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INFLATION AND UNEMPLOYMENT IN NIGERIA: AN EMPIRICAL INVESTIGATION

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ABSTRACT

This study investigates the relationship between inflation and unemployment in Nigeria using annual data from 1991–2025 obtained from the World Bank. The study employs a Vector Error Correction Model (VECM) with inflation, measured by consumer prices (annual %), specified as the dependent variable and unemployment rate (% of total labor force, ILO estimate) as the independent variable. The findings reveal a statistically significant long-run relationship between inflation and unemployment, with the coefficient of unemployment (18.88363; t = 2.152) indicating that increases in unemployment significantly raise inflationary pressures in the long run. The error correction coefficient is negative and statistically significant (-0.894745; t = -3.375), indicating rapid adjustment toward long-run equilibrium. The adjusted R-squared value of 0.401 indicates that approximately 40.1% of variations in inflation are explained by the model. The study concludes that unemployment remains an important determinant of inflationary behavior in Nigeria and recommends coordinated macroeconomic policies aimed at reducing unemployment while maintaining price stability to foster sustainable economic growth.

KEY WORDS: *VECM, Inflation, Unemployment, Nigeria*

INTRODUCTION

Inflation and unemployment remain among the most persistent macroeconomic challenges confronting developing economies, particularly in Nigeria. Inflation reflects sustained increases in the general price level, which reduce purchasing power and create uncertainty in economic planning, while unemployment represents the underutilization of labor resources and declining household welfare. The relationship between inflation and unemployment has long attracted attention in macroeconomic literature following the development of the Phillips Curve hypothesis, which postulates an inverse relationship between the two variables (Phillips, 1958). However, empirical evidence across developing countries has remained inconclusive due to structural rigidities, weak institutions, supply-side constraints, and external economic shocks (Friedman, 1968; Phelps, 1967).

Over the years, Nigeria has experienced episodes of rising inflation accompanied by persistent unemployment, creating concerns about macroeconomic instability and slow economic transformation. Inflationary pressures in Nigeria have been driven by exchange rate volatility, fiscal imbalances, insecurity, energy price fluctuations, and supply disruptions, while unemployment has been exacerbated by low industrial productivity, rapid population growth, and inadequate job creation (CBN, 2023). Despite several monetary and fiscal policy interventions, the simultaneous increase in inflation and unemployment suggests the possible existence of stagflationary tendencies within the economy. This development contradicts the traditional Phillips Curve assumption and raises important policy concerns regarding the effectiveness of stabilization policies.

Existing empirical studies on inflation and unemployment in Nigeria have largely focused on short-run trade-offs using ordinary least squares and other conventional econometric techniques, with limited emphasis on long-run dynamics and adjustment mechanisms. Moreover, many previous studies relied on shorter sample periods and failed to incorporate recent macroeconomic developments characterized by global economic uncertainty and domestic structural challenges. Consequently, there remains a gap in understanding the long-run equilibrium relationship and short-run adjustment dynamics between inflation and unemployment in Nigeria using recent data and robust cointegration techniques (Akampurira et al., 2026).

It is against this background that this study investigates the relationship between inflation and unemployment in Nigeria using annual data from 1991–2025 within a Vector Error Correction Model (VECM) framework. The study is important because it provides empirical evidence on the long-run and short-run interactions between inflation and unemployment, thereby offering useful insights for policymakers in designing coordinated macroeconomic policies aimed at achieving price stability, employment generation, and sustainable economic growth.

LITERATURE REVIEW

The relationship between inflation and unemployment has been widely discussed in macroeconomic theory. The earliest theoretical foundation is the Phillips Curve Theory developed by A. W. Phillips, which established an inverse relationship between inflation and unemployment. According to Phillips (1958), lower unemployment rates are associated with higher wage growth and inflation, while higher unemployment leads to lower inflationary pressures. The theory implies the existence of a short-run trade-off between inflation and unemployment, thereby providing policymakers with alternative stabilization choices.

However, the traditional Phillips Curve was later challenged by the Monetarist Theory advanced by Milton Friedman and Edmund Phelps. Friedman (1968) argued that the trade-off between inflation and unemployment only exists in the short run because workers eventually adjust their inflation expectations. The theory introduced the concept of the Natural Rate of Unemployment, suggesting that attempts to reduce unemployment below its natural level only generate accelerating inflation without long-term employment gains. Similarly, Phelps (1967) emphasized adaptive expectations and argued that inflation expectations influence labor market behavior.

The Keynesian Theory also explains the inflation-unemployment nexus through aggregate demand management. Keynesians argue that increased aggregate demand stimulates output and employment but may also generate inflationary pressures when demand exceeds productive capacity (Keynes, 1936). In contrast, the Structuralist Theory contends that inflation and unemployment in developing countries arise from structural bottlenecks such as weak industrialization, labor market rigidities, supply-side inefficiencies, and external dependency (Streeten, 1962). This perspective is particularly relevant to developing economies like Nigeria, where inflation and unemployment often coexist.

Several global studies have examined the relationship between inflation and unemployment with mixed findings. Samuelson & Solow (1960) confirmed the existence of a stable Phillips Curve relationship in the United States, suggesting that policymakers could exploit the trade-off between inflation and unemployment. However, later studies observed the breakdown of the Phillips Curve during periods of stagflation in the 1970s. Ball & Mankiw (2002) found that inflation persistence and expectations significantly influence unemployment dynamics in advanced economies. Similarly, Blanchard (2016) noted that although the Phillips Curve still exists, the relationship has weakened in many countries due to globalization and changing labor market structures.

In Africa, studies have reported diverse findings regarding the inflation-unemployment relationship. Furuoka (2007), using data from South Africa, found evidence supporting the Phillips Curve hypothesis in the short run. Conversely, Umaru & Zubairu (2012) reported that inflation and unemployment positively coexist in several Sub-Saharan African economies due to structural economic weaknesses. In Ghana, studies by Frimpong and Oteng-Abayie (2010) established that inflation significantly affects unemployment through aggregate demand channels, although the relationship was unstable over time.

Empirical studies in Nigeria provide conflicting evidence regarding the inflation-unemployment nexus. Bakare (2012) found a positive relationship between inflation and unemployment, suggesting the presence of stagflation in the Nigerian economy. Similarly, Furuoka & Munir (2014) observed that inflationary pressures in Nigeria are associated with persistent unemployment due to supply-side constraints and structural inefficiencies. On the contrary, Orji, Anthony-Orji, and Okafor (2015) reported evidence supporting the Phillips Curve in the short run but noted that the relationship disappears in the long run.

Most existing Nigerian studies relied on Ordinary Least Squares (OLS), Autoregressive Distributed Lag (ARDL), and Granger causality techniques, with limited attention given to long-run equilibrium adjustment using the Vector Error Correction Model (VECM). In addition, several studies used relatively shorter data periods and may not adequately capture recent macroeconomic developments such as exchange rate instability, post-pandemic inflationary pressures,

and labor market disruptions. Therefore, this study contributes to the literature by employing annual data from 1991–2025 and utilizing the VECM framework to examine both short-run and long-run dynamics between inflation and unemployment in Nigeria.

The conceptual framework of the study is based on the relationship between unemployment and inflation. Inflation, measured by consumer prices (annual %), is treated as the dependent variable, while unemployment (% of total labor force, modeled ILO estimate) is the independent variable. The framework assumes that changes in unemployment influence aggregate demand, production costs, labor market conditions, and ultimately price levels within the economy. The framework postulates that increases in unemployment may either reduce inflation through lower aggregate demand or increase inflation under structural rigidities and supply-side constraints, particularly in developing economies such as Nigeria (Kagarura & Nahabwe, 2025).

DATA AND METHODS

This study employed a quantitative longitudinal research design based on time series analysis to investigate the relationship between inflation and unemployment in Nigeria. The quantitative approach was considered appropriate because it enables objective measurement and statistical analysis of macroeconomic variables over time (Gujarati & Porter, 2009; Nahabwe & Kagarura, 2025). The longitudinal design was adopted since the study utilized annual observations spanning the period 1991–2025, allowing the examination of both short-run and long-run dynamics between inflation and unemployment.

The study relied exclusively on secondary data obtained from the World Bank database. Inflation was measured using inflation, consumer prices (annual %), while unemployment was proxied by unemployment (% of total labor force, modeled ILO estimate). The choice of these indicators was guided by their consistency, reliability, and wide acceptance in macroeconomic literature and international economic reporting (Nahabwe & Kagarura, 2025).

The sample consisted of 35 annual observations covering the period from 1991 to 2025. The study adopted purposive sampling in selecting the study period based on data availability, consistency, and relevance (Nahabwe & Maniple, 2025) to the Nigerian macroeconomic environment. The selected period captures major economic episodes in Nigeria, including structural adjustment reforms, exchange rate fluctuations, oil price shocks, global financial crises, post-pandemic inflationary pressures, and labor market challenges. The use of annual data was considered suitable for analyzing long-run macroeconomic relationships and minimizing short-term volatility distortions (Nahabwe & Kagarura, 2025).

The study specified inflation as the dependent variable and unemployment as the independent variable. The functional relationship is expressed as:
$INF_t = f(UNEMP_t)$

The econometric form of the model is specified as:

$INF_t = \beta_0 + \beta_1 UNEMP_t + \varepsilon_t$ ……………………………………………………………(1)

Where:

INF_t is inflation rate at time t
$UNEMP_t$ is Unemployment rate at time t

β_0 is constant term
β_1 is parameter coefficient
ε_t is error term (Green 2018; Nahabwe & Kagarura, 2025).

The study employed descriptive and inferential econometric techniques in analyzing the data. Descriptive statistics were first used to summarize the behavior and distribution of the variables. Thereafter, stationarity tests were conducted using the Augmented Dickey-Fuller (ADF) unit root test to determine the order of integration of the variables and avoid spurious regression results (Dickey & Fuller, 1981; Nahabwe & Kagarura, 2025).

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Following confirmation of stationarity, the Johansen cointegration test was employed to establish the existence of a long-run equilibrium relationship between inflation and unemployment (Johansen, 1988; Nahabwe & Kagarura, 2025). Since the variables were found to be cointegrated, the study estimated a Vector Error Correction Model (VECM). The VECM approach was considered appropriate because it captures both short-run dynamics and long-run equilibrium adjustments among integrated variables (Engle & Granger, 1987; Nahabwe & Kagarura, 2025).

The VECM specification is expressed as:

$$\Delta Y_t = \alpha + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

Where:

Δ is first difference operator
ECT_{t-1} is error correction term
λ is speed of adjustment coefficient
ε_t is white noise error term (Green 2018; Nahabwe & Kagarura, 2025).

The error correction term measures the speed at which deviations from long-run equilibrium are corrected over time. The statistical analyses were conducted using econometric software, and model adequacy was assessed through diagnostic and stability tests to ensure the reliability of the estimated results.

RESULTS AND THEIR DISCUSSION

The descriptive statistics for inflation and unemployment in Nigeria from 1991–2025 are presented in Appendix 1. The average inflation rate was 19.69%, indicating persistent price instability during the study period, while the mean unemployment rate stood at 4.00%. Inflation exhibited substantial volatility with a standard deviation of 16.21 compared to 0.60 for unemployment, suggesting that inflation fluctuated more widely than unemployment over the period under review.

The maximum inflation rate of 72.84% and minimum of 5.39% reveal periods of severe inflationary pressures and relative macroeconomic stability respectively. Unemployment ranged from 3.05% to 5.71%, indicating moderate but persistent labor market challenges. The positive skewness values for both variables imply that the distributions were skewed to the right, while kurtosis values greater than three indicate leptokurtic distributions characterized by extreme observations.

Furthermore, the Jarque-Bera statistics for inflation (29.964; p = 0.0000) and unemployment (11.142; p = 0.0038) indicate that the variables were not normally distributed (Nahabwe & Maniple, 2025). This finding reflects the presence of macroeconomic shocks and structural instabilities in the Nigerian economy during the study period.

Stationarity of inflation and unemployment time series is tested using the Augmented Dickey-Fuller (ADF) test (Appendix 2-5). Results indicate that both series are non-stationary at levels ($p > 0.05$), implying the presence of unit roots. However, after first differencing, both series became stationary ($p < 0.05$), satisfying the requirement for VECM modeling (Gujarati & Porter, 2009; Dickey & Fuller, 1979; (Green 2018; Nahabwe & Kagarura, 2025). This transformation ensures that the statistical properties of the series remain constant over time, thus avoiding spurious regression results (Enders, 2014).

Model selection in this study was guided by the Akaike Information Criterion (AIC = 7.773181) and the Schwarz Criterion (SC = 8.050726), where lower values indicate a more parsimonious and better-fitting model (Nahabwe, 2025). These criteria are widely recommended in time series econometrics for selecting optimal lag length and ensuring model efficiency without over-parameterization (Akaike, 1974; Schwarz, 1978; Kagarura et al., 2025). The relatively low AIC and SC values suggest that the specified Vector Error Correction Model (VECM) provides an appropriate balance between goodness-of-fit and model simplicity in capturing the dynamics between inflation and unemployment in Nigeria. Consequently, the selected specification is considered robust for both short-run and long-run analysis of the inflation–unemployment relationship.

The VECM results (Appendix 6) reveal the existence of a significant long-run relationship between inflation and unemployment. The cointegration coefficient for unemployment was positive and statistically significant (18.88363; t = 2.152), implying that increases in unemployment significantly raise inflationary pressures in the long run. This finding suggests the presence of structural rigidities and stagflationary tendencies within the Nigerian economy, where unemployment and inflation coexist simultaneously.

The error correction term for inflation was negative and statistically significant (-0.894745; t = -3.375), indicating that approximately 89.5% of short-run disequilibrium is corrected within one period. This confirms a strong speed of adjustment toward long-run equilibrium after macroeconomic shocks. The adjusted R-squared value of 0.401 indicates that about 40.1% of variations in inflation are explained by unemployment and the lagged dynamics included in the model (Kagarura & Nahabwe, 2025).

In the short run, the coefficients of unemployment lags were positive, with values of 8.036854 and 12.16243 respectively, indicating that increases in unemployment are associated with upward movements in inflation over time. However, these effects were statistically insignificant, as shown by their low t-statistics (1.31853 and 1.81817), implying that the short-run influence of unemployment on inflation is weak and not robust enough to reject the null hypothesis of no effect (Gujarati & Porter, 2009; Kagarura et al., 2025). This suggests that while unemployment may exert some delayed influence on inflation dynamics, such effects are not immediate or statistically reliable within the short-run framework of the model.

The findings are consistent with the studies of Bakare (2012) and Furuoka & Munir (2014), who reported a positive relationship between inflation and unemployment in Nigeria, contrary to the traditional Phillips Curve hypothesis. However, the results contradict the findings of Samuelson & Solow (1960), who established an inverse relationship between inflation and unemployment in developed economies. The divergence may be attributed to structural bottlenecks, weak productive capacity, exchange rate instability, and supply-side shocks prevalent in developing economies such as Nigeria.

A unique contribution of this study is the evidence that unemployment significantly increases inflation in the long run, implying that inflationary pressures in Nigeria may not solely originate from excess demand but also from structural inefficiencies and labor market distortions. The use of recent data up to 2025 and the VECM framework further distinguishes this study from earlier Nigerian studies that relied mainly on static estimation techniques.

Diagnostic tests were conducted to assess the adequacy and reliability of the estimated VECM model (Appendix 7-10). The residual serial correlation LM tests showed insignificant probabilities at lags 1 and 2, indicating absence of serial correlation in the residuals at these lag levels. Although the cumulative lag 1 to 3 test became significant, the overall model remained reasonably stable for inference (Kagarura et al., 2025).

The heteroskedasticity test produced a joint Chi-square probability of 0.0063, suggesting the presence of heteroskedasticity in the residuals. Similarly, the Jarque-Bera residual normality test indicated that the residuals were not normally distributed, as evidenced by the joint probability value of 0.0000 (Nahabwe & Maniple, 2025). The non-normality of residuals may be attributed to structural breaks, macroeconomic shocks, and volatility associated with inflation dynamics in Nigeria (Kagarura & Nahabwe, 2025). Nevertheless, the VECM estimates remain useful for explaining the long-run and short-run relationships among the variables.

LIMITATIONS

This study is subject to several limitations that may have influenced the robustness and generalizability of its findings. Firstly, the study relies exclusively on secondary annual time series data obtained from the World Bank, which, although widely used and reliable, may be affected by measurement errors, revisions, and inconsistencies in macroeconomic reporting across time (Wooldridge, 2013; Kagarura & Nahabwe, 2025). In particular, unemployment data in developing economies such as Nigeria is often subject to estimation challenges due to large informal sectors and underemployment, which may not be fully captured in official statistics.

Secondly, the use of annual data limits the ability of the model to capture short-term fluctuations and high-frequency dynamics between inflation and unemployment. As a result, some short-run adjustments may be understated or smoothed out over time (Gujarati & Porter, 2009; Kagarura & Nahabwe, 2025). This may affect the precision of short-

run coefficient estimates in the VECM framework. Thirdly, although the Vector Error Correction Model (VECM) is appropriate for examining long-run relationships among cointegrated variables, the model assumes linear relationships and may not fully capture possible nonlinear dynamics or structural breaks that characterize the Nigerian macroeconomic environment. Structural changes such as policy regime shifts, oil price shocks, and global financial crises may introduce instability that is not explicitly modeled (Engle & Granger, 1987; Kagarura & Nahabwe, 2025).

Fourthly, the study is limited by variable omission. Inflation and unemployment are influenced by multiple macroeconomic factors such as exchange rates, money supply, fiscal deficits, and oil prices. Excluding these variables may lead to omitted variable bias, potentially affecting coefficient estimates and explanatory power. Lastly, diagnostic tests indicated issues such as non-normal residuals and heteroskedasticity, suggesting possible violations of classical assumptions. While these do not invalidate the VECM results, they may reduce the efficiency of the estimators and affect inference reliability (Wooldridge, 2013; Kagarura & Nahabwe, 2025).

CONCLUSION

This study examined the dynamic relationship between inflation and unemployment in Nigeria using annual data from 1991–2025 obtained from the World Bank within a Vector Error Correction Model (VECM) framework. The overall evidence indicates that inflation and unemployment are structurally interconnected in both the short and long run, with adjustments toward equilibrium occurring over time (Engle & Granger, 1987; Kagarura & Nahabwe, 2025).

The findings suggest that macroeconomic stability in Nigeria is shaped by persistent structural and institutional constraints that weaken the effectiveness of conventional stabilization policies (Blanchard, 2016; Munyambonera et al., 2025). The existence of a stable long-run relationship implies that labor market conditions and price dynamics are jointly determined within the broader macroeconomic environment. However, short-run adjustments are relatively weak and inconsistent, reflecting underlying rigidities and external shocks that continuously disrupt equilibrium paths (Friedman, 1968).

Diagnostic results further indicate that while the model provides meaningful long-run insights, the Nigerian macroeconomic environment is characterized by volatility and non-normal disturbances, reinforcing the complexity of inflation and unemployment interactions. Overall, the study concludes that achieving sustainable macroeconomic stability in Nigeria requires coordinated policy interventions that address structural inefficiencies in both the labor and product markets rather than relying solely on short-term demand management policies (Phelps, 1967).

RECOMMENDATIONS

Based on the findings of this study on the inflation–unemployment nexus in Nigeria, several policy, programme, and research recommendations are proposed. Firstly, the evidence of a long-run relationship between inflation and unemployment suggests the need for coordinated macroeconomic policy frameworks that integrate both monetary and labour market objectives. The monetary authorities should avoid focusing solely on price stability in isolation but instead align inflation-targeting strategies with employment creation goals to reduce persistent macroeconomic imbalances (Blanchard, 2016; Munyambonera et al., 2025).

Secondly, given the indication that unemployment contributes to inflationary pressures over time, the government should prioritize job creation through productive sector expansion, particularly in agriculture, manufacturing, and small and medium enterprises (SMEs). Industrial policies that enhance domestic production capacity will help reduce structural bottlenecks that transmit unemployment into inflationary pressures (Keynes, 1936). Thirdly, the weak short-run dynamics observed in the study imply that labour market reforms are necessary to improve responsiveness and flexibility. Policies aimed at skills development, vocational training, and youth entrepreneurship should be strengthened to reduce structural unemployment and improve labour market absorption capacity (Phelps, 1967).

Fourthly, since inflation in Nigeria appears to be partly driven by structural and supply-side constraints, there is a need for investment in infrastructure, energy supply, and logistics systems to reduce production costs and stabilize prices (Friedman, 1968). Finally, for future research, it is recommended that scholars incorporate additional macroeconomic variables such as exchange rates, money supply, fiscal deficits, and oil price shocks to provide a more comprehensive model of inflation dynamics. Future studies may also explore nonlinear models or structural break approaches to better capture Nigeria's evolving macroeconomic conditions (Engle & Granger, 1987; Nahabwe, 2026).

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APPENDICES

Appendix 1: Descriptive statistics

	Inflation, consumer prices (annual %)	Unemployment, total (% of total labor force) (modeled ILO estimate)
Mean	19.69017	4.002886
Median	13.24602	3.831
Maximum	72.8355	5.714
Minimum	5.388008	3.045
Std. Dev.	16.2103	0.599442
Skewness	1.855134	1.18885
Kurtosis	5.604027	4.409619
Jarque-Bera	29.96443	11.14237
Probability	0	0.003806
Sum	689.1559	140.101
Sum Sq. Dev.	8934.315	12.21723
Observations	35	35

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Appendix 2: Unit root test, Inflation (in Level)

Null Hypothesis: INFLATION has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.850701	0.3400
Test critical values:	1% level	-2.634731	
	5% level	-1.951000	
	10% level	-1.610907	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLATION)
Method: Least Squares
Date: 05/01/26 Time: 17:48
Sample (adjusted): 1992 2025
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.067223	0.079021	-0.850701	0.4011

R-squared	0.015960	Mean dependent var	0.847579
Adjusted R-squared	0.015960	S.D. dependent var	11.47602
S.E. of regression	11.38407	Akaike info criterion	7.731277
Sum squared resid	4276.701	Schwarz criterion	7.776170
Log likelihood	-130.4317	Hannan-Quinn criter.	7.746587
Durbin-Watson stat	1.384907		

Appendix 3: Unit root test, Inflation (in First difference)

Null Hypothesis: D(INFLATION) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.515584	0.0000
Test critical values:	1% level	-2.636901	
	5% level	-1.951332	
	10% level	-1.610747	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLATION,2)
Method: Least Squares

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Date: 05/01/26 Time: 17:48
Sample (adjusted): 1993 2025
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLATION(-1))	-0.851696	0.154416	-5.515584	0.0000

R-squared	0.486069	Mean dependent var	-0.696949
Adjusted R-squared	0.486069	S.D. dependent var	14.11936
S.E. of regression	10.12202	Akaike info criterion	7.497138
Sum squared resid	3278.571	Schwarz criterion	7.542487
Log likelihood	-122.7028	Hannan-Quinn criter.	7.512397
Durbin-Watson stat	2.093788		

Appendix 4: Unit root test, Unemployment (in Level)

Null Hypothesis: UNEMPLOYMENT has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.663158	0.4219
Test critical values:	1% level	-2.639210	
	5% level	-1.951687	
	10% level	-1.610579	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMPLOYMENT)
Method: Least Squares
Date: 05/01/26 Time: 17:49
Sample (adjusted): 1994 2025
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT(-1)	-0.008356	0.012600	-0.663158	0.5125
D(UNEMPLOYMENT(-1))	0.688058	0.167977	4.096145	0.0003
D(UNEMPLOYMENT(-2))	-0.381534	0.168021	-2.270751	0.0308

R-squared	0.371568	Mean dependent var	-0.029969
Adjusted R-squared	0.328228	S.D. dependent var	0.355117
S.E. of regression	0.291060	Akaike info criterion	0.458486
Sum squared resid	2.456764	Schwarz criterion	0.595899
Log likelihood	-4.335781	Hannan-Quinn criter.	0.504035
Durbin-Watson stat	1.818513		

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Appendix 5: Unit root test, Unemployment (in First difference)

Null Hypothesis: D(UNEMPLOYMENT) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.164853	0.0001
Test critical values:	1% level	-2.639210	
	5% level	-1.951687	
	10% level	-1.610579	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMPLOYMENT,2)
Method: Least Squares
Date: 05/01/26 Time: 17:50
Sample (adjusted): 1994 2025
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNEMPLOYMENT(-1))	-0.694619	0.166781	-4.164853	0.0002
D(UNEMPLOYMENT(-1),2)	0.386097	0.166305	2.321615	0.0272

R-squared	0.367111	Mean dependent var	-0.006687
Adjusted R-squared	0.346015	S.D. dependent var	0.356538
S.E. of regression	0.288330	Akaike info criterion	0.411037
Sum squared resid	2.494021	Schwarz criterion	0.502646
Log likelihood	-4.576596	Hannan-Quinn criter.	0.441403
Durbin-Watson stat	1.812334		

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Appendix 6: Results of the Vector Error Correction model

Vector Error Correction Estimates
Date: 05/01/26 Time: 17:57
Sample (adjusted): 1995 2025
Included observations: 31 after adjustments
Standard errors in ( ) & t-statistics in [ ]
Lags interval (in first differences): 1 to 2
Endogenous variables: D(INFLATION) D(UNEMPLOYMENT)
Deterministic assumptions: Case 3 (Johansen-Hendry-Juselius):
Cointegrating relationship includes a constant. Short-run dynamics include a constant.

Cointegrating Eq:	CointEq1
D(INFLATION(-1))	1.000000
D(UNEMPLOYMENT(-1))	18.88363 (8.77401) [2.15222]
C	1.367463

Error Correction:	D(INFLATION,2)	D(UNEMPLOYMENT,2)
COINTEQ1	-0.894745 (0.26510) [-3.37506]	-0.011478 (0.00787) [-1.45842]
D(INFLATION(-1),2)	-5.26E-05 (0.22159) [-0.00024]	0.003041 (0.00658) [0.46224]
D(INFLATION(-2),2)	-0.097161 (0.16015) [-0.60670]	0.002995 (0.00475) [0.62991]
D(UNEMPLOYMENT(-1),2)	8.036854 (6.09532) [1.31853]	0.206402 (0.18096) [1.14062]
D(UNEMPLOYMENT(-2),2)	12.16243 (6.68939) [1.81817]	-0.424950 (0.19859) [-2.13980]
C	0.547658 (1.95940) [0.27950]	-0.005844 (0.05817) [-0.10047]
R-squared	0.501153	0.339107
Adj. R-squared	0.401383	0.206929
Sum sq. resids	2928.349	2.580949
S.E. equation	10.82284	0.321307
F-statistic	5.023108	2.565525

Log likelihood	-114.4843	-5.456727
Akaike AIC	7.773181	0.739144
Schwarz SC	8.050726	1.016690
Mean dependent	0.281164	-0.000710
S.D. dependent	13.98837	0.360798

Determinant resid covariance (dof adj.)	12.00891
Determinant resid covariance	7.810165
Log likelihood	-119.8333
Akaike information criterion	8.634406
Schwarz criterion	9.282013
Number of coefficients	14

Appendix 7: Normality of Residuals

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 05/01/26 Time: 18:05
Sample: 1991 2025
Included observations: 31

Component	Skewness	Chi-sq	df	Prob.*
1	-2.575926	34.28287	1	0.0000
2	-1.637301	13.85057	1	0.0002
Joint		48.13343	2	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	12.11038	107.2070	1	0.0000
2	6.670317	17.40033	1	0.0000
Joint		124.6073	2	0.0000

Component	Jarque-Bera	df	Prob.
1	141.4899	2	0.0000
2	31.25090	2	0.0000
Joint	172.7408	4	0.0000

*Approximate p-values do not account for coefficient estimation

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Appendix 9: Heteroskedasticity test

VEC Residual Heteroskedasticity Tests (Levels and Squares)
Date: 05/01/26 Time: 18:06
Sample: 1991 2025
Included observations: 31

Joint test:

Chi-sq	df	Prob.
52.73186	30	0.0063

Individual components:

Dependent	R-squared	F(10,20)	Prob.	Chi-sq(10)	Prob.
res1*res1	0.491016	1.929397	0.1013	15.22150	0.1242
res2*res2	0.530400	2.258943	0.0580	16.44240	0.0876
res2*res1	0.612733	3.164394	0.0136	18.99472	0.0403

Appendix 10: Serial Correlation LM Test

VEC Residual Serial Correlation LM Tests
Date: 05/01/26 Time: 18:07
Sample: 1991 2025
Included observations: 31

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	2.177480	4	0.7032	0.545361	(4, 44.0)	0.7033
2	5.430906	4	0.2459	1.410986	(4, 44.0)	0.2461
3	1.418678	4	0.8409	0.352312	(4, 44.0)	0.8410

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	2.177480	4	0.7032	0.545361	(4, 44.0)	0.7033
2	9.402068	8	0.3095	1.221995	(8, 40.0)	0.3115
3	26.01309	12	0.0107	2.658042	(12, 36.0)	0.0116

*Edgeworth expansion corrected likelihood ratio statistic.