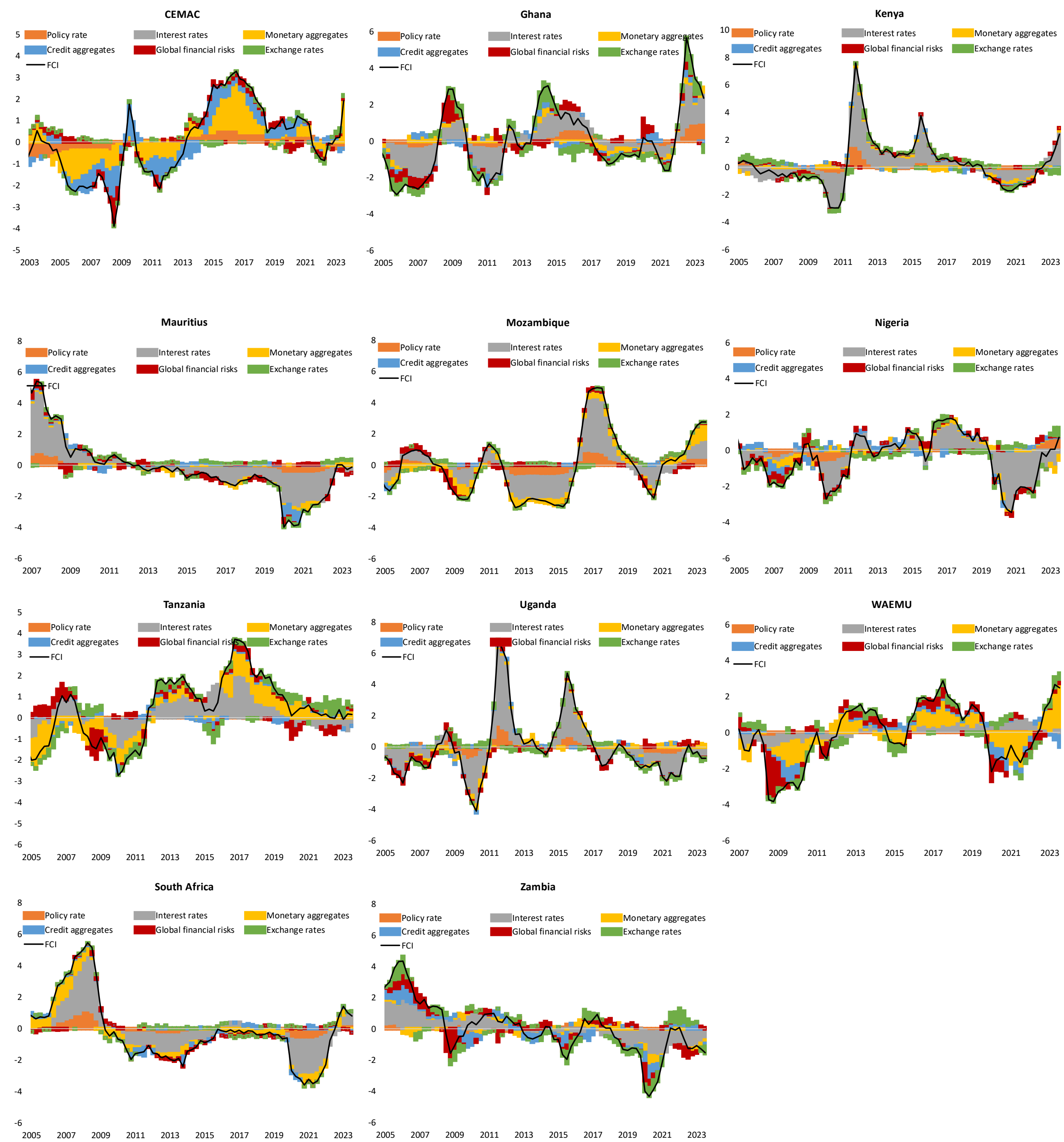
Figure B.1: Equal-Weights FCIs and Contributions from Different Variables



Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The figures show the FCIs along with the contributions of the different financial variables. The FCIs are constructed using the equal-weights approach. For each country, the index includes twelve variables, as described in Table B.1, where data are available. Positive values of the FCI indicate tighter-than-average financial conditions, while negative values indicate looser-than-average financial conditions. A value of zero represents the average or "normal" value of the index over the historical period, indicating neutral financial conditions.

Figure B.2: FCI-PCA and Contributions from Different Variables



Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The figures show the FCIs along with the contributions made by the different financial variables. The FCIs are constructed using the principal component analysis (PCA) approach. The first principal component (PC1)—which explains the largest portion of variation in the dataset—is interpreted as the financial conditions index (FCI). For each country, the index includes twelve variables, as described in Table B.1, where data are available. Positive values of the FCI indicate tighter-than-average financial conditions, while negative values indicate looser-than-average financial conditions. A value of zero represents the average or "normal" value of the index over the historical period, indicating neutral financial conditions.

Figure B.3: FCI-PCA vs FCI-Equal Weights

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The figures show the FCIs along with the contributions made by the different financial variables. The FCIs are constructed using the principal component analysis (PCA) approach. The first principal component (PC1)—which explains the largest portion of variation in the dataset—is interpreted as the financial conditions index (FCI). For each country, the index includes twelve variables, as described in Table 1, where data are available. Positive values of the FCI indicate tighter-than-average financial conditions, while negative values indicate looser-than-average financial conditions. A value of zero represents the average or "normal" value of the index over the historical period, indicating neutral financial conditions.

Table B.2: FCI-PCA – Variables and Factor Loadings by Country

Variables	Transformation	CEMAC	GHA	KEN	MOZ	MUS	NGA	TZA	UGA	WAEMU	ZAF	ZMB
Individual Variables' Weight (or Loadings) in the First Principal Component (PC1)												
Policy Rate												
Policy rate	Level	-0.406	0.406	0.447	0.472	0.434	0.330	0.041	0.450	-0.141	0.460	0.187
Interest Rates												
Deposit rate	Level	…	0.333	0.437	0.366	0.416	0.398	0.493	0.426	0.223	0.433	0.208
Lending rate	Level	…	…	0.361	0.487	0.403	0.396	0.429	0.339	-0.253	0.458	0.403
Government treasury bill rate	Level	…	0.486	0.454	0.487	0.435	0.454	0.221	0.475	…	0.448	-0.228
Government treasury bond rate	Level	…	0.407	0.465	…	0.418	0.428	0.231	0.440	…	-0.018	-0.434
Monetary Aggregates												
Monetary base	YoY percent change	0.433	-0.124	-0.123	-0.110	0.163	0.147	0.337	0.102	0.416	-0.233	0.169
Broad money	YoY percent change	0.548	-0.120	-0.049	0.363	-0.063	0.105	0.396	0.103	0.504	-0.329	0.098
Credit Aggregates												
Private sector credit	YoY percent change	0.405	0.082	0.004	-0.052	0.040	0.111	0.121	-0.063	0.010	0.048	0.053
Public sector credit	YoY percent change	-0.343	-0.171	0.062	0.064	0.196	0.099	0.025	0.057	0.345	0.138	0.412
Foreign Exchange												
Exchange rate	YoY percent change	0.064	-0.385	0.169	0.061	0.053	-0.126	0.305	-0.138	0.251	-0.023	0.382
Global Financial Risks												
Global stock market volatility	Level	-0.243	0.104	-0.083	-0.108	0.012	-0.104	-0.211	0.034	-0.465	0.075	-0.198
Emerging market bond index	Level	0.045	0.313	-0.004	-0.052	-0.195	0.323	-0.213	0.183	-0.201	0.008	-0.351
Share of total variance explained by FCI (PC1)		34.05	32.64	32.71	34.14	39.63	26.20	27.96	33.42	26.47	38.41	24.37

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Haver and authors' calculations.

Notes: The first principal component (PC1)—which explains the largest portion of variation in the dataset—is interpreted as the financial conditions index (FCI). The table shows the weights (or loadings) of the different financial variables in the first principal component (PC1), along with the share of total variance explained by PC1 for each economy. The weights (or loadings) represent the contribution of each variable to the variations in the broader dataset, with higher absolute values indicating a stronger influence on the first principal component.

Figure B.46: FCIs – International Comparison

Sources: IMF World Economic Outlook; IMF International Financial Statistics; Goldman Sachs; IMF GFSR; Haver and authors' calculations.

Notes: FCI-EW and FCI-PCA1 represent our financial conditions indices, computed using the equal-weights approach and principal component analysis, respectively. FCI-EM exc. China (GFSR) refers to the GFSR emerging market index excluding China, while FCI-EM (GS) denotes the Goldman Sachs emerging market index. To facilitate comparison, the FCIs have been (re-)normalized to have a zero mean and unit variance over the period considered.

Annex C. Data Sources

Table C.1: List of Countries

Emerging markets	***Monetary Unions***
South Africa	***CEMAC***
Frontier markets	Cameroon
Ghana	Central African Rep.
Kenya	Chad
Mauritius	Rep. of Congo
Mozambique	Equatorial Guinea
Nigeria	Gabon
Tanzania	***WAEMU***
Uganda	Benin
Zambia	Burkina Faso
	Côte d'Ivoire
	Guinea-Bissau
	Mali
	Niger
	Senegal
	Togo

Table C.2: Classification of Exchange Rate Arrangements and Monetary Policy Frameworks in SSA Emerging and Frontier Markets

Exchange rate arrangement			Monetary policy framework											
			Exchange rate anchor				Monetary aggregate target	Inflation-targeting framework	Other 1/	Main instruments		Price stability 3/		
			US dollar	Euro	Composite	Other				Policy interest rate 2/	Open market operations	Inflation target	Price stability objective	Average inflation (2002-2023)
Conventional peg (14)	*Central African Economic and Monetary Union (CEMAC) (6)*	Cameroon		*						*				
		Central African Rep.		*						*				
		Chad		*						*			3	2.7
		Congo, Rep. of		*						*				
		Equatorial Guinea		*						*				
		Gabon		*						*				
	West African Economic and Monetary Union (WAEMU) (8)	Benin		*						*				
		Burkina Faso		*						*				
		Côte d'Ivoire		*						*				
		Guinea-Bissau		*						*			1-3	2.3
		Mali		*						*				
		Niger		*						*				
		Senegal		*						*				
		Togo		*						*				
Stabilized arrangement (3)		Mozambique 4/							*	*				7.9
		Nigeria					*			+	*			13.2
		Tanzania					*			+	*		5	6.6
Crawl-like arrangement (3)		Ghana						*		*		8		15.5
		Kenya						*		*		5		7.7
		Mauritius						*		*		2-5		4.8
Floating (3)		South Africa						*		*		3-6		5.3
		Uganda						*		*		5		6.4
		Zambia							*	*			6-8	12.4

Sources: AREAER database 2023; and websites of central banks

Notes: 1/ Includes countries that have no explicitly stated nominal anchor, but rather monitor various indicators in conducting monetary policy. 2/ *: The policy rate is the main instrument to signal the stance of monetary policy. +: The central bank uses a variety of instruments to align the operating target with the policy rate. 3/ In percentage. 4/ The central bank is in transition toward inflation-targeting.

Table C.3: Data Sources and Description

Variables	Description	Source
Real GDP	Real GDP in local currency units interpolated to quarterly frequency using the quadratic match method if quarterly series not available.	Haver Analytics
Nominal GDP	Nominal GDP in local currency units interpolated to quarterly frequency using the quadratic match method if quarterly series not available.	Haver Analytics
Output gap	Measured by the Hodrick-Prescott (HP)-filtered quarterly real GDP with a smoothing parameter λ=1600.	IMF WEO
Policy rate	Nominal official/policy interest rate. The monetary policy instrument varies by country	Haver Analytics
NEER	Nominal effective exchange rate	IMF, IFS
REER	Real effective exchange rate, CPI based.	IMF, IFS
USD exchange rate	Exchange rate; domestic currency per USD	IMF, IFS
CPI Inflation	Consumer price index	Haver Analytics
Inflation expectations	1-year-ahead, 3-year-ahead and 5-year-ahead forecasts for CPI inflation. Data was interpolated to quarterly frequency using the quadratic match method.	IMF WEO
GDP growth expectations	1-year-ahead, 3-year-ahead and 5-year-ahead forecasts for GDP growth. Data was interpolated to quarterly frequency using the quadratic match method.	IMF WEO
Inflation target	Inflation target/Historical average	IMF AREAER Database
Commodity prices, all index	World commodity price index (2016=100), USD, includes both fuel and non-fuel price indices	Datastream, IMF
Commodity prices, exc. Fuel	World commodity price index, excluding fuel (2016=100), USD, includes precious metal, food and beverages and industrial inputs price indices.	Datastream, IMF
Commodity food prices	World food index, (2016=100), USD, includes cereal, vegetable oils, meat, seafood, sugar, and other food (apple (non-citrus fruit), bananas, chana (legumes), Fishmeal groundnuts, milk (dairy), tomato (veg) price indices.	Datastream, IMF
Oil prices	Brent crude oil price in USD	Datastream, IMF
Bank lending rates	The other depository corporations' rate that usually meets the short- and medium-term financing needs of the private sector.	IMF, IFS
Bank deposit rates	The rates offered to resident customers for demand, time, or savings deposits.	IMF, IFS
Money market interest rates	The rate on short-term lending between financial institutions.	IMF, IFS
Government treasury bills	The rate at which short-term government debt securities are issued or traded in the market.	IMF, IFS, Datastream, Haver Analytics
Government treasury bonds	One or more series representing yields to maturity of government bonds or other bonds that would indicate longer term rates.	IMF, IFS, Datastream, Haver Analytics
Private sector credit	Claims on private sector	IMF, IFS
Public sector credit	Claims on central government	IMF, IFS
Monetary base	Currency in circulation; Deposits with the central bank	IMF, IFS
Broad money	M2	IMF, IFS
US Policy Rate	Fed Funds Target Rate	Haver Analytics
Euro area Policy Rate	Main refinancing rate	Haver Analytics
U.S. long-term interest rates	Ten-year U.S. Treasury yield	Haver Analytics
Euro area long-term interest rates	Ten-year German bund yield	Haver Analytics
VIX	Chicago Board Options Exchange volatility index	Haver Analytics
EMBI	Emerging Market Bond Index (JPM EMBI Global)	Haver Analytics
U.S., Euro area r-star	Estimates based on Holston et. al. (2017)	Federal Reserve Bank of New York
FCI EM exc. China (GS)	FCI emerging market excluding China	Goldman Sachs
FCI EM (GFSR)	FCI emerging market	IMF, Global Financial Stability Report

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