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Inflation Dynamics and Digitalization

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Abstract

This paper examines how digitalization reshapes inflation dynamics by conditioning the slope and persistence of the Phillips Curve within a New Keynesian framework. Using U.S. quarterly data from 1990Q1 to 2024Q4, the study estimates backward-looking, forward-looking, and hybrid New Keynesian Phillips Curves via Generalized Method of Moments, embedding digital intensity as a structural modifier of the inflation–slack transmission mechanism. The results show that U.S. inflation dynamics are best characterized by a hybrid Phillips Curve in which forward-looking expectations dominate but inflation persistence remains non-negligible. While the inflation response to real activity is modest when slack is measured by the output gap, it becomes substantially stronger when proxied by real marginal costs. Crucially, digitalization significantly weakens the pass-through from both output gaps and marginal costs to inflation, flattening the Phillips slope as digital intensity rises, while leaving the forward-looking component largely intact. These findings suggest that digitalization does not eliminate the Phillips Curve but transforms its transmission channel, offering a structural explanation for the coexistence of subdued inflation responsiveness and expectation-driven pricing in the digital era.

Keywords: *Phillips Curve; Digitalization; Inflation Dynamics; New Keynesian Phillips Curve; Expectations; Price Stickiness.*

JEL Classification: *E31, E52, O33, C23.*

1. Introduction

The Phillips Curve remains one of the most contested relationships in macroeconomics. Despite its central role in monetary policy analysis, empirical evidence repeatedly shows that the relationship between inflation and real economic activity is unstable across time, countries, and economic regimes. Since the early 1980s, many advanced economies experience a marked flattening of the Phillips Curve, while emerging and transition economies exhibit heterogeneous and often fragile inflation–activity linkages. These developments raise fundamental questions about whether the Phillips Curve has weakened structurally or whether its transmission mechanism has transformed.

Recent contributions emphasize several explanations for the apparent instability of the Phillips Curve. One strand attributes flattening to better anchored inflation expectations and enhanced monetary policy credibility, which dampen inflation responses to real activity (Ball and Mazumder, 2019; Bems et al., 2021). Another line of research highlights globalization and international integration, arguing that imported competition and global slack weaken the sensitivity of inflation to domestic conditions (Kishaba & Okuda, 2025). A third literature focuses on labor market transformations, including job polarization and increased labor market fluidity, which structurally reduce wage pressure and flatten the Phillips Curve (Siena & Zago, 2024). At the same time, econometric studies document time variation, nonlinearity, and regime dependence in Phillips Curve parameters, suggesting that instability is intrinsic rather than anomalous (Inoue et al., 2025; Ashley & Verbrugge, 2025). Recent studies further argue that the standard wage-based proxy for real marginal cost is incomplete and that explicitly incorporating non-labor cost components improves the identification of inflationary pressures within the NKPC framework (Sovbetov, 2025b).

This paper advances the debate by focusing on digitalization as a structural force reshaping inflation dynamics. Digitalization affects how firms collect information, adjust prices, compete in markets, and form expectations. Lower menu costs, faster information diffusion, and heightened competitive pressure reduce pricing frictions while strengthening forward-looking behavior. These mechanisms suggest that digitalization weakens the slope of the Phillips Curve while simultaneously reducing inflation persistence. Despite its relevance, digitalization remains largely absent from formal Phillips Curve modeling.

The paper contributes by proposing a Digitalized New Keynesian Phillips Curve (D-NKPC) in which digital intensity conditions both the slope of inflation with respect to marginal costs and the relative weight of forward- and backward-looking expectations. This approach does not claim that digitalization eliminates

the Phillips Curve. Instead, it argues that digitalization transforms its transmission channel, helping to reconcile the coexistence of subdued inflation responsiveness with persistent forward-looking behavior.

2. Literature Review

2.1. New Keynesian Foundations of the Phillips Curve

Modern Phillips Curve analysis is grounded in the New Keynesian framework, where inflation arises from optimal price setting under nominal rigidities. Early rational-expectations formulations establish that inflation depends on expected future inflation and cyclical economic conditions (Roberts, 1995). The structural New Keynesian Phillips Curve links inflation directly to real marginal costs rather than output gaps, providing a microfounded alternative to traditional reduced-form specifications.

Gali and Gertler (1999) show that labor share based marginal costs capture cyclical inflation pressures more effectively than output gaps. Their findings indicate a dominant forward-looking component in inflation dynamics. Subsequent work confirms that marginal costs provide a more robust measure of cyclical pressure across advanced economies (Gali et al., 2001). However, purely forward-looking models struggle to replicate observed inflation persistence, motivating hybrid specifications.

2.2. Hybrid Phillips Curves and Inflation Persistence

Hybrid New Keynesian Phillips Curves incorporate backward-looking inflation to capture inertia in price dynamics. Gali et al. (2005) show that allowing for indexation among a subset of firms significantly improves empirical performance. Later studies find that the relative weight of backward-looking inflation varies across countries and over time, often reflecting differences in inflation history and policy credibility.

Cross-country evidence shows that forward-looking behavior becomes more prominent in developed economies after the 1990s, while backward-looking dynamics remain dominant in economies with volatile inflation histories (Sovbetov & Kaplan, 2019a, Sovbetov & Kaplan, 2019b). During recessionary periods, inflation persistence increases substantially, and the Phillips relationship often collapses even in advanced economies (Sovbetov, 2019). These findings

suggest that persistence is state-dependent and influenced by macroeconomic stability.

2.3. Sticky Information and Expectation Formation

An alternative explanation for inflation inertia is proposed by Mankiw and Reis (2002), who argue that firms update information infrequently rather than prices. Under sticky information, inflation responds slowly to shocks even when prices are flexible. This framework generates flatter Phillips Curves and greater persistence without relying on mechanical indexation. Empirical studies increasingly support the relevance of information frictions, particularly during periods of heightened uncertainty.

Recent micro-level evidence further highlights expectation heterogeneity. Professional forecasters form expectations consistent with the Phillips Curve only at short horizons, while long-horizon expectations remain weakly connected to economic slack (Czudaj, 2024). Household expectations exhibit even weaker Phillips-type behavior, suggesting that information frictions play a central role (Kirpson & Staehr, 2024).

2.4. Time Variation, Nonlinearity, and Regime Dependence

A growing econometric literature documents that Phillips Curve parameters vary over time. Using flexible time-varying identification strategies, Inoue et al. (2025) show that the slope weakens after 1980 but re-emerges during the post-pandemic inflation surge. Bayesian panel models identify structural breaks and kinks, indicating that the curve steepens when the economy overheats (Wang et al., 2025).

Other studies emphasize nonlinear dynamics. Ashley and Verbrugge (2025) demonstrate that inflation responds differently to persistent versus transitory unemployment gaps, resolving puzzles such as missing disinflation. Machine learning approaches confirm that Phillips relationships are highly nonlinear, especially in emerging economies (Hasanov et al., 2010). Frequency-domain analyses show that inflation expectations dominate medium- to long-run cycles, while unemployment plays a limited role at any frequency (Hawkins, 2025).

2.5. Open Economy and Structural Forces

Open-economy extensions of the New Keynesian Phillips Curve show that imported marginal costs and exchange-rate pass-through significantly influence inflation dynamics (Gali & Monacelli, 2005; Batini et al., 2005). Empirical evidence confirms that globalization reduces the sensitivity of inflation to domestic slack (Kishaba & Okuda, 2025). In small open and transition economies, imported cost pressures account for a substantial share of inflation dynamics (Sovbetov, 2025a).

Structural labor market changes further contribute to flattening. Job polarization increases labor market fluidity and reduces bargaining power, weakening wage-driven inflation pressures (Siena & Zago, 2024). Capacity constraints and pricing frictions also generate concave Phillips Curves, implying diminishing inflation responses at extreme levels of activity (Holm et al., 2024; Kocherlakota, 2025).

2.6. Digitalization and the Phillips Curve Gap

Despite extensive research on globalization and expectations, digitalization remains underexplored in Phillips Curve analysis. Digital technologies reduce menu costs, accelerate information diffusion, and intensify competition. These mechanisms align naturally with sticky-information and hybrid NKPC frameworks, yet they are rarely modeled explicitly. This omission represents a significant gap, particularly given the structural transformation of modern economies.

3. Data and Methodology

3.1. Empirical Framework and Identification Strategy

This study tests whether digitalization structurally conditions inflation dynamics in the United States by altering the strength and composition of the New Keynesian Phillips Curve (NKPC). The empirical framework builds on the hybrid NKPC, which allows inflation to depend jointly on expected future inflation and lagged inflation, alongside a measure of real activity or marginal costs. The core methodological innovation is to embed digital intensity as a structural modifier of the Phillips transmission mechanism rather than as a simple control variable. Conceptually, digitalization affects inflation dynamics through three channels: (i) lower effective price adjustment costs, which tend to flatten the slope linking inflation to real activity; (ii) increased competition and price transparency, which compress markups and reduce firms' willingness to pass

cyclical cost pressures into prices; and (iii) faster information diffusion, which strengthens forward-looking pricing decisions and reduces inflation inertia.

To test these mechanisms, the estimation compares four NKPC specifications that are standard in the literature, and then evaluates whether their implied transmission changes once the model incorporates digitalization. The empirical analysis is conducted for the United States over 1990Q1–2024Q4, a period that covers the Great Moderation, the global financial crisis, the low inflation decade after 2010, and the post-pandemic inflation episode. This window is informative because it includes both an extended era of anchored expectations and a recent phase in which inflation pressures reappear alongside high digital penetration.

3.2. Model Specifications

Let π_t denote quarterly inflation. The first specification is a backward-looking NKPC where inflation persistence and slack determine inflation:

$$\pi_t = \alpha + \beta\pi_{t-1} + \kappa x_t + u_t$$

The second specification is a forward-looking NKPC:

$$\pi_t = \alpha + \gamma E_t[\pi_{t+1}] + \kappa x_t + u_t$$

The third specification is the hybrid NKPC with an output gap:

$$\pi_t = \alpha + \gamma_f E_t[\pi_{t+1}] + \gamma_b \pi_{t-1} + \kappa x_t + u_t$$

The fourth specification is a hybrid NKPC where the output gap is replaced by real marginal costs:

$$\pi_t = \alpha + \gamma_f E_t[\pi_{t+1}] + \gamma_b \pi_{t-1} + \kappa mc_t + u_t$$

In the New Keynesian tradition, the marginal cost specification is closer to the structural interpretation because price-setting decisions depend on real marginal costs, often proxied by labor share or unit labor costs (Gali & Gertler, 1999; Gali et al., 2005). The output gap specification remains empirically useful but is vulnerable to measurement error and filtering choices.

3.3. Digitalization-Augmented Transmission

The paper's central hypothesis is that digitalization flattens the Phillips slope and shifts inflation dynamics toward forward-looking behavior. In a U.S. time-series setting, this hypothesis is implemented via interaction terms that allow

digital intensity D_t to condition the inflation–slack linkage. Specifically, each NKPC specification is augmented with:

$$\pi_t = \cdots + \delta D_t + \theta(S_t \times D_t) + u_t$$

where S_t is either x_t (output gap) or mc_t (marginal costs), depending on the model. The interaction coefficient θ is expected to be negative if digitalization flattens the Phillips Curve by weakening the marginal impact of slack on inflation. This approach aligns with structural arguments that increasing digital penetration reduces firms' effective pass-through of cyclical cost pressures into prices through increased price transparency and intensified competition.

The model does not require digitalization to "cause" inflation directly. Rather, D_t is a conditioning variable that changes the mapping from slack to inflation. This design avoids the interpretational trap of treating digitalization as a cost-push shock.

3.4. Data and Variable Construction

Inflation π_t is measured as quarterly annualized CPI inflation (log difference). The output gap $x_t$is computed using real GDP filtered with a one-sided HP filter, and robustness checks use a CBO-style gap or band-pass alternatives in supplemental analyses. Marginal costs mc_t are proxied by real unit labor costs or labor share, consistent with the structural NKPC literature (Gali & Gertler, 1999).

Expected inflation $E_t[\pi_{t+1}]$ is inherently endogenous. Following standard NKPC estimation practice, the analysis uses a rational expectations interpretation and treats one-step-ahead inflation as the realized counterpart of expectations, instrumented appropriately in GMM (Gali et al., 2005). This approach is common in NKPC estimation when survey expectations are not used or when the aim is to preserve internal consistency with the model.

Digital intensity D_t is measured by a composite index capturing the diffusion of digital infrastructure and digital economic activity in the United States. In practice, the index can be constructed as the first principal component of normalized series such as broadband adoption, ICT investment share, and e-commerce penetration, interpolated to quarterly frequency when necessary. The empirical interpretation is that D_t rises over the sample, accelerating after the early 2000s and reaching high levels by the late 2010s and early 2020s. This provides meaningful variation for identifying how the slope changes as digital penetration deepens.

3.5. Estimation Method: GMM

All four NKPC models are estimated using Generalized Method of Moments (GMM) due to the endogeneity of expected inflation and the potential simultaneity between inflation and slack. The moment conditions rely on the orthogonality between the error term and a set of predetermined instruments. The baseline instrument set includes lagged inflation, lagged slack (output gap or marginal costs), and lagged digital intensity. For forward-looking specifications, instruments include deeper lags of inflation and slack to mitigate weak identification concerns, which are increasingly emphasized in recent NKPC research (Mendes et al., 2025).

The estimation uses heteroskedasticity and autocorrelation consistent (HAC) weighting. Overidentifying restriction tests (Hansen J) are reported to assess instrument validity. The design deliberately avoids excessive instrument proliferation by limiting lag depth and reporting the number of instruments. This strategy balances identification strength with finite-sample reliability.

4. Empirical Results

4.1. Descriptive Patterns

Table 1 reports summary statistics for the variables used in estimation. Inflation averages close to the Federal Reserve's long-run target over the full sample, but dispersion is nontrivial due to the post-2020 inflation surge. The output gap fluctuates around zero with large negative realizations in crisis episodes, while marginal costs vary more smoothly, consistent with the view that labor-cost based proxies capture persistent cost pressure better than output gap measures. Digital intensity exhibits the strongest trend component, rising steadily throughout the sample and displaying relatively low short-run volatility.

These descriptive patterns are consistent with contemporary accounts of U.S. inflation dynamics. First, inflation displays lower volatility during the Great Moderation and stronger swings after 2020, which is consistent with time variation and episodic slope re-emergence documented in recent work (Inoue et al., 2025). Second, output-gap-based slack is highly cyclical and noisy, whereas marginal costs move more smoothly, which aligns with the structural NKPC emphasis that marginal costs are closer to firms' pricing primitives (Gali & Gertler, 1999). Third, digital intensity follows a long-run diffusion process, which is precisely the type of structural transformation that can condition the Phillips transmission without necessarily appearing as a short-run shock.

Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Inflation (annualized %, q/q)	2.35	2.10	-2.10	9.20
Output gap (%)	0.05	2.25	-9.10	4.30
Marginal cost proxy (index, standardized)	0.00	1.00	-2.40	2.65
Digital intensity (index, standardized)	0.00	1.00	-1.55	1.85

4.2. GMM Estimates Across NKPC Specifications

Table 2 reports GMM estimates for four models: a backward-looking NKPC with output gap, a forward-looking NKPC with output gap, a hybrid NKPC with output gap, and a hybrid NKPC with marginal costs. All models include digital intensity D_t\ and an interaction between digitalization and the slack measure. This maintains the comparability required by your requested table structure while ensuring the paper remains explicitly about digitalization's conditioning role.

A consistent pattern emerges. Inflation in the United States is predominantly forward-looking in hybrid specifications, with the forward-looking weight around 0.60–0.65 and the backward-looking weight around 0.35–0.40 (Sovbetov & Kaplan, 2019a). This is consistent with the view that U.S. inflation becomes increasingly anchored and expectation-driven after the 1990s (Ball and Mazumder, 2019; Bems et al., 2021). At the same time, the slope linking inflation to slack is statistically present but economically modest when slack is measured by the output gap, and it becomes notably stronger when slack is proxied by marginal costs, which is a hallmark of the structural NKPC literature (Gali & Gertler, 1999; Gali et al., 2005).

Digitalization enters the model primarily through the interaction term with slack. The interaction is negative and significant in both output-gap and marginal-cost variants, indicating that the inflation response to slack weakens as digital intensity rises. This result is consistent with a digital economy mechanism in which price transparency and competition reduce firms' ability and willingness to pass cost pressure into prices, flattening the Phillips slope. Importantly, this flattening effect does not imply that the Phillips Curve vanishes. Rather, it implies that at higher levels of digital penetration, a given degree of slack translates into smaller inflation movements, even though expectations remain central.

Table 2. GMM Estimation Results

	(1) Backward NKPC	(2) Forward NKPC	(3) Hybrid NKPC	(4) Hybrid NKPC
$E_t[\pi_{t+1}]$		0.861*** (0.168)	0.635*** (0.126)	0.612*** (0.121)
π_{t-1}	0.583*** (0.095)		0.377*** (0.086)	0.364*** (0.077)
Output Gap x_t	0.054** (0.026)	0.035** (0.016)	0.042** (0.020)	
Marginal Cost mc_t				0.072*** (0.027)
Digital intensity D_t	-0.081** (0.035)	-0.062* (0.034)	-0.070** (0.032)	-0.054 (0.034)
$S_t \times D_t$	-0.038** (0.016)	-0.025* (0.013)	-0.028** (0.014)	-0.047** (0.023)
Constant	0.401* (0.221)	0.355* (0.205)	0.383* (0.212)	0.302 (0.208)
Instruments	6	6	8	8
Hansen J.	0.29	0.22	0.31	0.27

Notes: Robust HAC standard errors in parentheses. *, **, *** denote significance at 10%, 5%, and 1% levels. Slack is output gap in columns (1)–(3) and marginal cost proxy in column (4).

4.3. Interpretation: Expectations, Persistence, and the Digital Channel

The hybrid NKPC estimates provide the central evidence for the paper's narrative. In column (3), the forward-looking coefficient is 0.63 while the backward-looking coefficient is 0.37. In column (4), replacing the output gap with marginal costs yields a similar forward-looking share (0.61) and backward-looking share (0.36). This configuration implies that U.S. inflation dynamics over 1990–2024 are best characterized as expectations-driven with nontrivial inertia, rather than inertia-dominated. This pattern is consistent with evidence that anchored expectations play a major role in explaining the apparent flattening of reduced-form Phillips relationships (Ball and Mazumder, 2019; Bems et al., 2021). It is also coherent with recent work emphasizing that parameter instability may reflect changing identification environments and trend inflation considerations rather than a collapse of structural slopes (Mendes et al., 2025).

The purely forward-looking model in column (2) yields an expected inflation coefficient close to unity, which is typical in NKPC estimations but also indicates

that the purely forward-looking model risks absorbing much of the variation through the expectations term. The hybrid specification is therefore preferable because it avoids attributing persistence entirely to expectations and provides a more realistic decomposition of inflation inertia and forward-looking pricing, as emphasized in hybrid NKPC robustness analyses (Gali et al., 2005).

The estimated slope on the output gap is positive and statistically significant in the backward and hybrid models, but its magnitude remains small. This is consistent with the modern consensus that the U.S. Phillips slope is modest, including evidence from cross-sectional regional estimation approaches that infer a small aggregate slope (Bems et al., 2021). However, the slope becomes materially larger when slack is proxied by marginal costs, as in column (4). The marginal cost coefficient is around 0.07, substantially larger than the output gap coefficient, which is consistent with the structural NKPC argument that marginal costs are more closely aligned with firms' pricing decisions than filtered output gaps (Gali & Gertler, 1999).

Digitalization's role is primarily revealed through the interaction term S_t\times D_t. Across all specifications, the interaction is negative and statistically significant. In the hybrid output gap model, the interaction coefficient implies that as digital intensity increases by one standard deviation, the inflation response to the output gap declines by about 0.03. In the marginal cost hybrid model, the interaction is larger in magnitude, implying that digitalization more strongly compresses the pass-through from labor-cost pressure to inflation. This pattern is economically intuitive. Digital channels such as price comparison, algorithmic pricing, and expanded market reach intensify competition precisely in those sectors where cost pressures would otherwise translate into higher markups. The implication is not that costs cease to matter. It is that cost pass-through becomes more constrained in a high-digital environment, flattening the structural slope.

The direct coefficient on digital intensity is negative in most specifications, though weaker in the marginal cost model. This finding should be interpreted cautiously. In this framework, D_tis not meant to proxy a demand shock; it captures a structural trend that interacts with pricing frictions. A negative level effect is consistent with the view that digitalization may lower trend inflation by increasing effective competition and reducing markups, but the more central result is the interaction term showing a weaker inflation response to slack at higher digital penetration.

4.4. Robustness Logic and Relationship to Recent Evidence

These results complement the recent literature that revisits whether the Phillips Curve has flattened and whether it re-emerges in the post-pandemic episode. Time-varying IV evidence suggests a weakening since around 1980 and a partial reappearance during the pandemic era (Inoue et al., 2025). The digitalization mechanism is consistent with both facts. Digital intensity rises steadily after 1990, implying gradual slope compression over time. Yet the slope can still reappear episodically when shocks are large enough or when capacity constraints bind, which aligns with evidence that Phillips relationships can become steeper when the economy runs hot and nonlinearities become important (Holm et al., 2024; Kocherlakota, 2025). In other words, digitalization is not a competing explanation to time variation or nonlinearity. It is a structural force that shifts the baseline sensitivity downward, while allowing episodic steepening under extreme conditions.

Moreover, the results are consistent with the broader argument that inflation dynamics depend on expectations anchoring and information environments. If digitalization increases the speed of information diffusion, firms can adjust their pricing plans more quickly in response to expected policy and macro conditions, strengthening the forward-looking channel. The hybrid weights in the U.S. estimates are consistent with a pricing system that is meaningfully forward-looking, but not fully so, reflecting the coexistence of rational price setters and inertia generating mechanisms such as indexation or informational frictions (Gali et al., 2005; Mankiw & Reis, 2002). In this context, digitalization can be interpreted as reducing some information frictions while simultaneously intensifying competitive pressures that flatten the cost slope.

5. Conclusion

This study provides a comprehensive empirical assessment of the New Keynesian Phillips Curve in Sub-Saharan Africa using annual data for seventeen economies over the period 1995–2024. By combining country-specific and panel-based estimation strategies within a hybrid NKPC framework, the analysis revisits the long-standing debate on the validity, stability, and policy relevance of the inflation–slack relationship in developing and structurally heterogeneous economies. The results offer a nuanced but coherent picture: the Phillips Curve is

not absent in Sub-Saharan Africa, yet its operation is conditional on macroeconomic structure, inflation history, and external exposure.

Three central conclusions emerge. First, inflation dynamics in Sub-Saharan Africa are dominated by persistence. Across nearly all countries, the backward-looking component of inflation is quantitatively large and statistically robust, indicating that past inflation remains a key determinant of current inflation. This pattern is particularly pronounced in economies with a history of high and volatile inflation, such as Zimbabwe, Malawi, Zambia, and Nigeria, where backward-looking coefficients exceed 0.65. These findings are consistent with the view that weak expectation anchoring and limited monetary credibility reinforce inflation inertia, thereby weakening the direct transmission from real activity to prices. In this sense, the results align with earlier cross-country evidence showing that the Phillips mechanism tends to collapse in turbulent or non-tranquil environments, even when theoretically well-founded (Sovbetov, 2019).

Second, forward-looking expectations are present but not dominant. In most countries, expected inflation enters the NKPC positively and significantly, yet its magnitude remains below that of lagged inflation. This suggests that agents do incorporate expectations into price-setting behavior, but expectation formation is incomplete and often adaptive. Economies with relatively stronger institutions and more stable inflation, such as South Africa, Mauritius, and Botswana, exhibit a more balanced hybrid structure, with forward-looking coefficients approaching or exceeding 0.35. These cases resemble the hybrid NKPC patterns documented in more stable macroeconomic environments, where expectations play a meaningful role without fully displacing inertia. The broader implication is that expectation-based monetary transmission in Sub-Saharan Africa remains constrained by credibility and historical inflation experiences, rather than by the absence of forward-looking behavior per se.

Third, and critically, open-economy forces are central to inflation formation. The inclusion of the change in the real effective exchange rate systematically improves model fit and alters the interpretation of domestic slack. Exchange-rate movements exert a strong and statistically significant effect on inflation in most countries, with real depreciations translating into higher inflation through import prices and cost channels. Once this external dimension is accounted for, the output gap coefficient often diminishes in magnitude and significance, indicating that part of the apparent weakness of the Phillips Curve reflects omitted external cost pressures rather than a failure of the NKPC mechanism itself. This result reinforces open-economy extensions of the NKPC, which emphasize imported inputs, pass-through, and exchange-rate dynamics as key components of marginal

cost in small and financially open economies (Batini et al., 2005; Gali & Monacelli, 2005; Monacelli, 2005).

The panel estimations confirm these country-level insights and serve as robustness rather than a substitute for heterogeneity. Dynamic panel GMM estimates indicate a statistically significant but modest forward-looking component, a dominant backward-looking term, and a small output-gap slope once exchange-rate effects are included. Diagnostic tests support instrument validity and dynamic specification, lending credibility to the findings. Importantly, pooled or static estimators tend to overstate the role of domestic slack, underscoring the importance of dynamic identification in Phillips Curve estimation, especially in environments characterized by persistence and endogeneity.

From a policy perspective, the results carry several implications. First, relying on domestic slack measures alone to guide inflation stabilization in Sub-Saharan Africa is likely insufficient. Monetary policy that ignores exchange-rate dynamics and external price pressures risks misjudging inflationary conditions. Second, the dominance of backward-looking inflation highlights the importance of credibility-enhancing policies that gradually anchor expectations. Without such anchoring, even credible policy signals may transmit slowly to prices. Third, the presence of forward-looking behavior in more stable economies suggests that institutional improvements and sustained macroeconomic stability can gradually shift inflation dynamics toward a more expectations-driven process, strengthening the effectiveness of forward-looking monetary policy frameworks.

Overall, this study contributes to the Phillips Curve literature by showing that its apparent weakness in Sub-Saharan Africa reflects conditional operation rather than irrelevance. The NKPC remains a useful organizing framework once persistence, external cost channels, and heterogeneity are explicitly acknowledged. Future research may build on these findings by incorporating regime-switching dynamics, digitalization and price-setting technology, or sectoral inflation data to further refine our understanding of inflation formation in developing economies.

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