

Monetary policy and unemployment nexus: evidence from Ghana

Review of
Economics and
Political Science

323

Prince Fosu

Department of Economics, Marquette University, Milwaukee, Wisconsin, USA

Martinson Ankrah Twumasi

*College of Management Science, Chengdu University of Technology,
Chengdu, China, and*

Seth Oppong

Department of Business, Minot State University, Minot, North Dakota, USA

Received 31 December 2022
Revised 17 October 2023
6 July 2024
7 March 2025
Accepted 19 March 2025

Abstract

Purpose – This study analyzed the impact of monetary policy on unemployment in Ghana. In addition, the direction of causality among the monetary policy rate, the growth of the money supply and unemployment was performed.

Design/methodology/approach – We used the vector error correction model and annual data from 1991 to 2020.

Findings – The results show that the monetary policy rate positively and significantly affected unemployment in the long run. In contrast, money supply growth negatively and significantly impacted unemployment. However, in the short run, both the monetary policy rate and money supply growth had a negative and insignificant effect on unemployment. We also found that the adoption of inflation targeting reduces the unemployment rate. The causal analysis shows a unidirectional causality from the monetary policy rate to unemployment and from unemployment to money supply growth.

Practical implications – The study suggests that the Central Bank of Ghana creates a conducive investment environment by lowering the interest rate to create more jobs, thereby decreasing unemployment. Second, currently, the mobile money business employs a lot of Ghanaian youths and serves many unbanked Ghanaian households. Thus, the Central Bank can regulate mobile money operations and use it as a medium to circulate money in the economy, thereby boosting aggregate demand and employment and eventually lowering unemployment. Thirdly, prudent and efficient management of inflation-targeting policy by policymakers is vital, as it has a negative impact on unemployment in the country.

Originality/value – Most studies on Ghana have mainly focused on the effect of monetary policy on inflation and growth. To our knowledge, no study has examined the impact of monetary policy on unemployment in Ghana. Our study fills the gap in the literature examining the effect of monetary policy on unemployment in Ghana. The findings of this study have important implications for monetary policy and fiscal policy for Ghana and other developing countries.

Keywords Monetary policy, Inflation targeting, Unemployment, Vector error correction model, Ghana

Paper type Research paper

1. Introduction

Monetary and fiscal policies are the principal channels through which economic policies affect employment. Monetary policy is the process whereby the Central Bank of a country influence interest rate via changes in money supply to promote economic growth, ensure price stability, dampen the impact of recessions and create a favorable environment conducive to firms' growth (Ahiabor, 2013). Aside from the interest rate channel, monetary policy can affect

JEL Classification — E24, E51, E52

© Prince Fosu, Martinson Ankrah Twumasi and Seth Oppong. Published in *Review of Economics and Political Science*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

Conflict of interest: There is no conflict of interest among the authors.



Review of Economics and Political
Science
Vol. 10 No. 4, 2025
pp. 323-339
Emerald Publishing Limited
e-ISSN: 2631-3561
p-ISSN: 2356-9980
DOI 10.1108/REPS-12-2022-0112

aggregate demand through the credit and exchange rate channels (Benazić and Rami, 2016). Today, the monetary policy in Ghana has metamorphosed from direct to indirect control measures, market-orientated tools and inflation targeting (Quartey and Afful-Mensah, 2014). In the short run, expansionary monetary policy decreases interest rates and increases consumption and investments. Aggregate demand rises as consumption and investment increase, leading to output increases. As output increases, employment increases and unemployment falls.

Unemployment is one of the major problems confronting most developing economies. In the past three decades, the national unemployment rate in Ghana has fluctuated from 2.8% to about 11% (see Figure 1). At the same period, youth unemployment has changed between 5 and 21% (World Bank, 2018). As of 2020, male and female youth unemployment was at a percentage of 9.73 and 9.04%, respectively, while the national unemployment rate stands at 4.53% (see Figure 1). As shown in Figure 1, the unemployment rate was the highest in 2000. During this period, the prices of gold and cocoa dropped on the world market. Since the country is a major exporter of these commodities, the falling price adversely affected the Ghanaian economy, thus raising the unemployment rate. Also, in 2015, the Ghanaian economy experienced a recession due to power crises, leading to a high unemployment rate (see Figure 1). The unemployment rate in Ghana is characterized by underemployment and insufficient wages (Baah-Boateng, 2013). Other demand and supply factors and demographic factors such as skill mismatch, reservation wage, marital status, sex and poverty status as well as their rural-urban location, among others, have been responsible for increasing unemployment rates in the country (Baah-Boateng, 2013, 2015).

Recently, the government of Ghana has implemented several policies and programs to create jobs and decrease youth unemployment. For example, in 2018, the Ghanaian government launched the Nation's Builder Corp, which sought to employ 100,000 graduates in various economic sectors. The Ghanaian government has implemented policies such as planting food and jobs, one district, one factory (1D1F), one village, one dam and various trade liberalization initiatives. Moreover, the Bank of Ghana (BOG) has implemented expansionary monetary policy measures such as the 1.5 and 2% cut in the policy rate and reserve requirement, respectively, to boost the economy and lower unemployment.

Significant amounts of literature exist on the relationship between monetary policy and unemployment in several developed and developing countries, such as the US, Sweden, Croatia and Nigeria (Goshit and Iorember, 2020; Iorember et al., 2022; Alexius and Holmlund,

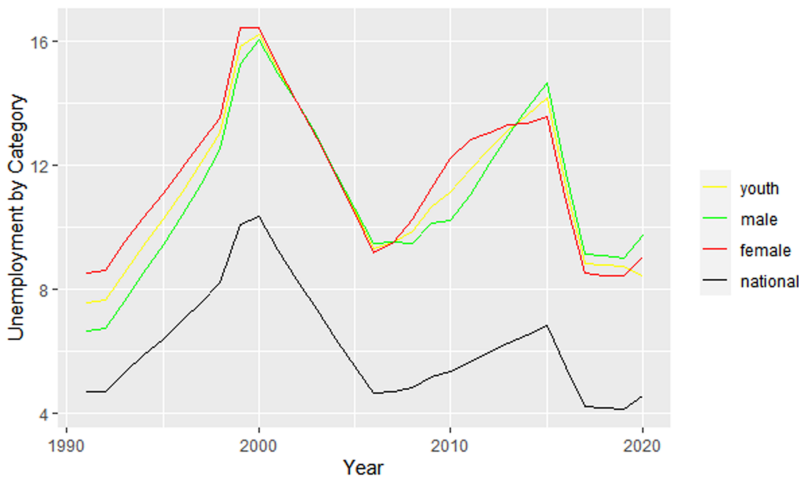


Figure 1. Trends in youth and national unemployment rate in Ghana (1991–2020). Source: Authors' construct using data from International Labor Organization, ILOSTAT database (2021)

2007; Benazić and Rami, 2016). Most studies on Ghana have mainly focused on the effect of monetary policy on inflation and growth (Ahiabor, 2013; Amidu, 2006; Havi and Enu, 2014; Twinoburyo and Odhiambo, 2018; Epstein and Heintz, 2006). To our knowledge, no study has examined the impact of monetary policy on unemployment in Ghana. Our study fills the gap in the literature examining the effect of monetary policy on unemployment in Ghana. We also analyzed the impact of inflation targeting on unemployment in Ghana [1]. The findings of this study have important implications for monetary policy and fiscal policy for Ghana and other developing countries. The remaining section of the article is structured as follows: section two presents the literature review, section three presents the methodology, section four presents the results and discussion and the last section focuses on the conclusions.

2. Literature review

Classical economists believe that money has no real effect; however, it affects long-run inflation (price level). Conversely, the neo-Keynesian school of thought postulates that money affects interest rates, inflation, unemployment and real wages, while post-Keynesian emphasizes the impact of money on growth (Keynes, 1937). Past studies have empirically analyzed the link between monetary policy and unemployment in several developed and developing countries. Using the asymmetric autoregressive distributed lag (ARDL) technique and quarterly data from 2000 to 2018, Goshit and Iorember (2020) investigated the asymmetric pass-through effect of monetary policy on unemployment in Nigeria. Their study found dissimilar long-run and short-run effects of contractionary and expansionary monetary policy on unemployment.

In a similar study, Iorember *et al.* (2022) analyzed the relationship between monetary policy and economic growth in Nigeria using quarterly data from 2004 to 2020 and the dynamic simulation ARDL technique. Their results show that money supply had a statistically significant effect on economic growth in both the short run and the long run.

Also, Benazić and Rami (2016) examined the impact of monetary policy on unemployment in Croatia using the bonds testing ARDL technique. The authors found the existence of cointegration among the variables; however, they concluded that Croatian monetary policy is limited in lowering unemployment.

Ahiabor (2013) analyzed the effects of monetary policy on inflation in Ghana using annual data from 1985 to 2009. The results of the study show a long-run positive effect of money supply and exchange rate on inflation but found a negative relationship between interest rate and inflation.

In a similar study focusing on Ghana, Amoah *et al.* (2023) examine monetary policy's short- and long-term effects on inflation using annual data from 1990 to 2018 and the vector error correction model (VECM). The study found that monetary policy had a favorable effect on inflation. Monetary policy also had a one-way causal effect on inflation.

Havi and Enu (2014) also used annual data from 1980 to 2012 and the ordinary least square (OLS) estimation technique to examine the relative importance of monetary and fiscal policy on Ghana's economic growth. Their study found a positive effect of fiscal and monetary policy on growth; however, monetary policy is more potent in stimulating growth.

Using quarterly data from 2000 to 2016, Asiama and Amoah (2019) employed the ARDL technique to estimate the effect of monetary policy on non-performing loans (NPLs) in Ghana. However, monetary policy does not significantly impact NPLs in the short run.

Epstein and Heintz (2006) also summarize the findings of a UNDP study analyzing the nexus between the financial sector, central bank policy and employment in Ghana. The authors concluded that monetary policy must be coordinated with financial sector reforms to increase employment in Ghana.

In conclusion, most studies on Ghana have mainly focused on the effect of monetary policy on inflation and growth. To the best of our knowledge, no study has examined the effect of

3. Methodology

3.1 Empirical model and data

Classical economists believe that money has no real effect; however, it affects long-run inflation (price level). Conversely, the neo-Keynesian school of thought postulates that money affects interest rates, inflation, unemployment and real wages, while post-Keynesian emphasizes the impact of money on growth (Keynes, 1937). Our empirical model is based on neo-Keynesian theory, which avers that monetary policy significantly impacts aggregate demand and economic activity. Thus, the basic model we estimate is Equation (1):

$$UR_t = \beta_0 + \beta_1 MPR_t + \beta_2 M2gr_t + \beta_3 GDPgr_t + \beta_4 INF_t + \varepsilon_t \quad (1)$$

Where UR_t denotes the unemployment rate measured as the total number of unemployed expressed as the percentage of the total labor force, MPR_t is the monetary policy rate (% annual), $M2gr_t$ is money supply growth rate (annual %), $GDPgr_t$ is the GDP growth rate (annual %) and INF_t is the inflation rate measured by the consumer price index (annual %). β_0 is the intercept parameter, $\beta_1, \dots, \beta_4$ are unknown coefficients or elasticity and ε_t is the error term. Data on the unemployment rate, money supply growth rate, real GDP and inflation comes from the World Bank, while data on monetary policy rates comes from the Bank of Ghana. The study used annual data covering the period from 1991 to 2020. The choice of this data coverage is justified by the fact it was extremely difficult getting data below 1991 on our key variable of interest (i.e. unemployment). An increase in the central bank's policy rate is expected to decrease consumption and investment, decreasing aggregate demand. A fall in aggregate demand reduces employment and thus increases unemployment. As a result, the coefficient of the monetary policy rate is expected to carry a positive sign ($\beta_1 > 0$). Furthermore, increasing money supply growth indicates a fall in short-term interest rates, so both aggregate demand and employment rise. As employment increases, unemployment falls. Therefore, we expect money supply to be negatively associated with unemployment ($\beta_2 < 0$). Okun's law postulated that a 1% rise in growth rate above the potential growth rate would cause unemployment to decrease by 0.3%. Thus, for a country's unemployment rate to decrease, its growth rate must exceed its trend growth rate. GDP growth is a significant indicator of the health of the economy. More intuitively, countries with increasing growth tend to attract more investments, which could increase employment and decrease unemployment. Several past studies have investigated the link between growth and unemployment (Kreishan, 2011; Iorember *et al.*, 2022; Sögner and Stiassny, 2002). Therefore, the GDP growth coefficient is expected to impact unemployment negatively ($\beta_3 < 0$). The Phillip's curve emphasizes the negative relationship between inflation and unemployment. The intuition is that as aggregate demand increases, unemployment falls, but aggregate demand will cause demand-pull inflation. Therefore, inflation is expected to be negatively associated with unemployment ($\beta_4 < 0$).

3.2 Estimation

We used the vector autoregressive regression (VAR) technique to estimate the dynamic association between monetary policy and unemployment in Ghana. The VAR estimation technique allows us to analyze both long-run and short-run dynamics and the causal relationship between monetary policy and unemployment. In addition, the choice of the VAR estimation is justified because it can address potential endogeneity problems in our model, which traditional OLS cannot address. The detailed analysis of the VAR method is explained below:

3.2.1 Unit root test. The test of the unit root is performed to distinguish between stationary and nonstationary series, thus getting robust estimates. Performing regression on nonstationary series leads to spurious regression estimates (Granger, 1988; Stock and Watson, 1988). We used both Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests to check the stationarity properties of the variables.

3.2.2 Cointegration test. We performed the Johansen and Johansen–Juselius cointegration analysis to determine if there is a long-run link among the variables. The empirical specification of the VECM within the VAR framework is below:

$$\Delta UR_t = \varnothing UR_{t-1} + \sum_{i=1}^{\rho-1} \tau_i \Delta UR_{t-i} + \psi + d_t + \epsilon_t \quad (2)$$

Where UR_t is a nonstationary series, $\varnothing$ and τ_i are coefficients, t is time and ϵ_t is the error term. We further decompose $\varnothing$ into $\varnothing = \alpha\beta'$ where α , β are $n \times r$ matrix, including the speed of adjustment and the cointegrating vectors. Thus, after substituting $\varnothing = \alpha\beta'$ into equation (2), equation (3) is obtained.

$$\Delta UR_t = \alpha\beta' UR_{t-1} + \sum_{i=1}^{\rho-1} \tau_i \Delta UR_{t-i} + \psi + d_t + \epsilon_t \quad (3)$$

The $\alpha\beta' UR_{t-1}$ term which captures the long-run information on UR_t .

We then extend Equation (3) to obtain the error correction model (ECM). The ECM includes the term which shows how any deviation from equilibrium is corrected in the long run. We specify the ECM for the VAR analysis as follows:

$$\Delta UR_t = \sum_{i=1}^n \theta_i \Delta UR_{t-i} + \sum_{i=1}^n \varpi_i MPR_{t-i} + \delta ECM_{t-1} + \eta_t \quad (4)$$

Where UR_t and MPR_t denote the series of cointegrated variables, ECM_{t-1} denotes the error correction term and δ denotes the speed of adjustment, indicating how changes in UR_t is restored in long run equilibrium.

Additionally, we carried out Granger's (1969) causality analysis to determine whether monetary policy helps forecast unemployment and vice versa. The variable UR Granger causes MPR if the past values of UR have marginal predictive content in explaining the future value of MPR (Granger, 1969). Empirically, the Granger causality is below:

$$UR_t = \forall + \partial t + \infty_1 UR_{t-1} + \dots + \infty_p UR_{t-p} + \bar{\mathfrak{A}}_1 MPR_{t-1} + \dots + \bar{\mathfrak{A}}_p MPR_{t-p} + \epsilon_t \quad (6)$$

$$MPR_t = \xi + \varpi t + \zeta_1 MPR_{t-1} + \dots + \zeta_p MPR_{t-p} + \psi_1 UR_{t-1} + \dots + \psi_p UR_{t-p} + v_t \quad (7)$$

The null hypothesis (H_0) of the Granger causality states that $\bar{\mathfrak{A}}_1 = \bar{\mathfrak{A}}_2 = \dots = \bar{\mathfrak{A}}_p = 0$; $\psi_1 = \psi_2 = \dots = \psi_p = 0$. Accepting the H_0 implies that the variable MPR_t does not Granger cause UR_t .

More so, we performed Breitung and Candelon's (2006) frequency domain causality test [2]. The test assumes that UR_t does not Granger cause MPR_t , given z_t at frequency x ($M_{UR \rightarrow MPR/z}(x) = 0$). Where x is the frequency. We follow Ciner (2011) and Fosu (2021) and chose $x = 0.5, 1.5$, and 2.5 for the short term, intermediate and long term, respectively.

4. Results and discussion

4.1 Summary statistics

This section presents the findings of the paper. Table 1 gives the summary statistics, which show the data patterns. The average national unemployment rate is 6.169%, the average monetary policy rate is around 24.10%, the average money supply growth is 32.81%, the average GDP growth is 5.53% and the average inflation rate is 18.04%. Table 1 shows that all variables are skewed positively. The unemployment rate, GDP growth, and inflation have a high Jarque–Bera value. Thus, we conclude that these variables are not normally distributed.

We also present the graphical analysis of the variables to examine their trends and patterns over time (see Figure 2). A cursory observation of the variable shows that all variables exhibit some fluctuations except the unemployment rate, which is not highly volatile. As can be observed from Figure 2, for most of the periods, money supply growth, monetary policy rate and inflation tend to move together. In addition, unemployment tends to move with the monetary policy rate.

Table 2 presents the correlation among GDP growth, inflation, money supply growth, monetary policy rate and unemployment. Unemployment is significantly correlated with

Table 1. Summary statistics

	UR	MPR	M2GR	GDPGR	INF
Mean	6.169000	24.10667	32.81081	5.370590	18.03897
Median	5.730000	22.45000	32.70919	4.772439	14.96721
Maximum	10.36000	45.00000	56.53422	14.04712	59.46155
Minimum	4.120000	12.70000	15.76091	0.414443	0.407362
Std. dev.	1.716457	9.894685	11.80476	2.559952	11.99581
Skewness	0.966082	0.849947	0.401400	1.272381	1.791142
Kurtosis	3.142422	2.631597	2.192794	5.845450	6.599944
Jarque–Bera	4.691926	3.781702	1.620089	18.21549	32.24044
Probability	0.095755	0.150943	0.444838	0.000111	0.000000
Sum	185.0700	723.2000	984.3244	161.1177	541.1690
Sum sq. dev.	85.44047	2839.239	4041.218	190.0472	4173.082

Source(s): Authors' construct

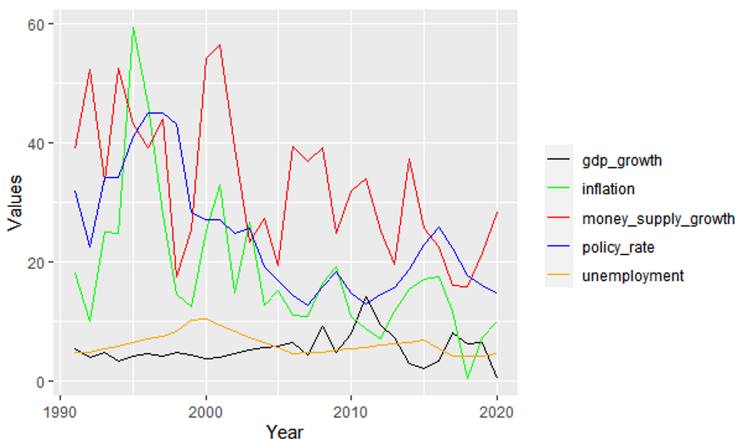


Figure 2. Trends in GDP, inflation, money supply growth, policy rate and unemployment (1991–2020). Source: Authors' construct

Table 2. Correlation among the variables

	UR	MPR	M2Gr	GDPgr	INF
UR	1.000				
MPR	0.448**	1.000			
M2Gr	0.301	0.293	1.000		
GDPgr	-0.259	-0.380**	-0.229	1.000	
INF	0.365*	0.719***	0.464***	-0.306	1.000

Note(s): *** denotes significance at 1%, ** denotes significance at 5% and * denotes significance at 10%

Source(s): Authors' construct

monetary policy rates and inflation, suggesting that these variables have a stronger relationship. Except for the GDP growth rate, unemployment correlates positively with all other variables.

4.2 Unit root test

[Table 3](#) reports the ADF and PP unit root test results. The ADF results show that variables are stationary at levels with the ADF, thus rejecting the null hypothesis of a unit root. However, the PP results indicate that only money supply and GDP growth are stationary. At the first difference, all variables in ADF and PP became stationary; thus, the null hypothesis of unit roots was rejected in favor of the alternative hypothesis. This result suggests that there might be a long-run relationship among the series. We also conducted the unit root test with breakpoints, and the result provided enough evidence to reject the claim that the variables have unit roots except for growth (see [Figures A1](#) and [A2](#) in the [Appendix](#)).

4.3 Lag order selection

We also performed the lag length selection criterion and the AR Roots graph (see [Figure 3](#)). The test results reveal that the optimal lag length is 2 (see [Table 4](#)).

4.4 Test of cointegration

The test results from [Tables 5](#) and [6](#) show the presence of 5 and 4 cointegrations among the variables. Thus, the null hypothesis of no cointegrating relationship is rejected at a 5% alpha level. This result suggests that unemployment, monetary policy rate, money supply growth, GDP growth and inflation have a long-run relationship.

4.5 Short and long run analysis

The long-run relationship for the unemployment function obtained from the normalized vectors is given by model (8). The standard errors and *t*-statistics are given in parentheses and brackets, respectively.

Table 3. Unit root test

Var	Levels		First difference		Structural break (levels)	
	ADF	PP	ADF	PP	ADF	Break year
UR	-3.307**	-1.727	-3.317**	-2.995**	-4.634**	2007
MPR	-4.361***	-1.265	-5.223***	-5.220***	-5.605***	2016
M2gr	-3.312**	-3.238**	-4.727***	-13.322***	-4.769**	2001
GDPgr	-3.004**	-2.994**	-5.957***	-7.192***	-3.185	2002
INF	-2.700*	-2.488	-1.233*	-9.168***	-4.941**	2001

Note(s): * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$

Source(s): Authors' construct

Inverse Roots of AR Characteristic Polynomial

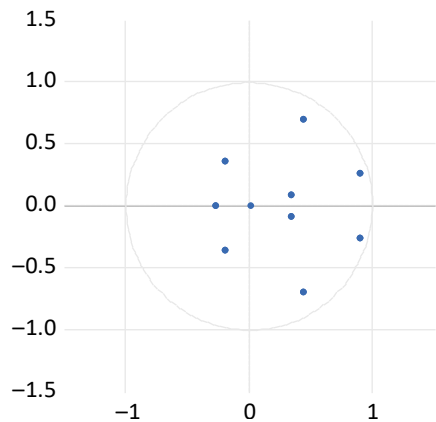


Figure 3. Inverse roots of AR characteristic polynomial. Source: Authors’ construct

Table 4. VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−418.250	NA	9276247	30.232	30.470	30.305
1	−348.336	109.866	387837.8	27.024	28.451	27.460
2	−317.989	36.849	319944.6*	26.642*	29.258	27.442*

Note(s): * Indicates lag order selected by the criterion, LR denotes sequential modified LR test statistic, FPE denotes final prediction error, AIC denotes Akaike information criterion, SC denotes Schwarz information criterion and HQ denotes Hannan–Quinn information criterion

Source(s): Authors’ construct

Table 5. Johansen’s cointegration tests (trace)

Hypothesized	Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical value
None*	0.769228	113.7215	69.81889
At most 1**	0.748038	74.13066	47.85613
At most 2*	0.469402	36.91176	29.79707
At most 3*	0.425853	19.80047	15.49471
At most 4*	0.163460	4.818986	3.841466

Note(s): *, ** indicates statistical significance at the 5% and 10% level

Source(s): Authors’ construct

$$UR = 9.198 + \begin{matrix} 0.399MPR - \\ (0.072) \\ [5.564] \\ ** * \end{matrix} \begin{matrix} 0.153M2_{gr} - \\ (0.038) \\ [-4.055] \\ ** * \end{matrix} \begin{matrix} - 1.038GDP_{gr} + \\ (0.203) \\ [-5.109] \\ ** * \end{matrix} \begin{matrix} 0.261INF \\ (0.058) \\ [4.509] \\ ** * \end{matrix}$$

(8)

Table 6. Johansen's cointegration tests (maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05 Critical value	Prob. **
No. of CE(s)	Eigenvalue	Statistic		
None *	0.769228	39.59080	33.87687	0.0093
At most 1 *	0.748038	37.21891	27.58434	0.0021
At most 2 *	0.469402	17.11129	21.13162	0.1668
At most 3 *	0.425853	14.98149	14.26460	0.0384
At most 4 *	0.163460	4.818986	3.841466	0.0281

Note(s): *, ** indicates statistical significance at the 5% and 10% level
Source(s): Authors' construct

Expectedly, the results revealed a one percent significant positive relationship between monetary policy rate and unemployment (UR). The results show that a one percent increase in the monetary policy rate leads to a 0.399% increase in unemployment. The intuition behind this result is that as the Central Bank raises the policy rate, it decreases consumption and investment demand, so aggregate demand falls. With a fall in aggregate demand, unemployment also increases. Our result is consistent with [Goshit and Iorember \(2020\)](#) and [Iorember et al. \(2022\)](#), who found a positive effect of MPR on unemployment in Nigeria.

Money supply growth negatively impacted unemployment in the long run. The coefficient value of 0.153 for money supply growth indicates that a percentage point increase in money supply growth leads to a 0.153 decline in the unemployment rate. An increase in money supply led to a fall in short-term interest rates, increasing aggregate demand and lowering unemployment. This result is consistent with several studies ([Alexius and Holmlund, 2007](#); [Benazić and Rami, 2016](#); [Essien et al., 2016](#)) who concluded that expansionary monetary policy decreases unemployment.

GDP growth had a one percent significant effect on the unemployment rate. Empirically, a percent increase in GDP growth in the long run decreases the unemployment rate by 1.038%. Higher growth enables both public and private firms to thrive, increasing employment. This result validates Okun's law, which emphasizes the negative effect of growth on unemployment. This result is consistent with several studies ([Fanati and Manfredi, 2003](#); [Doğru, 2013](#); [Iorember et al., 2022](#)) that found that growth reduces unemployment; however, the result contradicts [Akinyele et al. \(2023\)](#), who found a positive association between the economy size and unemployment in Sub-Saharan Africa (SSA) countries.

Inflation had a significant positive effect on unemployment, suggesting that inflation is inimical to job creation. The results revealed that a percent increase in inflation causes unemployment to rise by 0.261. This result contradicts the Phillips curve, hypothesizing a trade-off relationship between inflation and unemployment. The result is consistent with [Haug and King \(2014\)](#) and [Orji et al. \(2015\)](#), who also found a positive association between inflation and unemployment.

[Table 7](#) presents the short-run estimates. Both the monetary policy rate and money supply growth had a negative effect on the unemployment rate. The results reveal that a percentage increase in monetary policy rate and money supply growth in the first quarter causes a decrease in the current unemployment of about 0.02%. In the short run, GDP growth positively and insignificantly affected unemployment. Inflation also positively affected the unemployment rate, although this effect is not statistically significant.

The error correction term shows a negative sign and is significant at one percent. The error correction term value of -0.188577 indicates that approximately 18.8577% of short-term deviation is restored in the long run every quarter. The model also passes all diagnostic tests (see [Table 8](#)) confirming that the results are robust, reliable and adequate.

Table 7. The short-run estimates

Variable	Coefficient	Std. error.	t-stat
ECT(−1)	−0.188577	0.06776	−2.78299***
D(UR(−1))	0.718533	0.14550	4.93837***
D(MPR(−1))	−0.021155	0.03031	−0.69789
D(M2gr(−1))	−0.020983	0.01063	−1.97311*
D(GDPgr(−1))	0.016718	0.04316	0.38733
D(INF(−1))	−0.011441	0.01102	1.69163
C	−0.022601	0.10452	−1.03830
R-squared	0.596606		
Note(s): * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$			
Source(s): Authors' construct			

Table 8. Diagnostic test

Diagnostic test	Test statistic	p-value
<i>Serial correlation</i>		
<i>LM tests</i>		
Lag 1	21.06975	0.6887
Lag 2	26.33274	0.3900
Lag 3	17.72586	0.8538
<i>Normality test</i>	11.86348	0.2943
<i>Heteroskedasticity tests</i>	184.1569	0.4003
Source(s): Authors' construct		

4.6 Causality analysis

The long-run equilibrium association between unemployment, monetary policy, money supply growth, GDP growth rate and inflation does not indicate the nature and direction of causality between the variables. As a result, we test for the causality among these variables. The Granger causality test and [Breitung-Candelon \(2006\)](#) spectral Granger causality test are shown in [Tables 9 and 10](#), respectively. In both tests, we found unidirectional causality from the monetary policy rate to the unemployment rate and from the unemployment rate to the money supply growth. The result is consistent with [Essien et al. \(2016\)](#), who found that monetary policy Granger causes the unemployment rate in Nigeria.

Table 9. Granger causality test

Null hypothesis	F-statistic	Prob.
MPR does not Granger cause UR	3.73147**	0.0395
UR does not Granger cause MPR	1.56000	0.2316
M2GR does not Granger cause UR	0.77446	0.4726
UR does not Granger cause M2GR	3.49734*	0.0472
GDPgr does not Granger cause UR	0.38031	0.6879
UR does not Granger cause GDPgr	0.44014	0.6493
INF does not Granger cause UNNT	1.69715	0.2054
UR does not Granger cause INF	2.07554	0.1484
Note(s): * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$		
Source(s): Authors' construct		

Table 10. Breitung-Candelon (2006) spectral Granger causality test

Causality outcome	Period	Lag	Short	Intermediate	Long
			$x = 0.5$	$x = 1.5$	$x = 2.5$
mpr $\rightarrow$ UR	1991–2020	2	7.4629** (0.0240)	7.4629** (0.0240)	7.4629** (0.0240)
UR $\rightarrow$ MPR	1991–2020	2	3.1200 (0.2101)	3.1200 (0.2101)	3.1200 (0.2101)
m2Gr $\rightarrow$ UR	1991–2020	2	1.5489 (0.4610)	1.5489 (0.4610)	1.5489 (0.4610)
UR $\rightarrow$ m2Gr	1991–2020	2	6.9947** (0.0303)	6.9947** (0.0303)	6.9947** (0.0303)
UR $\rightarrow$ GDPgr	1991–2020	2	0.8803 (0.6439)	0.8803 (0.6439)	0.8803 (0.6439)
GDPgr $\rightarrow$ UR	1991–2020	2	0.7606 (0.6837)	0.7606 (0.6837)	0.7606 (0.6837)
UR $\rightarrow$ INF	1991–2020	2	4.1511 (0.1255)	4.1511 (0.1255)	4.1511 (0.1255)
INF $\rightarrow$ UR	1991–2020	2	3.3943 (0.1832)	3.3943 (0.1832)	3.3943 (0.1832)

Note(s): * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$

Source(s): Authors' construct

4.7 Variance decomposition analysis (VDA)

We also conducted the VDA to find out how changes in the explanatory variables influence the outcome variable (see Figure 4). The VDA of unemployment indicates that over time, monetary policy rate and money supply growth contribute significantly to the variations in unemployment. However, the money supply growth effect is profound. For example, in period 10, money supply growth alone contributes 33.49%. During the same period, the monetary policy rate contributed 4.68%, GDP growth (1.62%) and inflation (1.76). The VDA of money supply results show the unemployment rate contributes mainly to the variations in money supply, accounting for about 54.19% in period 10, suggesting that the unemployment and money supply growth Granger cause each other. These results confirm the Granger causality results in Tables 9 and 10.

4.8 Robustness test

Figure 5 shows the unemployment rate in Ghana before and after the inflation-targeting policy. The cursory observation of the Figure shows that the unemployment rate decreased after inflation targeting. For the robustness test, we used inflation targeting to measure monetary policy rates and examine its impact on the unemployment rate. The results show that targeting inflation hurt the unemployment rate, suggesting the effectiveness of monetary policy in reducing unemployment. The results in Table 11 show estimates of inflation targeting unemployment. The results in Column 2 of Table 11 show that unemployment significantly decreases by 1.359% after inflation targeting relative to when there was no inflation targeting. These results also confirm the robustness of our main results, although the GDP growth and inflation rate are statistically insignificant.

5. Conclusions and policy recommendation

This study investigates the impact of monetary policy on unemployment using annual data from 1991 to 2020 and a VECM for Ghana. In addition, the direction of causality among monetary policy, money supply growth and unemployment was performed. The monetary

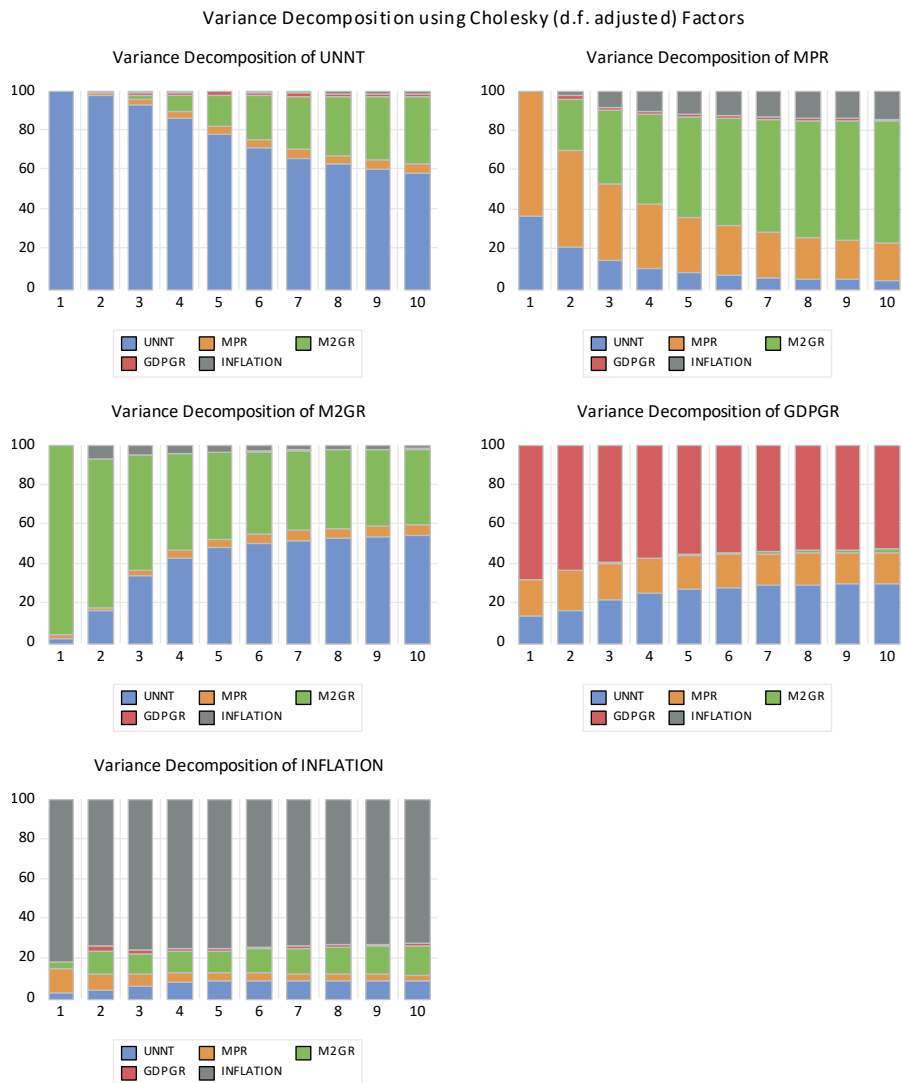


Figure 4. Variance decomposition analysis. Source: Authors' construct based on World Bank Data

policy rate is positively associated with unemployment, while money supply growth negatively affects unemployment in the long run. However, in the short run, both had a negative effect on unemployment, although the monetary policy rate effect is insignificant. We also found that the adoption of inflation targeting reduces the unemployment rate. The Granger causality test shows a bidirectional causality between unemployment and money supply growth. The VDA shows that money supply growth contributes more to the variations in unemployment than monetary policy, GDP growth and inflation.

Based on the results above, the study offered several implications. First, the study suggests that the Central Bank of Ghana create a conducive investment environment by lowering the interest rate and extending credit to small-scale enterprises to create more jobs and spur



Figure 5. Average unemployment rate in Ghana before and after Inflation targeting. Source: Authors' calculation

Table 11. Effect of inflation targeting on unemployment

	(1) OLS-level	(2) OLS-lagged
Inflation targeting	-1.4000* (0.6892)	
GDPgr	-0.0641 (0.0845)	
Inflation	0.0184 (0.0277)	
Lag inflation targeting		-1.3599* (0.7564)
LagGDPgr		-0.0297 (0.0929)
LagInflation		0.0218 (0.0259)
Constant	6.8348*** (1.1015)	6.5960*** (1.1682)
R-squared	0.2816	0.2634
F-stat	4.3878***	6.6594***
Mean VIF	1.30	1.36
Obs	30	29

Note(s): Inflation targeting is a dummy variable equal 1 for period after the implementation of inflation targeting and 0 otherwise. The policy-reform occurred in 2007. Robust standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$

Source(s): Authors' own work

economic growth, thereby decreasing unemployment. Second, currently, the mobile money business employs a lot of Ghanaian youths and serves many unbanked Ghanaian households. Thus, the Central Bank can regulate mobile money operations and use it as a medium to circulate money in the economy, thereby boosting aggregate demand and employment and eventually lowering unemployment. Thirdly, prudent and efficient management of inflation-targeting policy by policymakers is vital, as it has a negative impact on unemployment in the country.

This study's main limitation is getting enough unemployment rate data, so our study relied on a few annual data. As enough data becomes available, future studies could analyze the relationship among these variables using high-frequency data. This is because monetary policy is taken at a higher frequency (monthly and quarterly), so connecting it to unemployment at a higher frequency will be ideal.

Notes

1. Ghana and South Africa are the only nations in Africa that have adopted inflation targeting as the key monetary policy tool (Heintz and Ndikumana, 2011; IMF, 2016; Divino, 2009). Inflation targeting leads to increased financial growth and price stability.
2. The test allows us to disaggregate the total variation in a variable into short, intermediate, and long-term periods (Breitung and Candelon, 2006).

References

- Ahiabor, G. (2013), "The effects of monetary policy on inflation in Ghana", *Developing Country Studies*, Vol. 3 No. 12, pp. 82-89.
- Akinyele, O.D., Oloba, O.M. and Mah, G. (2023), "Drivers of unemployment intensity in sub-Saharan Africa: do government intervention and natural resources matter?", *Review of Economics and Political Science*, Vol. 8 No. 3, pp. 166-185, doi: [10.1108/REPS-11-2020-0174](https://doi.org/10.1108/REPS-11-2020-0174).
- Alexius, A. and Holmlund, B. (2007), "Monetary policy and Swedish unemployment fluctuations", *Economics Discussion Paper*, (2007-34).
- Amidu, M. (2006), "The link between monetary policy and banks lending behavior: the Ghanaian case", *Banks and Bank Systems*, Vol. 1 No. 4, pp. 38-48.
- Amoah, E.K., Asaki, F.A., Anarigide, D.A. and Osei, M. (2023), "The effect of monetary policy on inflation in Ghana", *International Journal of Finance and Banking Research*, Vol. 9 No. 5, pp. 79-89.
- Asiamah, R.K. and Amoah, A. (2019), "Non-performing loans and monetary policy dynamics in Ghana", *African Journal of Economic and Management Studies*, Vol. 10 No. 2, pp. 169-184, doi: [10.1108/ajems-04-2018-0103](https://doi.org/10.1108/ajems-04-2018-0103).
- Baah-Boateng, W. (2015), "Unemployment in Ghana: a cross-sectional analysis from demand and supply perspectives", *African Journal of Economic and Management Studies*, Vol. 6 No. 4, pp. 402-415, doi: [10.1108/ajems-11-2014-0089](https://doi.org/10.1108/ajems-11-2014-0089).
- Baah-Boateng, W. (2013), "Determinants of unemployment in Ghana", *African Development Review*, Vol. 25 No. 4, pp. 385-399, doi: [10.1111/1467-8268.12037](https://doi.org/10.1111/1467-8268.12037).
- Benazić, M. and Rami, J. (2016), "Monetary policy and unemployment in Croatia", *Economic research-Ekonomska istraživanja*, Vol. 29 No. 1, pp. 1038-1049, doi: [10.1080/1331677x.2016.1211955](https://doi.org/10.1080/1331677x.2016.1211955).
- Breitung, J. and Candelon, B. (2006), "Testing for short-and long-run causality: a frequency-domain approach", *Journal of Econometrics*, Vol. 132 No. 2, pp. 363-378, doi: [10.1016/j.jeconom.2005.02.004](https://doi.org/10.1016/j.jeconom.2005.02.004).
- Ciner, C. (2011), "Eurocurrency interest rate linkages: a frequency domain analysis", *International Review of Economics and Finance*, Vol. 20 No. 4, pp. 498-505, doi: [10.1016/j.iref.2010.09.006](https://doi.org/10.1016/j.iref.2010.09.006).
- Divino, J.A. (2009), "Optimal monetary policy for a small open economy", *Economic Modelling*, Vol. 26 No. 2, pp. 352-358.
- Doğru, B. (2013), "The link between unemployment rate and real output in Eurozone: a panel error correction approach", *Procedia-Social and Behavioral Sciences*, Vol. 99, pp. 94-103, doi: [10.1016/j.sbspro.2013.10.475](https://doi.org/10.1016/j.sbspro.2013.10.475).
- Epstein, G. and Heintz, J. (2006), "Monetary policy and financial sector reform for employment creation and poverty reduction in Ghana", *PERI Working Papers*, 97.
- Essien, S.N., Many, G.A., Arigo, M.O., Bassey, K.J., Ogunyinka, S.F., Ojegwo, D.G. and Ogbuehi, F. (2016), "Monetary policy and unemployment in Nigeria: are there a dynamic relationship?", *CBN Journal of Applied Statistics (JAS)*, Vol. 7 No. 1, p. 10.
- Fanati, L. and Manfredi, P. (2003), "Population, unemployment and economic growth cycles: a further explanatory perspective", *Metroeconomica*, Vol. 54 Nos 2-3, pp. 179-207.

- Fosu, P. (2021), "Frozen chicken import, domestic chicken production, and real exchange rates in Ghana: a trivariate causality analysis", *Journal of International Studies*, Vol. 14 No. 4, pp. 113-130, doi: [10.14254/2071-8330.2021/14-4/8](https://doi.org/10.14254/2071-8330.2021/14-4/8).
- Goshit, G.G. and Iorember, P.T. (2020), "Measuring the asymmetric pass-through of monetary policy rate to unemployment in", *Nigerian Journal of Economic and Social Studies*, Vol. 62 No. 3, pp. 369-387.
- Granger, C.W. (1969), "Investigating causal relations by econometric models and cross-spectral methods", *Econometrica: Journal of the Econometric Society*, Vol. 37 No. 3, pp. 424-438, doi: [10.2307/1912791](https://doi.org/10.2307/1912791).
- Granger, C.W. (1988), "Some recent developments in the concept of causality", *Journal of Econometrics*, Vol. 39 Nos 1-2, pp. 199-211, doi: [10.1016/0304-4076\(88\)90045-0](https://doi.org/10.1016/0304-4076(88)90045-0).
- Haug, A.A. and King, I. (2014), "In the long run, US unemployment follows inflation like a faithful dog", *Journal of Macroeconomics*, Vol. 41, pp. 42-52, doi: [10.1016/j.jmacro.2014.04.003](https://doi.org/10.1016/j.jmacro.2014.04.003).
- Havi, E.D.K. and Enu, P. (2014), "The effect of fiscal policy and monetary policy on Ghana's economic growth: which policy is more potent?", *International Journal of Empirical Finance*, Vol. 3 No. 2, pp. 61-75.
- Heintz, J. and Ndikumana, L. (2011), "Is there a case for formal inflation targeting in sub-Saharan Africa?", *Journal of African Economies*, Vol. 20 No. suppl_2, pp. ii67-ii103, doi: [10.1093/jae/ejq027](https://doi.org/10.1093/jae/ejq027).
- International Monetary Fund, IMF (2016), "Monetary policy and the future of central banking: implications for Africa", *Monetary Policy and the Future of Central Banking: Implications for Africa* (imf.org).
- Iorember, P.T., Jelilov, G., Alymkulova, N. and Yua, P.M. (2022), "Reconsidering the nexus between monetary policy and economic growth in Nigeria: the role of interest rate, money supply, and financial inclusion", *International Social Science Journal*, Vol. 72 No. 244, pp. 339-351, doi: [10.1111/issj.12324](https://doi.org/10.1111/issj.12324).
- Keynes, J.M. (1937), "The general theory of employment", *Quarterly Journal of Economics*, Vol. 51 No. 2, pp. 209-223, doi: [10.2307/1882087](https://doi.org/10.2307/1882087).
- Kreishan, F.M. (2011), "Economic growth and unemployment: an empirical analysis", *Journal of Social Sciences*, Vol. 7 No. 2, pp. 228-231, doi: [10.3844/jssp.2011.228.231](https://doi.org/10.3844/jssp.2011.228.231).
- Orji, A., Anthony-Orji, O.I. and Okafor, J.C. (2015), "Inflation and unemployment nexus in Nigeria: another test of the Phillips curve", *Asian Economic and Financial Review*, Vol. 5 No. 5, pp. 766-778, doi: [10.18488/journal.aefr/2015.5.5/102.5.766.778](https://doi.org/10.18488/journal.aefr/2015.5.5/102.5.766.778).
- Quartey, P. and Afful-Mensah, G. (2014), "Financial and monetary policies in Ghana: a review of recent trends", *Review of Development Finance*, Vol. 4 No. 2, pp. 115-125, doi: [10.1016/j.rdf.2014.07.001](https://doi.org/10.1016/j.rdf.2014.07.001).
- Sögner, L. and Stiassny, A. (2002), "An analysis on the structural stability of Okun's law—a cross-country study", *Applied Economics*, Vol. 34 No. 14, pp. 1775-1787.
- Stock, J.H. and Watson, M.W. (1988), "Testing for common trends", *Journal of the American Statistical Association*, Vol. 83 No. 404, pp. 1097-1107, doi: [10.2307/2290142](https://doi.org/10.2307/2290142).
- Twinoburyo, E.N. and Odhiambo, N.M. (2018), "Monetary policy and economic growth: a review of international literature", *Journal of Central Banking Theory and Practice*, Vol. 7 No. 2, pp. 123-137, doi: [10.2478/jcbtp-2018-0015](https://doi.org/10.2478/jcbtp-2018-0015).
- World Bank (2018), *World Development Indicators for 2017*, World Bank, Washington, DC, United States.

Further reading

- Granger, C.W.J. (1986), "Developments in the study of cointegrated economic variables", *Oxford Bulletin of Economics and Statistics*, Vol. 48 No. 3, pp. 213-228, doi: [10.1111/j.1468-0084.1986.mp48003002.x](https://doi.org/10.1111/j.1468-0084.1986.mp48003002.x).

Johansen, S. (1991), “Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models”, *Econometrica: Journal of the Econometric Society*, Vol. 59 No. 6, pp. 1551-1580, doi: [10.2307/2938278](https://doi.org/10.2307/2938278).

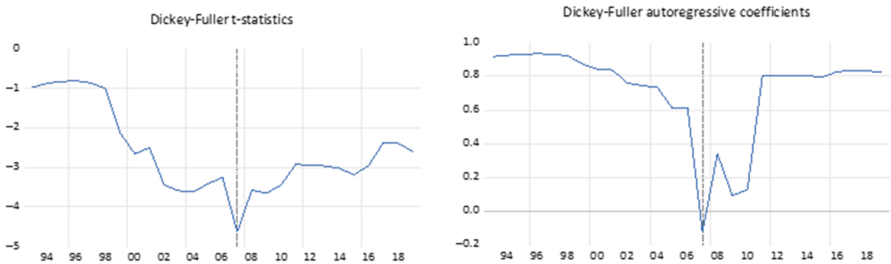
Johansen, S. and Juselius, K. (1992), “Testing structural hypotheses in a multivariate cointegration analysis of the PPP and the UIP for UK”, *Journal of Econometrics*, Vol. 53 Nos 1-3, pp. 211-244, doi: [10.1016/0304-4076\(92\)90086-7](https://doi.org/10.1016/0304-4076(92)90086-7).

Onanuga, A.T. and Omitogun, O. (2022), “Unemployment and monetary policy: evidence from sub-Saharan Africa”, *Journal of Public Affairs*, Vol. 22 No. 1, e2382, doi: [10.1002/pa.2382](https://doi.org/10.1002/pa.2382).

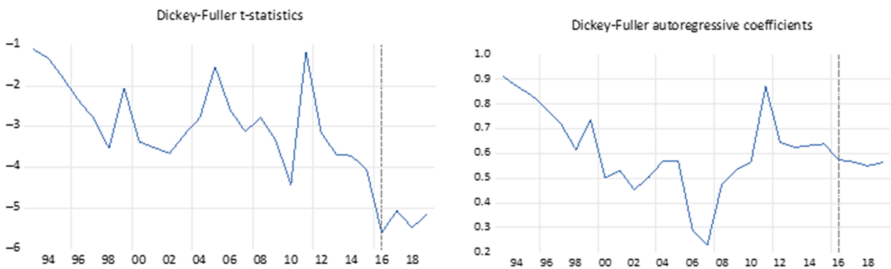
Stock, J.H. and Watson, M.W. (2001), “Vector autoregressions”, *The Journal of Economic Perspectives*, Vol. 15 No. 4, pp. 101-115.

Appendix

UR



MPR



M2gr

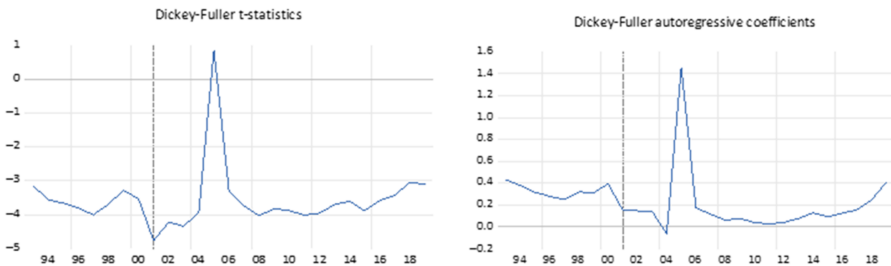
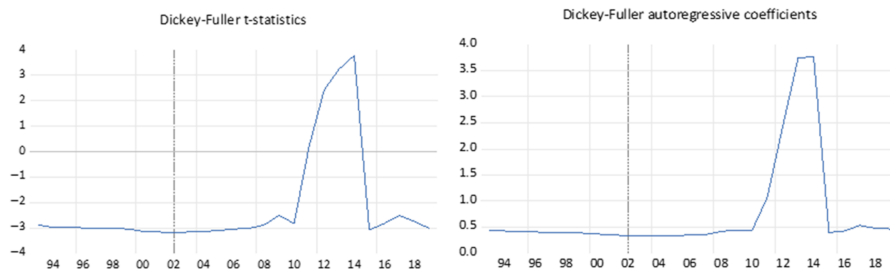


Figure A1. Augmented Dickey–Fuller statistics and AR coefficients at each test date. Source: Authors’ construct

GDPgr



INF

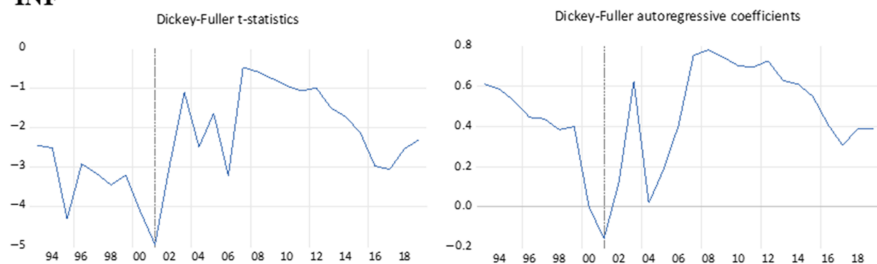


Figure A2. Augmented Dickey–Fuller statistics and AR coefficients at each test date. Source: Authors’ construct

Corresponding author

Prince Fosu can be contacted at: prince.fosu@marquette.edu