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Effects of Monetary Policy on Economic Indicators in Rural-Urban Nigeria

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Abstract

Neglecting regional differences in a country with vastly different economic realities like Nigeria can result in a one-size-fits-all approach to macroeconomic policy. This study tackles this overlooked research area by employing a simultaneous Vector Error Correction Model (VECM) that considers the endogeneity of monetary policy.

The analysis reveals distinct long-run effects in both urban and rural Nigeria, highlighting the need for tailored policy frameworks. Drawing on Lewis's Dual Economy Models and Place-Based Development Framework, the study establishes a theoretical foundation and incorporates a diverse set of economic indicators. The results indicate that monetary policy impacts unemployment and inflation differently in urban and rural areas.

In urban settings, an increase in the Monetary Policy Rate (MPR) leads to higher unemployment but also contributes to inflation. Conversely, rural areas experience stronger inflationary effects and a greater positive impact on unemployment from MPR. The study also identifies a positive long-run relationship between MPR and money supply (M2), suggesting the need for further investigation. Short-run dynamics reveal the speed of adjustment to long-run equilibrium, with implications for policy interventions. The findings underscore the importance of targeted monetary policies, financial inclusion initiatives, and transparent communication in fostering inclusive development.

Keywords: Real GDP Growth, Inflation, Fiscal and Monetary Policies, Monetary Policy Rate (MPR), Rural-Urban Disparities, Vector Error Correction Model (VECM), Endogeneity, Place-Based Development Framework, Dualistic Nature of Economies.

Introduction

Nigeria, like many developing economies, grapples with a multitude of economic challenges. These include suboptimal growth, persistent macroeconomic instability, and stark spatial disparities in economic outcomes. Over a decade (from 2010 to Q3 2023), its real GDP growth dwindled from 6.7% to 2.54% (year-on-year), painting a grim picture of declining living standards (National Bureau of Statistics (NBS), 2023). Inflation in Nigeria has also been on the rise, reaching 27.33% in October 2023 (NBS). Trade deficits have continued to soar, averaging $13.61 billion between 2015 and 2019 (World Bank, 2019). Unemployment and poverty in Nigeria have been on the rise, surpassing most Sub-Saharan counterparts.

In an effort to stimulate economic growth and contain internal macroeconomic imbalances and shield the economy from external shocks, the Federal Government of Nigeria has implemented an array of fiscal and monetary policies at different times. The Central Bank of Nigeria (CBN), for instance, has employed a complex arsenal of monetary policies. From conventional tools like adjusting the monetary policy rate (MPR) to unconventional interventions, the CBN's efforts have yielded mixed results [1].

However, a critical gap remains in our understanding of the differential impact of these policies across the geographical canvas of Nigeria. Existing studies often rely on highly aggregated national-level data, overlooking the stark realities of rural-urban disparities. This oversight obscures the nuanced ways in which monetary policy affects economic indicators such as investment, inflation, and unemployment in disparate spatial contexts.

Urban areas, often hubs for economic activity, may serve as efficient transmitters of monetary policy, while rural areas, marked by inequalities and informality, may exhibit dampened responses. Hauptmeier, Holm-Hadulla, and Nikalexi aptly highlight this rural-urban divide, emphasizing the potential for uneven economic impacts. Furthermore, most monetary policy initiatives in Nigeria aimed at rural areas remain fixated on agriculture, neglecting the burgeoning potential of other sectors like tradable activities, value addition, and fostering rural-urban linkages. This narrow focus fails to capitalize on the diverse opportunities in rural Nigeria, hindering inclusive development [2].

Adding to this gap, existing empirical studies often treat monetary policy as an exogenous variable, attributing economic outcomes solely to its influence. This overlooks the dynamic interplay between policy and performance. As Ramey aptly notes, central banks, including the CBN, are driven by explicit macroeconomic stabilization mandates. Consequently, monetary policy becomes endogenous, intertwined with and responsive to the nation's economic health. Untangling this intricate cause-and-effect relationship requires a more sophisticated econometric approach, one that moves beyond single-equation models.

Therefore, this study aims to bridge these critical gaps by delving into the unexplored realm of rural-urban disparities in the face of monetary policy in Nigeria. By employing a simultaneous model that addresses the endogeneity of monetary policy, this study offers a nuanced understanding of its differential impact across the Nigerian landscape. This knowledge is crucial for informing policy frameworks that foster inclusive development, catering to the specific needs of both urban and rural communities [3].

In view of the above, this paper is designed to assess the disparities in the influence of monetary policy within Nigeria. It aspires to highlight the path towards economic growth that embraces the diverse realities of its urban and rural landscapes, paving the way for a more equitable and prosperous future for all Nigerians [4].

Review of Relevant Literature

Understanding the differential impact of monetary policy on economic performance across rural and urban areas remains a critical yet under-researched area. To navigate this complex landscape, this paper draws upon two theoretical perspectives. The first theoretical perspective is based on Arthur Lewis's Dual Economy Models, initially proposed in 1954. These models provide a theoretical lens through which to analyze the economic dynamics within Nigeria, particularly the rural-urban disparities.

The core postulation of Lewis' model revolves around the coexistence of two distinct sectors within an economy: a subsistence sector (rural agriculture) characterized by low productivity and surplus labor, and a capitalist sector (urban industry) characterized by higher productivity and capital-intensive production [5].

Lewis' model emphasizes the dualistic nature of economies, with a rural-urban divide. The urban sector typically experiences faster growth due to industrialization, while the rural sector lags behind. This perspective aligns with the observed disparities in Nigeria, where urban areas often act as economic hubs, responding more efficiently to monetary policy, while rural areas face challenges marked by inequalities and informality.

This means monetary policy impulses primarily impact the capitalist sector via interest rate adjustments, influencing investment, production, and employment. The transmission of monetary policy effects to the subsistence sector is often dampened due to factors like financial exclusion, information asymmetries, and sectoral specificity (monetary policy tools might not be well-suited to address the challenges of the subsistence sector, heavily reliant on rain-fed agriculture and informal markets) [6].

Applied to this paper, Nigeria displays characteristics of a dual economy, with a large rural agricultural sector and a growing urban industrial sector. Monetary policy in Nigeria primarily targets the capitalist sector through the MPR and other instruments. However, as in Lewis's model, the transmission of these effects to the rural sector may be limited due to financial exclusion, information asymmetries, and sectoral differences. A number of empirical studies have also laid credence to this.

For instance, Liu et al. (2019) investigated the response of the production side of the economy to a low-interest-rate environment. Their study utilized a model incorporating competition between firms, market structure, and investment in productivity-enhancing technology. The findings indicated that low interest rates promote market concentration, especially as rates approach zero. This result suggests a link between falling long-run interest rates and increased market concentration, reduced dynamism, a widening productivity gap, and slower productivity growth [7].

Irandoust explored the long-run asymmetric effects of conventional monetary policy on output in several OECD countries. Using a vector autoregressive model (VAR) with regime-switching models, the study identified a long-run relationship between the real interest rate and the growth rate of real output in five out of nine countries, suggesting asymmetric responses to changes in the real interest rate [8].

Fan and Jiechao examined the differentiation between economic and financial cycles, addressing the challenges of balancing monetary policies for stability in both aspects. Covering 1999–2017, the study used techniques like correlation, revealing that quantitative regulation has a more neutral impact on the financial cycle, while price regulation increases the volatility of price and financial cycles, though smoothing the growth cycle. Given the ongoing differentiation between economic and financial cycles, the study suggests expediting the establishment of a robust dual-pillar regulatory framework encompassing "monetary policy and macro-prudential policy."

In a more recent study, Deb, Estefania-Flores, Firat, Furceri, and Kothari investigated how monetary policy transmission varies with economic uncertainty and financial conditions' tightness. Using quarterly uncertainty indexes from Ahir, Bloom, and Furceri and data covering 33 advanced and emerging market economies from 1991Q2-2023Q2, the study found that tightening monetary policy swiftly and negatively impacts economic activity, with delayed effects on inflation [9].

Heterogeneities in transmission were noted across countries and time, dependent on structural characteristics and cyclical conditions. Monetary policy proved more effective in countries with flexible exchange rates, developed financial systems, and credible policy frameworks. Additionally, the study highlighted stronger transmission when uncertainty is low, financial conditions are tight, and monetary and fiscal policies are coordinated—consistent with earlier findings by Aastveit and Pellegrino.

From the above reviews, a commonality in the literature suggests that there exist spatial disparities in the effects of monetary policy, suggesting the need for tailoring monetary policies to the economic structure of different localities, including rural and urban areas. This is the theoretical proposition of the Place-Based Development Framework, championed by Richard Florida, Fainstein, and Harvey. The framework advocates for:

- Targeted Interventions: Identifying and addressing the unique challenges and potential of each region through tailored policy measures. For example, rural areas may require targeted investments in infrastructure, rural finance initiatives promoting microfinance and digital access, and development of non-agricultural sectors like agro-processing and light manufacturing to enhance their responsiveness to monetary policy.
- Place-Based Governance: Promoting participatory decision-making processes that involve local communities in shaping economic policies that cater to their specific needs and aspirations Studies by Rodríguez-Pose and Rozenblat and Pike and Rodríguez-Pose showcase the effectiveness of such approaches in promoting inclusive economic growth and addressing the challenges faced by marginalized regions like rural areas.

Methodology

This study analyzes the impacts of monetary policy on key economic indicators in rural and urban Nigeria using a Vector Error Correction Model (VECM), which extends the framework of a vector autoregressive (VAR) model by integrating an error correction term into each equation. The inclusion of the error correction term in each equation of the VAR accounts for the disequilibrium between variables in the short run, allowing for the analysis of the adjustments that occur in response to any deviations from the long-run equilibrium [10].

By considering the speed and direction of these adjustments, the VECM provides insights into the interdependencies and feedback mechanisms among the variables under investigation. In summary, the utilization of a Vector Error Correction Model (VECM) enhances the analysis by capturing the short-run dynamics and the speed of adjustment towards long-run equilibrium, thereby providing a comprehensive understanding of the interrelationships among the variables in the system.

Theoretically, the VAR model is specified thus:

Let $Yt = (y_{1t}, y_{2t} \dots , y_{nt})0$ denote an (n 1) vector of time series variables.

The basic p-lag vector autoregressive (VAR(p)) model has the form.

$$Y_t = c + \pi_1 Y_{1-t} + \pi_2 Y_{t-2} + \cdots + + \pi_p Y_{t-p} + £_t, t = 1, \dots, T \qquad (3.1)$$

Where π_i are (n x n) coefficient matrix and £_t is an (n × 1) unobservable zero mean white noise vector process (serially uncorrelated or independent) with time invariant covariance matrix Σ. A bivariate VAR (2) model equation by equation has the form:

$$\begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix} + \begin{pmatrix} \pi_{11}^1 & \pi_{12}^1 \\ \pi_{21}^1 & \pi_{22}^1 \end{pmatrix} \begin{pmatrix} y_{1t-1} \\ y_{2t-1} \end{pmatrix} + \begin{pmatrix} \pi_{11}^2 & \pi_{12}^2 \\ \pi_{21}^2 & \pi_{22}^2 \end{pmatrix} \begin{pmatrix} y_{1t-2} \\ y_{2t-2} \end{pmatrix} + \begin{pmatrix} £_{1t} \\ £_{2t} \end{pmatrix} \qquad \mathbf{(3.2)}$$

where cov (£_1t, £_2t) = σ12 for t = s; 0 otherwise.

From the above, it can be observed that each equation has the same regressors — lagged values of y1t and y2t. Hence, the VAR(p) model is just a seemingly unrelated regression (SUR) model with lagged variables and deterministic terms as common regressors.

In lag operator notation, the VAR(p) is written as

π(L)Yt = c + εt

where $\pi(L) = I\pi - \pi 1L - \dots - \pi_p L_p$.

The VAR(p) is stable if the roots of det $(I_\pi - \pi_{1z} - \cdots - \pi p_z^p) = 0$ … **(3.3)**

The mean-adjusted form of the VAR(p) is then.

Yt - μ = Π1(Yt-1 - μ)+Π2(Yt-2 - μ)+ ⋯ + Πp(Yt-p - μ) + εt (3.4)

Using the variables for this study, an appropriate VECM model can be formulated as follows

$$\Delta yt = \alpha\beta' yt - 1 + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + \varepsilon t \qquad (3.5)$$

where:

Δ: Operator differencing,

Δ*yt*= *yt* - *yt*−1 *yt*−*i*: Vector variable endogenous with the 1st lag

Εt: Vector residual.

Γ*i*: Matrix with order k × k of coefficient Endogenous of the i-th variable

α: Vector adjustment, matrix with order (k × r)

β: Vector cointegration (long-run parameter) matrix (k × r)

The VECM in this study comprises five core variables:

Monetary Policy Rate (MPR): The Central Bank's benchmark interest rate

Money Supply (M2): Broad measure of money in circulation

Investment (Inv): Total investment spending in the economy

Unemployment (UN): Rate of joblessness in the labor force

Inflation (CPI): Change in consumer prices

Government Spending (GSP): Total government expenditure

Equation 3.5 is modified and presented in five (5) endogenous variables as stated below.

ΔMPR_t = α1 + β1ΔMPR_(t-1) + γ1ECT_(t-1) + ε1_t

ΔM2_t = α2 + β2ΔM2_(t-1) + γ2ΔMPR_(t-1) + δ2ECT_(t-1) + ε2_t

ΔUN_t = α4 + β4ΔUN_(t-1) + γ4ΔMPR_(t-1) + δ4ΔInv_(t-1) + θ4ECT_(t-1) + ε4_t

ΔCPI_t = α5 + β5ΔCPI_(t-1) + γ5ΔMPR_(t-1) + δ5ΔM2_(t-1) + θ5ΔInv_(t-1) + ι5ECT_(t-1) + ε5_t

Where:

Δ: Represents the first difference of a variable.

ECT_(t-1): Error Correction Term, capturing long-run equilibrium relationships.

α1, β1, γ1, ...: Coefficients to be estimated.

ε1_t, ε2_t, ...: Error terms.

We expect monetary policy changes (MPR) to impact these variables, with potential influences like: Negative impact of MPR on investment, Negative impact of MPR on inflation (Tighter monetary policy can dampen aggregate demand and reduce inflationary pressures); Uncertain impact of MPR on unemployment [11].

Results and Discussion

In this section, we present the empirical findings derived from the Vector Error Correction Model (VECM) analysis conducted in this study. Prior to the estimation of the VECM, we performed descriptive analysis, Unit Root tests, and Johansen Cointegration tests to assess the data background, stationarity, and cointegration of the series. The dataset includes 31 observations, including two macroeconomic indicators (Consumer Price Index (CPI) measures (a gauge of inflation) and unemployment), two proxies of monetary policy (MPR and M2), and two mediating factors (investment and government spending). The study was conducted for both urban and rural Nigeria.

Data Background and Diagnostics Tests

Descriptive analysis of the urban setting reveals relatively high inflation and moderate unemployment between 1990 and 2020. In rural areas, both CPI and unemployment exhibit higher average values compared to urban areas, suggesting potentially higher inflation and unemployment pressures in rural regions. Cointegration tests confirm strong evidence of cointegration for both rural and urban models, establishing a foundation for the subsequent VECM analysis [12].

Estimated VECM Equations

Long-Run Relationships in Urban and Rural Nigeria

The Estimated VECM models illustrate the long-run effects of monetary policy on economic indicators (CPI and Unemployment) in both urban and rural Nigeria.

Urban Models

Urban Models

UNEMPURBAN(-1) = 3.983272 + 0.566558 MPR(-1) - 1.227488 M2(-1) + 1.330886 INVTOTAL(-1)

CPIURBAN(-1)= 3.267417 + 0.593153MPR(-1) + 0.767765 M2(-1) - 0.159253 GSPENDING(-1)

In urban Nigeria, the models indicate that a lagged increase in MPR leads to higher unemployment ($p < 0.05$), aligning with theoretical expectations. Conversely, an increase in the lag of M2(-1) reduces unemployment in the long run ($p < 0.05$). For urban CPI, a past increase in both MPR(-1) and M2(-1) contributes to higher inflation ($p < 0.05$), in line with economic theory [13].

Rural Models

Rural Models:

UNEMPRURAL(-1) = 6.066308 + 1.093042 MPR(-1) - 2.125666 M2(-1) + 2.312164INVTOTAL(-1)

CPIRURAL(-1) = 3.013628 + 0.625228 MPR(-1) + -.725487 M2(-1) - 0.158904 GSPENDING(-1)

The models for rural Nigeria show that MPR(-1) has a larger positive impact on unemployment compared to the urban model, suggesting stronger inflationary effects in rural areas. Additionally, M2(-1) has a greater dampening effect on rural unemployment. For rural inflation, MPR(-1) tightens inflation, while M2(-1) has a more pronounced inflationary impact, possibly due to limited financial options.

The study also found that past increases in MPR tend to persist and influence future MPR adjustments in the long run, suggesting a tendency for monetary policy decisions to exhibit inertia. Additionally, the study found that a positive and significant long-run relationship between MPR and money supply (M2). The observed positive MPR-M2 relationship appears counterintuitive compared to the traditional expectation of monetary tightening leading to lower money supply. Further investigation is required.

Short-Run Dynamics in Urban and Rural Nigeria

Building upon the long-run analysis, the study estimates short-run effects and Error Correction Mechanisms (ECM) for both urban and rural Nigeria.

Urban Nigeria

Estimated Short-run Equations for Urban Nigeria:

D(UNEMPURBAN) = 0.080522 + 0.372404 D(UNEMPURBAN(-1))* - 0.241618 D(MPR(-1)) + 0.241899 D(M2(-1)) - 0.973414 D(INVTOTAL(-1))* - 0.769489ECMt-1 *

D(CPIURBAN) = 0.038482 + 0.196829 D(CPIURBAN(-1)) - 0.034971 D(MPR(-1)) - 0.027968 D(M2(-1)) + 0.002957 D(GSPENDING(-1)) - 0.100083ECMt-1

In the short run, the urban unemployment model corrects to its long-term equilibrium at a speed of 76.94% ($p < 0.05$). Monetary policy tools at lag 1 and total investment significantly impact urban unemployment, suggesting persistence and influence on employment dynamics. For urban inflation, the model indicates a 10.0% ($p > 0.05$) Error Correction Term, suggesting limited correction to its long-term equilibrium. Monetary policy tools at lag 1 reduce urban inflation in the short run, though not statistically significant.

Rural Nigeria

Estimated Short-run Equations for Rural Nigeria:

D(UNEMPRURAL) = 0.048551 + 0.295912 D(UNEMPRURAL(-1)) - 0.385678D(MPR(-1))* + 0.663225D(M2(-1)) - 0.911241 D(INVTOTAL(-1))* - 0.474132ECMt-1 *

D(CPIRURAL) = 0.032064 + 0.192707 D(CPIRURAL(-1)) - 0.043458 D(MPR(-1)) + 0.010921 D(M2(-1)) + 0.018636 D(GSPENDING(-1)) - 0.116319ECMt-1

The rural unemployment model corrects to its long-term equilibrium at a speed of 47.41% ($p < 0.05$). MPR at lag 1 significantly reduces rural unemployment, while total investment also has a significant impact. The rural inflation model has an Error Correction Term of 11.63% ($p > 0.05$), indicating limited correction to its long-term equilibrium. Monetary policy tools at lag 1 show tendencies to reduce rural inflation, while M2 at lag 1 tends to fuel inflation, though not statistically significant [14].

Conclusion and Policy Implication

This study analyzed the impact of monetary policy on inflation and unemployment in both urban and rural Nigeria using a VECM model. Following the analysis of data, the study concludes that monetary policy impacts urban and rural economies differently. Inflationary pressures seemed stronger in rural areas, potentially due to limited financial options. Inflation in both urban and rural areas exhibited limited correction to its long-run equilibrium, suggesting the need for additional policy measures. The positive long-run relationship between MPR and M2 requires further investigation to understand the underlying mechanisms and its implications for policy design. In view of the above, the following recommendations are made:

- **Targeted monetary policy:** Design policy instruments that cater to the specific needs of urban and rural economies, considering their differing sensitivity to monetary policy tools.

- **Financial inclusion:** Promote financial inclusion programs in rural areas to provide alternative financial options and potentially mitigate the inflationary impact of monetary tightening.
- **Transparency and communication:** Enhance transparency and communication of monetary policy decisions to build trust and public understanding, particularly in rural regions.
- **Further research:** Conduct further research with larger datasets to confirm the findings and investigate the counterintuitive MPR-M2 relationship to inform more effective monetary policy design.

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Appendices

Monetary Policy Endogeneity

Vector Error Correction Estimates		
Date: 01/22/24 Time: 19:42		
Sample (adjusted): 1992 2020		
Included observations: 29 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
Cointegrating Eq:	CointEq1	
MPR(-1)	1.000000	
M2(-1)	0.152381	
	(0.04837)	
	[3.15049]	
C	-2.087051	
Error Correction:	D(MPR)	D(M2)
CointEq1	-0.425693	-0.119052
	(0.17756)	(0.09516)
	[-2.39752]	[-1.25112]
D(MPR(-1))	-0.044814	-0.008924
	(0.19224)	(0.10303)
	[-0.23311]	[-0.08662]
D(M2(-1))	-0.837280	0.246327
	(0.36239)	(0.19421)
	[-2.31045]	[1.26834]
C	0.073595	0.064928
	(0.03719)	(0.01993)
	[1.97907]	[3.25797]
R-squared	0.302791	0.181634
Adj. R-squared	0.219126	0.083430

Sum sq. resids	0.237080	0.068092
S.E. equation	0.097382	0.052189
F-statistic	3.619086	1.849560
Log likelihood	28.54729	46.63648
Akaike AIC	-1.692916	-2.940447
Schwarz SC	-1.504324	-2.751854
Mean dependent	-0.000999	0.086978
S.D. dependent	0.110201	0.054513
Determinant resid covariance (dof adj.)		2.53E-05
Determinant resid covariance (dof adj.)		2.53E-05
Determinant resid covariance		1.88E-05
Log likelihood		75.48296
Akaike information criterion		-4.516066
Schwarz criterion		-4.044585
Number of coefficients		10

Vector Error Correction Estimates		
Date: 01/22/24 Time: 19:44		
Sample (adjusted): 1992 2020		
Included observations: 29 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
Cointegrating Eq:	CointEq1	
MPR(-1)	1.000000	
M2(-1)	6.562491	
	(2.00063)	
	[3.28022]	
C	-13.69625	
Error Correction:	D(M2)	D(MPR)
CointEq1	-0.018141	-0.064868
	(0.01450)	(0.02706)
	[-1.25112]	[-2.39752]
D(MPR(-1))	0.246327	-0.837280
	(0.19421)	(0.36239)
	[1.26834]	[-2.31045]
D(M2(-1))	-0.008924	-0.044814
	(0.10303)	(0.19224)
	[-0.08662]	[-0.23311]
C	0.064928	0.073595
	(0.01993)	(0.03719)
	[3.25797]	[1.97907]
R-squared	0.181634	0.302791
Adj. R-squared	0.083430	0.219126
Sum sq. resids	0.068092	0.237080
S.E. equation	0.052189	0.097382
F-statistic	1.849560	3.619086
Log likelihood	46.63648	28.54729
Akaike AIC	-2.940447	-1.692916
Schwarz SC	-2.751854	-1.504324

Mean dependent	0.086978	-0.000999
S.D. dependent	0.054513	0.110201
Determinant resid covariance (dof adj.)		2.53E-05
Determinant resid covariance		1.88E-05
Log likelihood		75.48296
Akaike information criterion		-4.516066
Schwarz criterion		-4.044585
Number of coefficients		10

Urban Macro Indicators Models

Vector Error Correction Estimates				
Date: 01/25/24 Time: 03:40				
Sample (adjusted): 1992 2020				
Included observations: 29 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
UNEMPURBAN(-1)	1.000000			
MPR(-1)	-0.566558			
	(0.19220)			
	[-2.94779]			
M2(-1)	1.227488			
	(0.27432)			
	[4.47465]			
INVTOTAL(-1)	-1.330886			
	(0.24171)			
	[-5.50612]			
C	-3.983272			
Error Correction:	**D(UNEMPURBAN)**	**D(MPR)**	**D(M2)**	**D(INVTOTAL)**
CointEq1	-0.769489	0.393777	-0.018951	-0.116499
	(0.18544)	(0.21778)	(0.10198)	(0.16993)
	[-4.14958]	[1.80814]	[-0.18583]	[-0.68555]
D(UNEMPURBAN (-1))	0.372404	0.037778	-0.063515	0.000266
	(0.16891)	(0.19837)	(0.09289)	(0.15479)
	[2.20480]	[0.19045]	[-0.68378]	[0.00172]
D(MPR(-1))	-0.241618	-0.324159	0.005603	-0.035897
	(0.15706)	(0.18445)	(0.08637)	(0.14393)
	[-1.53838]	[-1.75741]	[0.06487]	[-0.24941]
D(M2(-1))	0.241899	-0.435486	-0.013589	0.065481
	(0.38038)	(0.44673)	(0.20919)	(0.34858)
	[0.63593]	[-0.97484]	[-0.06496]	[0.18785]
D(INVTOTAL(-1))	-0.973414	0.204239	0.407951	0.234763
	(0.36607)	(0.42992)	(0.20132)	(0.33547)
	[-2.65906]	[0.47506]	[2.02641]	[0.69980]
C	0.080522	0.016479	0.050223	0.064670
	(0.03680)	(0.04321)	(0.02024)	(0.03372)
	[2.18837]	[0.38134]	[2.48197]	[1.91790]
R-squared	0.454914	0.298977	0.371806	0.181747
Adj. R-squared	0.336417	0.146581	0.235242	0.003865

Sum sq. resids	0.172831	0.238376	0.052269	0.145142
S.E. equation	0.086686	0.101805	0.047671	0.079439
F-statistic	3.839040	1.961840	2.722576	1.021731
Log likelihood	33.13044	28.46819	50.47115	35.66220
Akaike AIC	-1.871064	-1.549530	-3.066976	-2.045669
Schwarz SC	-1.588176	-1.266641	-2.784087	-1.762780
Mean dependent	0.015397	-0.000999	0.086978	0.093020
S.D. dependent	0.106414	0.110201	0.054513	0.079593
Determinant resid covariance (dof adj.)			5.98E-10	
Determinant resid covariance			2.37E-10	
Log likelihood			156.7967	
Akaike information criterion			-8.882529	
Schwarz criterion			-7.562381	
Number of coefficients			28	

Vector Error Correction Estimates				
Date: 01/22/24 Time: 19:47				
Sample (adjusted): 1992 2020				
Included observations: 29 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
UNEMPURBAN(-1)	1.000000			
MPR(-1)	-0.593153			
	(0.11806)			
	[-5.02433]			
M2(-1)	-0.767765			
	(0.08412)			
	[-9.12672]			
INVTOTAL(-1)	0.159253			
	(0.11222)			
	[1.41910]			
C	3.267417			
Error Correction:	**D(CPIURBAN)**	**D(MPR)**	**D(M2)**	**D(GSPENDING)**
CointEq1	-0.100083	0.382139	0.334846	0.495100
	(0.05633)	(0.22789)	(0.09717)	(0.16737)
	[-1.77687]	[1.67683]	[3.44610]	[2.95807]
D(CPIURBAN(-1))	0.196829	-0.176071	-0.058405	-0.212120
	(0.18640)	(0.75416)	(0.32155)	(0.55388)
	[1.05597]	[-0.23346]	[-0.18163]	[-0.38297]
D(MPR(-1))	-0.034971	0.177509	0.224771	0.068404
	(0.06225)	(0.25188)	(0.10739)	(0.18499)
	[-0.56175]	[0.70474]	[2.09297]	[0.36978]
D(M2(-1))	-0.027968	-0.306445	0.436729	0.224683
	(0.09538)	(0.38592)	(0.16455)	(0.28344)
	[-0.29322]	[-0.79405]	[2.65414]	[0.79271]
D(GSPENDING(-1))	0.002957	-0.658454	-0.382333	-0.557072
	(0.07341)	(0.29703)	(0.12665)	(0.21815)
	[0.04028]	[-2.21678]	[-3.01892]	[-2.55361]

C	0.038482	0.084883	0.080625	0.107142
	(0.01246)	(0.05039)	(0.02149)	(0.03701)
	[3.08964]	[1.68440]	[3.75238]	[2.89489]
R-squared	0.248096	0.325276	0.498722	0.488626
Adj. R-squared	0.084639	0.178597	0.389748	0.377457
Sum sq. Resids	0.014015	0.229434	0.041709	0.123755
S.E. equation	0.024685	0.099877	0.042584	0.073353
F-statistic	1.517802	2.217601	4.576542	4.395369
Log likelihood	69.55692	29.02262	53.74363	37.97359
Akaike AIC	-4.383236	-1.587767	-3.292664	-2.205075
Schwarz SC	-4.100347	-1.304878	-3.009775	-1.922186
Mean dependent	0.044811	-0.000999	0.086978	0.075399
S.D. dependent	0.025801	0.110201	0.054513	0.092968
Determinant resid covariance (dof adj.)			3.06E-11	
Determinant resid covariance			1.21E-11	
Log likelihood			199.8754	
Akaike information criterion			-11.85348	
Schwarz criterion			-10.53333	
Number of coefficients			28	

Rural Macro Indicators Models

Vector Error Correction Estimates				
Date: 01/25/24 Time: 03:44				
Sample (adjusted): 1992 2020				
Included observations: 29 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
UNEMPURBAN(-1)	1.000000			
MPR(-1)	-1.093042			
	(0.23266)			
	[-4.69793]			
M2(-1)	2.125666			
	(0.38350)			
	[5.54275]			
INVTOTAL(-1)	-2.312164			
	(0.33426)			
	[-6.91722]			
C	-6.066308			
Error Correction:	**D(UNEMPRURAL)**	**D(MPR)**	**D(M2)**	**D(INVTOTAL)**
CointEq1	-0.474132	0.181075	0.007793	0.038337
	(0.12291)	(0.16153)	(0.07283)	(0.11960)
	[-3.85762]	[1.12101]	[0.10700]	[0.32055]
D(UNEMPRURAL (-1))	0.295912	0.198343	0.062687	0.148730
	(0.16098)	(0.21156)	(0.09539)	(0.15664)
	[1.83820]	[0.93751]	[0.65719]	[0.94948]
D(MPR(-1))	-0.385678	-0.336219	-0.022511	-0.071343
	(0.15660)	(0.20581)	(0.09279)	(0.15238)
	[-2.46281]	[-1.63365]	[-0.24260]	[-0.46819]

D(M2(-1))	0.663225	-0.582253	-0.054595	-0.068082
	(0.38019)	(0.49966)	(0.22528)	(0.36995)
	[1.74444]	[-1.16530]	[-0.24234]	[-0.18403]
D(GSPENDING(-1))	-0.911241	0.142789	0.450623	0.494355
	(0.37135)	(0.48804)	(0.22004)	(0.36135)
	[-2.45384]	[0.29258]	[2.04791]	[1.36807]
C	0.048551	0.029831	0.046990	0.047234
	(0.03345)	(0.04396)	(0.01982)	(0.03255)
	[1.45158]	[0.67865]	[2.37102]	[1.45129]
R-squared	0.497522	0.234501	0.364061	0.195521
Adj. R-squared	0.388288	0.068088	0.225813	0.020635
Sum sq. resids	0.150707	0.260301	0.052913	0.142699
S.E. equation	0.080947	0.106383	0.047964	0.078767
F-statistic	4.554637	1.409149	2.633399	1.117989
Log likelihood	35.11663	27.19236	50.29348	35.90838
Akaike AIC	-2.008043	-1.461542	-3.054723	-2.062647
Schwarz SC	-1.725155	-1.178653	-2.771834	-1.779758
Mean dependent	0.031951	-0.000999	0.086978	0.093020
S.D. dependent	0.103497	0.110201	0.054513	0.079593
Determinant resid covariance (dof adj.)			3.43E-10	
Determinant resid covariance			1.36E-10	
Log likelihood			164.8658	
Akaike information criterion			-9.439018	
Schwarz criterion			-8.118870	
Number of coefficients			28	

Vector Error Correction Estimates				
Date: 01/25/24 Time: 03:37				
Sample (adjusted): 1992 2020				
Included observations: 29 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
UNEMPURBAN(-1)	1.000000			
MPR(-1)	-1.093042			
	(0.23266)			
	[-4.69793]			
M2(-1)	2.125666			
	(0.38350)			
	[5.54275]			
GSPENDING(-1)	-2.312164			
	(0.33426)			
	[-6.91722]			
C	-6.066308			
Error Correction:	**D(CPIRURAL)**	**D(MPR)**	**D(M2)**	**D(GSPENDING)**
CointEq1	-0.116319	0.558040	0.309364	0.559185
	(0.06076)	(0.24065)	(0.10800)	(0.18413)
	[-1.91440]	[2.31887]	[2.86444]	[3.03685]

D(CPIRURAL(-1))	0.192707	0.285364	-0.430541	-0.161587
	(0.18700)	(0.74065)	(0.33239)	(0.56670)
	[1.03052]	[0.38529]	[-1.29527]	[-0.28513]
D(MPR(-1))	-0.043458	0.218224	0.206061	0.064102
	(0.06106)	(0.24185)	(0.10854)	(0.18505)
	[-0.71170]	[0.90232]	[1.89852]	[0.34641]
D(M2(-1))	0.010921	-0.216878	0.458987	0.295650
	(0.09485)	(0.37568)	(0.16860)	(0.28745)
	[0.11514]	[-0.57730]	[2.72234]	[1.02853]
D(GSPENDING(-1))	0.018636	-0.679194	-0.352355	-0.534445
	(0.07127)	(0.28230)	(0.12669)	(0.21600)
	[0.26147]	[-2.40595]	[-2.78121]	[-2.47431]
C	0.032064	0.059483	0.091296	0.096547
	(0.01259)	(0.04985)	(0.02237)	(0.03814)
	[2.54741]	[1.19318]	[4.08061]	[2.53110]
R-squared	0.222684	0.370110	0.481527	0.481849
Adj. R-squared	0.053703	0.233177	0.368816	0.369207
Sum sq. resids	0.013654	0.214188	0.043140	0.125395
S.E. equation	0.024365	0.096501	0.043309	0.073837
F-statistic	1.317803	2.702861	4.272212	4.277714
Log likelihood	69.93575	30.01962	53.25460	37.78268
Akaike AIC	-4.409362	-1.656525	-3.258938	-2.191909
Schwarz SC	-4.126473	-1.373636	-2.976049	-1.909020
Mean dependent	0.042511	-0.000999	0.086978	0.075399
S.D. dependent	0.025047	0.110201	0.054513	0.092968

Determinant resid covariance (dof adj.)	3.03E-11
Determinant resid covariance	1.20E-11
Log likelihood	200.0214
Akaike information criterion	-11.86355
Schwarz criterion	-10.54340
Number of coefficients	28