

The relationship between inflation and unemployment in the Republic of Congo: Evidence from ARDL approach

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Abstract

This research examines the relationship between inflation and unemployment in the Republic of Congo over 1990-2022 period using the Autoregressive Distributed Lag (ARDL) approach. The analysis incorporates additional macroeconomic variables, including exports, imports, gross fixed capital formation, population growth, and GDP per capita growth, to capture the structural determinants of unemployment in the Congolese economy. The study employs Augmented Dickey–Fuller (ADF) unit root tests to examine the stationarity properties of the variables, while the ARDL is used to verify the long-run cointegration relationship.

The empirical findings confirm a long-run relationship among different variables. The results further show that inflation has a positive and statistically significant effect on unemployment in both the short run and the long run, in contrast to the traditional Phillips curve hypothesis. This outcome suggests the presence of stagflation-type dynamics in the Republic of Congo, where inflationary pressures coexist with persistent unemployment due to structural rigidities, commodity dependence, weak productive diversification, and labor market inefficiencies. In addition, GDP per capita growth reduces unemployment, supporting the growth-employment nexus predicted by Okun's Law. Exports and gross fixed capital formation reduce unemployment in the short run but produce weaker long-run employment effects because of the capital-intensive structure of the oil sector.

This research concludes that inflation stabilization alone is insufficient to reduce unemployment in the Republic of Congo. Sustainable employment creation requires broader structural reforms aimed at economic diversification, non-oil sector development, labor-intensive investment, private-sector expansion, and human capital development. The findings provide important policy implications for macroeconomic management within the BEAC monetary framework and contribute to the literature on inflation-unemployment dynamics in resource-dependent developing economies.

Keywords: Inflation, Unemployment, ARDL, Phillips curve, Republic of Congo, Economic growth

Introduction

Inflation and unemployment are among the most persistent macroeconomic challenges affecting both developed and developing economies, especially in economic and social debates (Bükey & Kalkan, 2024)^[5]. The traditional Phillips curve framework, introduced by (Phillips, 1958a)^[29], suggests the existence of an inverse relationship between inflation and unemployment. The Phillips curve rapidly became one of the most influential concepts in macroeconomics after (Lipsey, 1960)^[22] extended the framework to price inflation and unemployment in the United States. However, the stagflation episodes of the 1970s challenged the validity of the traditional Phillips curve.

Monetarist economists, particularly (Phelps, 1968)^[28], argued that the inflation–unemployment trade-off exists only in the short run. In the long run, unemployment returns to its natural rate the NAIRU, regardless of the inflation level. New classical economists (Lucas, 1972; Sargent & Wallace, 1976)^[23, 31], further suggested that systematic monetary policy cannot permanently reduce unemployment because individuals anticipate policy interventions. Despite the policy relevance of inflation and unemployment dynamics in the Republic of the Congo, empirical evidence using modern time-series econometric approaches remains limited. This study therefore investigates the relationship using the ARDL bounds testing approach developed by (Pesaran *et al.*, 2001)^[27] over the period 1990–2022, incorporating exports, imports, gross fixed capital formation, population growth, and GDP per capita growth.

Given these mixed findings, this research answers the following question:

What is the relationship between inflation and unemployment in Congo-Brazzaville?

The general objective of this study is to examine the relationship between inflation and unemployment in Congo-Brazzaville. In particular, the study aims to determine: Whether a relationship exists between inflation and unemployment; Whether this relationship is proportional (positive) or inverse (negative).

This study contributes to literature in important ways. First, it extends the Phillips curve in Central African economy characterized by strong commodity dependence and structural vulnerabilities. Second, the study applies the ARDL methodology, which is appropriate for mixed integration orders and small sample sizes commonly observed in African macroeconomic data. Third, the study provides policy-relevant evidence regarding the effectiveness of inflation stabilization policies in promoting employment creation within the context of the BEAC monetary framework.

The remainder of this research is organized as follows. Section 2 presents stylized facts and the macroeconomic background of inflation and unemployment in the Republic of Congo. Section 3 theoretical and empirical review also, develops the study hypotheses. Section 4 presents the data and methodology. Section 5 discusses the empirical findings, while Section 6 concludes the study and provides policy recommendations.

2 Analysis of Stylized Facts

Before reviewing the theoretical and empirical literature, this section presents the macroeconomic context of the Republic of Congo over the study period 1990-2022.

2.1 The Stylized Facts of the relationship between Unemployment and Inflation

Figure 1 illustrates the joint evolution of the unemployment rate and the inflation rate in the Republic of Congo over 1990-2022 period. Three distinct phases can be identified.

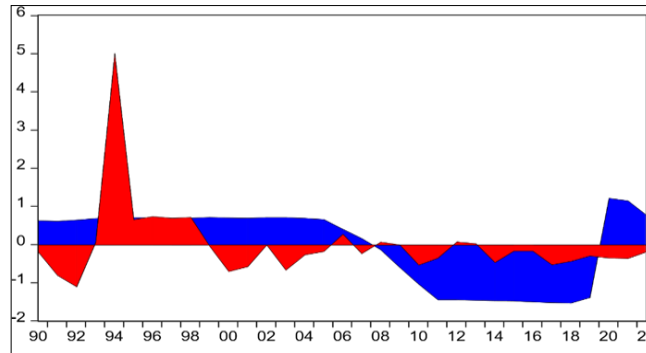


Fig 1: Evolution of Unemployment and Inflation in the Republic of Congo, 1990–2022
Source: Author's calculations using EViews 10 and World Bank data (2024)

Phase 1 from 1990 to 2008: This phase is characterized by a regression of the inflation trend from 1990 to 1993 and a standard increase in that of unemployment from 1990 to 2005, before a rebound in the upward inflation trend from 1994 to 1999 and from 2005 to 2007. This increase in inflation and unemployment during this period may be the result of the weak ability of the Congolese economy to withstand the shocks due to the devaluation of the CFA franc. Indeed, this devaluation of the CFA franc has produced negative effects and has doubled the goods prices from abroad by lowering the real capacity to consume households in the Republic of Congo (Decree n ° 2009-735, 2009).

Phase 2 from 2008 to 2019: The second phase is characterized by a convergence toward lower levels of both unemployment and inflation, attributable to improved fiscal and monetary policy performance, effective management of oil export revenues, and strengthened governance frameworks. This period coincided with the implementation

of the HIPC debt relief initiative and a sustained rise in global oil prices, which generated fiscal space for public investment and employment-creation programs.

Phase 3 from 2019 to 2022: The third phase reveals a sharp increase in unemployment despite moderate inflation levels, a pattern inconsistent with the standard Phillips curve trade-off. This divergence reflects the cumulative impact of three overlapping shocks: the fiscal and monetary policy misalignment that followed the 2015-2016 oil price collapse, which generated twin deficits of approximately 5.1% of GDP (fiscal) and 42.8% of GDP (current account) in 2017; persistent structural inequalities disproportionately affecting youth and women; and the COVID-19 pandemic, which severely disrupted labor market recovery efforts

2.2 The Stylized Facts of Unemployment

Figure 2 presents the evolution of the unemployment rate in the Republic of Congo between 1990 and 2022, revealing three distinct phases.

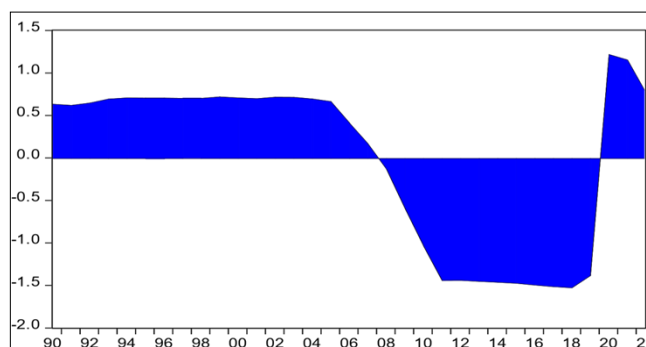


Fig 2: Evolution of Unemployment in the Republic of Congo, 1990–2022
Source: Author's calculations using EViews 10 and World Bank data (2024)

Phase 1 from 1990 to 2005: This phase is characterized by persistently high and rising unemployment, driven by three interrelated factors: the socio-political instability of the early 1990s, including the civil conflicts of 1993–1997; the 1994 CFA franc devaluation, which eroded real purchasing power and disrupted formal sector employment; and the structural expansion of informality in the labor market, which absorbed displaced workers but without providing stable or adequately remunerated employment (Diata, 1994). By

2005, the national unemployment rate had reached approximately 19.4% (European Commission, 2007).

Phase 2 from 2005 to 2019: The second phase is marked by a sustained decline in unemployment, attributable to several reinforcing factors: the implementation of poverty-reduction budgetary policies; effective management of oil revenues during the commodity price boom; debt cancellation under the HIPC initiative; the expansion of oil production and

resumption of exports; and accelerated public investment programs across major urban departments. These dynamics were further supported by improvements in the business climate, the return of sustained economic growth, and the restoration of credibility with international credit institutions, collectively reducing the national unemployment rate to 6.9% by 2011.

Phase 3 from 2019 to 2022: The third phase is marked by a reversal of the employment gains of the previous period, driven by three compounding factors. First, fiscal and monetary policy missteps following the 2015–2016 oil price collapse generated a socio-economic crisis and structural twin deficits. Second, entrenched social inequalities continued to exclude youth and women particularly those aged 15–29 from formal labor market opportunities. Third, governance weaknesses and anti-corruption failures

suppressed private sector confidence and job creation. These structural vulnerabilities were further amplified by the COVID-19 pandemic, which disrupted government employment programs and caused a sharp increase in labor market inactivity, pushing the national unemployment rate to 21.8% by 2022.

2.3 Evolution of Inflation

Figure 3 presents the evolution of the consumer price inflation rate in the Republic of Congo between 1990 and 2022. The inflation series exhibits high volatility in the 1990s followed by relative moderation from 2001 onward, broadly reflecting the monetary policy evolution within the CEMAC framework and the structural transformation of the Congolese economy.

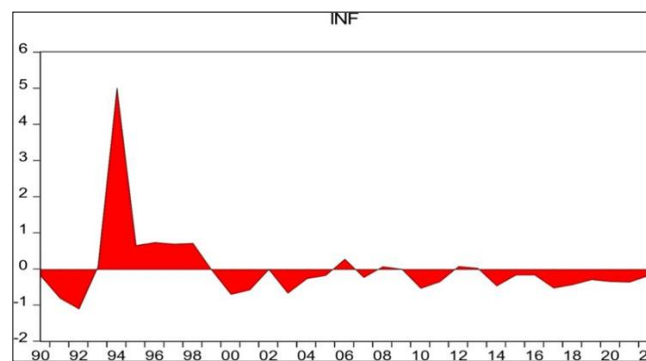


Fig 3: Evolution of Inflation in the Republic of Congo, 1990–2022
Source: Author's calculations using EViews 10 and World Bank data (2024)

Period 1 from 1990 to 2000: Inflation followed a declining trend between 1990 and 1992, before surging to a record peak of approximately 42.4% in 1994, driven primarily by the devaluation of the CFA franc, which doubled the prices of domestically consumed imported goods. The devaluation, combined with the civil conflicts of 1993–1997, destroyed a large share of non-oil productive capacity and halted economic reforms, sustaining inflationary pressure throughout the mid-1990s. Inflation subsequently declined from 1998 to 2000, reflecting the gradual restoration of macroeconomic stability following the cessation of civil conflict, the resumption of structural adjustment programs, and improved oil market conditions, which accelerated non-oil sector growth and strengthened fiscal outcomes.

Period 2 from 2001 to 2022: From 2001 onward, inflation evolved more moderately, averaging below 5% for most of the period. Between 2006 and 2009, underlying inflation rates fluctuated between 3.1% and 5.1%, reflecting cost-push pressures from deteriorating transport infrastructure particularly disruptions to the Congo-Ocean Railway (CFCO) between Pointe-Noire and Brazzaville rising energy tariffs, and increasing construction material prices. From 2010, inflationary pressures moderated significantly, driven by improvements in electricity supply, a decline in international commodity prices, reduced European demand, and prudential monetary policy within the CEMAC framework, including tax policy adjustments and expenditure controls. This moderation broadly aligned with the BEAC's 3% inflation convergence target, although the simultaneous persistence of high unemployment as showed in Section 2.2 suggests that price stability alone was insufficient to stimulate employment generation in the Republic of Congo.

2.4 Synthesis

Combining facts, the stylized facts presented in this section reveal a macroeconomic trajectory in which inflation and unemployment have not consistently moved in opposite directions, as the classical Phillips curve would predict. Rather, both variables have at times deteriorated simultaneously particularly during the 1993-1997 civil conflict period and again during 2019-2022 while periods of relative stability in both were associated with structural improvements in governance, oil revenue management, and external debt conditions rather than deliberate inflation–unemployment trade-off management.

3 Literature Review and Hypothesis

3.1 Theoretical Framework

3.1.1 The Keynesian Approach

The Keynesian tradition on the inflation–unemployment relationship originates with the seminal contribution of (Phillips, 1958b) ^[30], who empirically found an inverse relationship between the rate of change of nominal wages and the unemployment rate in the United Kingdom over the period 1861–1957. Phillips argued that when unemployment declines, workers gain bargaining power and demand higher wages; firms subsequently pass increased labor costs to consumers through higher prices, generating inflationary pressure. Policymakers therefore face a fundamental trade-off: they may reduce unemployment by accepting higher inflation, or reduce inflation by tolerating higher unemployment, but cannot achieve both objectives simultaneously. (Lipsey, 1957) ^[21] extended this analysis, formalizing the inflation–unemployment trade-off and describing it as a genuine policy dilemma.

However, the empirical validity of this inverse relationship was fundamentally challenged by the macroeconomic turbulence of the 1970s including the collapse of the Bretton Woods system (Bordo, 2020) ^[4], the first oil shock triggered by the Yom Kippur War in 1973, and the Iranian Revolution oil shock of 1979 (Barsky & Kilian, 2004) ^[2] which produced simultaneous high inflation and high unemployment (stagflation) across many economies, demonstrating that the two variables could deteriorate concurrently rather than moving in opposite directions (Kumaraswamy, 1999) ^[20]. Samuelson and Solow adapted the Phillips curve to the United States context, confirming a negative relationship between the two variables and suggesting that policymakers could choose among combinations of inflation and unemployment rates along the curve. Their analysis was grounded in the mark-up pricing approach, which treats the price-setting margin as fixed when wages constitute the principal production cost component. They estimated that maintaining price stability would require accepting an unemployment rate of 5–6%, while achieving 3% unemployment would necessitate tolerating inflation of 4–5% (Hoover, 2015) ^[16].

3.1.2 Monetarist Approach

In the monetarist approach, (Friedman, 1986) ^[10, 11] and (Gbaguidi, 2013) ^[13] argue that, in the long term, the share of the unemployed active population remains at its equilibrium level, and there is no inverse relationship between the inflation rate and the unemployment rate. In this direction (Friedman & Schwartz, 1986) ^[10, 11] by analyzing the inflation-unemployment dilemma, questions the Phillips curve. According to him, Keynesian policies are ineffective in the long term. Inflation has no influence on unemployment since it does not depend on nominal wages, but rather on real wages. On the other hand (Gbaguidi, 2013) ^[13], by examining this problem, insists on Friedman ideas. In his research, (Friedman, 1986) ^[10, 11] recognizes the existence of Phillips theory in the short term.

Overall, as workers revise their inflation expectations upward, they demand real wage increases that eliminate the employment stimulus of expansionary monetary policy. Consequently, the long-run Phillips curve becomes vertical at the Non-Accelerating Inflation Rate of Unemployment (NAIRU), a structural unemployment rate determined by real labor market conditions, not by the rate of inflation. (Hall *et al.*, 1975) ^[14] further emphasized that unemployment depends on real wages rather than nominal wages, rendering monetary expansion incapable of producing lasting reductions in unemployment. (Gbaguidi, 2013) ^[13] corroborated this monetarist position, confirming the short-run existence but long-run irrelevance of the Phillips curve trade-off and reaffirming the vertical long-run curve and the absence of a sustainable inflation–unemployment arbitrage.

3.1.3 The New Classical School and Rational Expectations

The New Classical School, drawing on the rational expectations hypothesis, provided the most decisive theoretical challenge to the activist use of monetary policy for employment purposes. (Lucas, 1972) ^[23] demonstrated that only unanticipated changes in the money supply have real effects on output and employment. When economic agents form rational expectations, they anticipate the

inflationary consequences of monetary expansion, adjusting their wage and price demands accordingly. As a result, the Phillips curve shifts upward, the unemployment rate returns to its equilibrium level regardless of the inflation rate, and discretionary monetary policy becomes ineffective in permanently reducing unemployment. (Sargent and Wallace 1976) ^[31] extended this reasoning through the principle of policy invariance: in a world of rational expectations, systematic monetary and fiscal policies are anticipated by agents and therefore cannot alter real variables such as output or unemployment overall. These New Classical insights established the theoretical foundations for the modern consensus that inflation targeting, rather than inflation–unemployment trade-off management, should be the primary objective of monetary policy a framework directly relevant to the BEAC's monetary policy mandate within the CEMAC zone.

3.2 Empirical Evidence

Blanchard *et al.*, (2015) ^[3] argue that the Phillips curve has steadily weakened in the U.S., this suggests that there is no automatic and long-lasting trade-off between Inflation and unemployment. (Makris & Stavroyiannis, 2019) ^[24] applying unit root, Johansen cointegration, and Granger causality tests to U.S. data for 1977–2012, similarly found no evidence of a causal effect between the two variables, though detecting an inverse relationship in levels. Based on empirical analysis of Greece using a nonlinear ARDL approach, concluded that eventually, positive unemployment shocks affect inflation with greater intensity than negative shocks, while the short-run trade-off exhibits linearity with inflation responding more strongly during expansionary periods, (Pegkas, 2024) ^[26]. (Zaman *et al.*, 2011) ^[34], applying VECM to Greek data for 1980–2010, identified a long-run causal relationship between inflation and unemployment, projecting that inflation shocks initially reduce unemployment before reversing course over a ten-year horizon.

In their study, (Caporale & Skare, 2011) ^[6] worked on 119 OECD countries between 1970–2010, confirmed a unidirectional cointegration relationship between employment growth, inflation, and output growth, with bidirectional causality between employment and inflation validating what they termed the Golden Triangle of Phillips. In addition, (Ho & Iyke, 2018) ^[15] using fixed-effects threshold regression for 11 European countries over 1999–2017, demonstrated that the inflation–unemployment relationship is nonlinear: it is negative when unemployment falls below 5%, transitions to positive between 5% and 6.54%, and becomes statistically insignificant above the 6.54% threshold. Furthermore, (Ayad & Djedaiet, 2024) ^[1] confirmed bidirectional causality between inflation and unemployment across G7 countries over 1991–2021.

Conversely, (Toda & Yamamoto, 1995) ^[33] applying the Toda-Yamamoto causality test and Johansen cointegration to German data for 1992–2023, found no short-run or long-run causal relationship between the two variables.

Overall, the evidence from developed economies suggests that the classical Phillips curve inverse relationship has weakened since the 1980s, with findings ranging from no relationship to positive co-movement, depending on the country, time, and methodology employed. In Malaysia, applying the ARDL model to data for 1975–2007, validated a long run cointegration relationship between inflation and unemployment and a unidirectional causal relationship from inflation to unemployment, consistent with the Phillips

curve hypothesis. Collectively, the developing country evidence highlights that the direction and magnitude of the inflation–unemployment relationship is extremely sensitive to structural economic conditions, institutional quality, and the monetary policy framework reinforcing the need for country-specific empirical investigations such as the present study.

3.3 Research Gap

Despite the growing literature on inflation and unemployment, empirical evidence from the Republic of the Congo remains limited. Existing studies rarely incorporate broader structural variables such as exports, imports, gross fixed capital formation, population growth, and GDP per capita

capita growth within a unified time-series framework. Furthermore, few studies apply the ARDL methodology to examine both short-run and long-run dynamics of inflation and unemployment in resource-dependent Central African economies. Given the structural characteristics of the Congolese economy, including oil dependence, external vulnerability, and weak productive diversification, the traditional Phillips curve relationship may not adequately explain labor market outcomes. This study therefore seeks to fill this gap by examining the inflation-unemployment relationship in the Republic of the Congo using the ARDL approach while incorporating broader macroeconomic determinants of unemployment.

3.4 Research Framework and Hypothesis

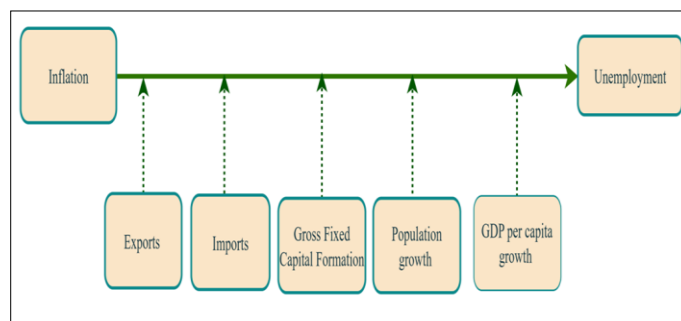


Fig 4: Research framework

The first hypothesis (H1) posits a positive relationship between inflation and unemployment, consistent with the Tobin (1972) [32] and Fitoussi (1973) [12] stagflation framework applicable to structurally weak, commodity-dependent economies, and contradicting the classical Phillips curve prediction. The second hypothesis (H2) posits

a negative relationship between GDP per capita growth and unemployment, consistent with Okun's Law and the standard growth-employment nexus. Hypotheses H3 through H5 address the control variables included in the model, drawing on standard open-economy macroeconomic theory.

Table 1: Summary of Research Hypotheses

Hypothesis	Variable Relationship	Expected Effect
H1	Inflation → Unemployment	Positive
H2	Exports → Unemployment	Negative
H3a	Imports → Unemployment	Negative
H3b	Gross Fixed Capital Formation → Unemployment	Positive
H4	Population growth → Unemployment	Negative
H5	GDP per capita growth → Unemployment	Positive

4. Data and Methodology

This section outlines the data sources, variable definitions, and econometric methodology used to analyze the relationship between inflation and unemployment in the Republic of Congo. Given the dynamic nature of macroeconomic relationships and the structural characteristics of the Congolese economy, a robust empirical strategy is required to capture both short-run and long-run interactions among variables. The study adopts a time-series econometric approach, using annual data over the period 1990–2022. The choice of methodology is guided by both theoretical considerations and the statistical

properties of the data. In particular, the Autoregressive Distributed Lag (ARDL) model is employed due to its flexibility in handling variables with different orders of integration and its suitability for small sample sizes.

4.1 Data Sources and Sample Period

The empirical analysis is based on annual time-series data from 1990 to 2022, which provides a sufficiently long horizon to capture structural changes, economic cycles, and external shocks affecting the Congolese economy. The data are collected from recognized and reliable sources.

Table 2: Data Sources and Sample Period

Category	Detail	Purpose / Justification
Data source 1	World Bank – World Development Indicators (WDI)	Ensure consistency, comparability, and reliability of the data
Data source 2	National statistical agencies and central bank reports (where applicable)	Ensure consistency, comparability, and reliability of the data
Sample period rationale 1	Captures key economic events	Includes the 1994 CFA franc devaluation, oil price boom periods, and the COVID-19 pandemic
Sample period rationale 2	Sufficient observations for econometric analysis	Provides an adequate number of data points to ensure statistical robustness
Sample period rationale 3	Covers pre- and post-reform conditions	Reflects both pre- and post-reform economic conditions in the Republic of Congo

4.2 Model Specification

To examine the determinants of unemployment, the study specifies the following functional relationship: This research methodology is based on the empirical approach of Okoebor *et al.* (2023) ^[9], who studied the relationship between unemployment and price level in Nigeria. These authors used an autoregressive model (ARDL) whose equation is as follows:

$$UR_t = f(INF_t, GDPG_t, LnEXR_t)$$

t: the temporal index; UR: the unemployment rate; INF: the inflation rate; GDPG: the gross domestic product; LnEXR: the natural logarithm of the exchange rate.

The choice of this model in the context of the Republic of Congo is dictated by practical considerations. This model seems more willing to capture the relationship between inflation and unemployment. Based on (Ehi. O *et al.*, 2023) ^[9] research, our econometric model is built by admitting that there is no relationship between inflation and Phillips-type unemployment in the Republic of Congo. Thus, we have extended our model by integrating the following control variables: exports, imports, gross fixed capital formation, population growth or population growth rate, and the per capita GDP growth rate. These data have been retained because of their theoretical and practical consideration. We have selected two models in this study, namely: theoretical model and the empirical model.

Theoretical Model

This relationship is attached to an idea related to the existence of an adjustment mechanism on the labor market; an increased demand for work reduces the unemployment rate. This increases the bargaining power of employees and stimulates an increase in wages. To simplify, we present this relationship as a linear relationship between the unemployment rate and the rate of wage growth:

$$\Delta w_t = a - cU_t + \varepsilon_t \quad (1)$$

Δw_t is the rate of wage growth (approximated as a function of the variation in the logarithm w of the salary per person), corresponds to unemployment rates, and the random shock, in which the relationship is presumed to be decreasing, which is expressed by a "minus" sign in front of the parameter c which is considered positive. Formally, this entails work after the introduction of inflation expectations in the Phillips curve. The following relation represents this curve in its augmented form:

$$\Delta w_t = a - b\Delta p_t - cU_t + \varepsilon_t \quad (2)$$

Δp_t illustrates the expected inflation rate. The Phillips curve increased by a unit indexation manifests itself in the hypothesis of absence of nominal illusion, which is represented in relation (2) by the condition $b=1$. In this context, it seems that a continuous increase in inflation, with an equivalent increase in the rate of wage growth, cannot lead to a lasting decrease in unemployment. In other words, it is a model that has the particularity of estimating the short- and long-term dynamics for series that are cointegrated. Thus, allowing the estimation of an error correction/MCE model. The equation of this model can be represented as follows:

$$\Delta w_t = a - b_0\Delta p_t + \dots + b_k\Delta p_{t-1} - cU_t + \varepsilon_t \quad (3)$$

Empirical model

The model chosen in this work for estimation purposes is the stepped delay autoregressive model (ARDL). In the sense of Kuma (2018) ^[19], it is a dynamic model, which considers in a particular way the temporal movement (adjustment delay, expectations, etc.) in the explanation of a variable (time series), with the aim of improving the forecasts and the effectiveness of policies, decisions, actions, etc. In opposition to the simple or non-dynamic model, whose instantaneous explanation restores only part of the variation of the variable to be explained.

In other words, it is a model that has the particularity of estimating the short- and long-term dynamics for series that are cointegrated or that are not integrated into the same orders, thus allowing the estimation of an error correction/MCE model. The equation of this model can be represented as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^q \alpha_{2i} \Delta x_{t-i} + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \varepsilon_t$$

y_t the variable to be explained; x_{t-1} the vector of the explanatory variables; α_{1i} et α_{2i} the short-term effects; β_1 et β_2 the long-term effects; Δ the primary difference; and the error term; ε_t the error term. Thus, our model (1) can be rewritten in the following form:

$$UR_t = f(rINF_t, rEXPT, rIMP_t, rGFCF_t, rPOPGR_t, rGDPPCGR_t) \quad (2)$$

By applying the general form of the ARDL model to the variables selected in this research, the specified model translates as follows:

$$\begin{aligned} \Delta UR_t = & \sum_{i=1}^p \alpha_{1i} \Delta UR_{t-i} + \sum_{i=0}^q \alpha_{2i} \Delta rINF_{t-i} + \sum_{i=0}^q \alpha_{3i} rEXP_{t-i} + \\ & \sum_{i=0}^q \alpha_{4i} \Delta rIMP_{t-i} + \sum_{i=0}^q \alpha_{5i} \Delta rGFCF_{t-i} + \sum_{i=0}^q \alpha_{6i} \Delta rPOPGR_{t-i} + \\ & \sum_{i=0}^q \alpha_{7i} \Delta rGDPPCGR_{t-1} + \beta_1 \Delta UR_{t-1} + \beta_2 rINF_{t-1} + \beta_3 rEXP_{t-1} + \beta_4 rIMP_{t-1} + \\ & \beta_5 rGFCF_{t-1} + \beta_6 rPOPGR_{t-1} + \beta_7 rGDPPCGR_{t-1} + \mu_t \end{aligned} \quad (3)$$

Δ : the first difference operator; α_0 : the constant; $\alpha_1 \dots \alpha_7$: the short-term effects; $\beta_1 \dots \beta_7$: the long-term dynamics of the model; $\varepsilon \sim (0,)$: the error term (white noise); (p, q): the optimum shifts; i: the index of the country of origin; t: the temporal index; α et β : the unknown parameters to be estimated, r: rate.

5. Results

For our empirical study, we selected annual data for the Republic of Congo. Thus, all the data used in this study except for the GDP per capita growth rate (GDPPCGR), which is obtained from the Perspective Monde database namely the unemployment rate (UR), inflation rate (INF), exports (EXP), imports (IMP), gross fixed capital formation (GFCF), and population growth rate (POPGR), are sourced from statistics provided by the World Bank (2023).

Table 3: Variables and Expected Signs

Variables	Sources	expected sign
Unemployment Rate: UR	World Bank (WDI)	
Inflation Rate: INF	World Bank (WDI)	+
Exports: EXP	World Bank (WDI)	-
Imports: IMP	World Bank (WDI)	+
Gross Fixed Capital Formation: GFCF	World Bank (WDI)	-
Population Growth Rate: POPGR	World Bank (WDI)	+
GDP per Capita Growth Rate: GDPPCGR	Perspective Monde	-

Source: Author's compilation based on literature review

Table 4: Results of Descriptive Statistics

Statistic	UR	INF	EXP	IMP	GFCF	POPGR	GDPPCGR
Mean	16.67806	4.371887	65.19989	54.07496	33.95776	2.865471	-1.471463
Median	19.72000	3.043443	69.08843	53.16100	26.58525	2.745972	-0.610669
Maximum	22.37300	42.43968	81.51643	84.81484	79.46179	4.155897	8.031166
Minimum	9.600000	-3.935468	40.69210	16.44861	17.23097	2.053684	-12.44246
Standard Deviation	4.652736	7.587596	12.68158	16.34700	16.25600	0.598178	5.183724
Skewness	-0.634413	3.950273	-0.655015	-0.283999	1.474499	0.713981	-0.065941
Kurtosis	1.627110	20.53743	2.222509	3.036625	4.468270	2.249310	2.220365
Jarque-Bera	4.805279	508.7225	3.190919	0.445451	14.92205	3.578586	0.859683
Probability	0.090479	0.000000	0.202815	0.800335	0.000575	0.167078	0.650612
Sum	550.3760	144.2723	2151.596	1784.474	1120.606	94.56056	-48.55827
Sum of Squared Deviations	692.7344	1842.292	5146.320	8551.181	8456.237	11.45013	859.8717
Observations	33	33	33	33	33	33	33

Source: Author's calculations based on data from Perspective Monde and the World Bank (2024), using EViews 10.

5.1 Model Estimation, Results, and Interpretation

Any estimation requires the examination of the various econometric tests. Thus, we examined the tests of stationarity of the time series, correlation, causality between the variables, and cointegration at the terminals. The choice of these tests depends on the nature of the data.

5.1.1 Stationarity test

To evaluate the order of data integration, the documentation on unit roots offers several tests. We used two-unit root tests, namely: the augmented Dickey Fuller test (ADF) and the (Dickey & Fuller, 1981) [8]. These tests are usually used to verify the existence of a unit root in a series.

▪ **Increased Dickey-Fuller Test**

This test proceeds with the verification of the null hypothesis $H_0: \rho = 1$ against the alternative hypothesis.

$H_1: \rho < 1$: It is based on the least square's estimation of the following three models: $\Delta X_t = (p - 1) X_{t-1} + \sum_{j=2}^k \theta_j \Delta_{t-j+1} + \varepsilon_t$ Process without trend or constant;

$\Delta X_t = (p - 1) X_{t-1} + \sum_{j=2}^k \theta_j \Delta_{t-j+1} + \alpha + \varepsilon_t$ Process without trend and with constant;

$\Delta X_t = (p - 1) X_{t-1} + \dots$ Dynamic without trend and with constant;

The hypotheses of the Augmented Dickey Fuller Test (ADF) are:

- $H_0: \rho = 1$ (the series is non-stationary)
- $H_1: |\rho| < 1$ the series is stationary.
- If the absolute value of the ADF statistics is higher than the critical value (or if the probability is less than 5%), the hypothesis H_1 is accepted: The X series is stationary.
- If the absolute value of the Dickey Fuller Augmented statistic (ADF) is less than the critical value (or if the probability is higher than or equal to 5%), then we accept the H_0 hypothesis: The X series is non-stationary. The tests are conducted at the significant level of 5%.

▪ **Phillips-Perron test**

Phillips-Perron (1988), on the other hand, submits a non-parametric method to correct the presence of autocorrelation, based on the verification of the hypothesis posed by Dickey-Fuller, without having to add delayed endogenous variables as in the ADF method. The procedure aims to examine the hypothesis of unit root $H_0: \rho = 0$ in the models below:

$\Delta Y_t = \rho Y_{t-1} + \alpha + \beta t + \varepsilon_t$

$\Delta Y_t = \rho Y_{t-1} + \alpha + \varepsilon_t$

$\Delta Y_t = \rho Y_{t-1} + \varepsilon_t$

Table 5: ADF and PP stationarity tests

Variables	Level of Tests	Test Type	Without Constant & Trend	With Constant & No Trend	With Constant & Trend	Critical Value (5%)	Test Statistic	Decision
UR	Level	ADF	No	No	Yes	-1.951687	-0.317435	I (1)
		PP	No	No	No	-1.951687	-0.317435	
	First Difference	ADF	Yes	Yes	No	-1.956406	-2.873184	
		PP	Yes	Yes	Yes	-1.952066	-4.818248	
INF	Level	ADF	Yes	Yes	Yes	-1.951687	-3.511878	I (0)
		PP	Yes	Yes	Yes	-1.951687	-3.481616	

	First Difference	ADF	Yes	Yes	Yes	-1.955020	-4.250057	
		PP	Yes	Yes	Yes	-1.952066	-14.84195	
EXP	Level	ADF	No	No	No	-1.951687	0.090829	I (1)
		PP	No	No	No	-1.951687	0.065458	
	First Difference	ADF	Yes	Yes	Yes	-1.952066	-5.235351	
		PP	Yes	Yes	Yes	-1.952066	-5.236623	
IMP	Level	ADF	No	Yes	Yes	-1.951687	-0.548684	I (1)
		PP	No	Yes	Yes	-1.951687	-0.323587	
	First Difference	ADF	Yes	Yes	Yes	-1.952910	-4.919088	
		PP	Yes	Yes	Yes	-1.952066	-8.588552	
GFCF	Level	ADF	No	No	No	-1.951687	-0.986947	I (1)
		PP	No	No	No	-1.951687	-0.770747	
	First Difference	ADF	Yes	Yes	Yes	-1.952066	-5.950639	
		PP	Yes	Yes	Yes	-1.952066	-6.533489	
POPGR	Level	ADF	No	No	No	-1.952473	-0.502816	I (1)
		PP	No	No	No	-1.951687	-0.569217	
	First Difference	ADF	Yes	Yes	Yes	-1.952473	-6.033904	
		PP	Yes	Yes	Yes	-1.952066	-6.305269	
GDPPCGR	Level	ADF	Yes	Yes	Yes	-1.951687	-3.692763	I (0)
		PP	Yes	Yes	Yes	-1.951687	-3.684022	
	First Difference	ADF	Yes	Yes	Yes	-1.952066	-8.986080	
		PP	Yes	Yes	Yes	-1.952066	-18.37463	

5.1.2 Correlation test

The purpose of this test is to verify whether the series of explanatory variables is linked together (phenomenon of multicollinearity). This test not only encourages the instability of the estimated coefficients, but it also leads to an increase in the estimated variance of certain values

(Erkel, 1995). These results suggest a probable multicollinearity among the studied variables, as the degree of association exceeds 50% for several pairs. This makes it possible to note the existence of a probable multicollinearity between the variables studied. The results of this test are recorded in Table 4.

Table 6: Correlation Matrix of the Study Variables

	UR	INF	EXP	IMP	GFCF	POPGR	GDPPCGR
UR	1	0.1733	0.3187	-0.1394	-0.5919	0.0660	0.0683
INF	0.1733	1	0.0089	0.3416	0.2168	-0.0970	-0.1611
EXP	0.3187	0.0089	1	0.2710	-0.4460	0.2732	0.2511
IMP	-0.1394	0.3416	0.2710	1	0.6042	-0.0335	-0.2987
GFCF	-0.5919	0.2168	-0.4460	0.6042	1	0.0180	-0.2470
POPGR	0.0660	-0.0970	0.2732	-0.0335	0.0180	1	0.5438
GDPPCGR	0.0683	-0.1611	0.2511	-0.2987	-0.2470	0.5438	1

Source: Author's calculations based on data from the World Bank (2024), processed using EViews 10 software.

These are the inflation rate (TINF) and the GDP per capita growth rate (TPIBH), while the other five series are stationary in first difference I (1). Therefore, we can say that not all the series selected in this work are integrated in the same order. This leads us to confirm the hypothesis of a cointegration relationship and, therefore, the use of the ARDL model.

When the non-stationary variables are not cointegrated or are integrated in different orders, the traditional Granger causality test becomes ineffective. In this case, we apply the Toda- causality test; this study is based on the Wald "W" statistics. It is distributed according to a chi-square. The null hypothesis, therefore, implies the absence of a causal link between the variables (probability greater than 5%). The results of this test are given in the following table:

5.2 Causality test between variables

Table 7: Results of the causality test of Toda and Yamamoto

Dependent Variables	UR	INF	EXP	IMP	GFCF	POPGR	GDPPCGR
UR	–	0.4012	1.1463	4.1137	0.5889	1.4065	0.4116
INF	0.5321	–	0.8840	0.5076	0.1615	0.3151	1.8479
EXP	0.4181	0.3274	–	10.6677**	5.6761*	0.0466	0.2868
IMP	0.5935	0.0809	0.4973	–	6.2973**	0.5863	1.4908
GFCF	2.8965	0.0025	2.4681	8.6992**	–	0.3568	0.1609
POPGR	0.1472	0.0412	3.1106	6.1057**	4.0563	–	1.9590
GDPPCGR	3.4692	0.0365	3.9502	1.5370	2.1842	0.6311	–

NB: *** significant at the 1% threshold; ** significant at the 5% threshold; * significant at the 10% threshold.

Source: Author on the World Bank 2024 database, from the Eviews 10 software.

The table above shows a one-way causality between certain variables of the model, namely:

- A unidirectional and statistically significant causality between imports and variables such as exports, gross fixed capital formation, and population growth at the 5% threshold. This result implies that imports positively and significantly influence exports, gross fixed capital formation, and population growth. In the Republic of Congo, he reveals that imports are an effective way to promote public investment, exports, and population growth.
- A statistically significant unidirectional causality between gross fixed capital formation and the variables "exports and imports", respectively, at the limits of 10% and 5%. This means that gross fixed capital formation has a significant effect on the export and import variables. All these results reveal that in the Republic of Congo, an improvement in public investments leads to an increase in exports and imports.

5.3 Bounds cointegration test

The boundary cointegration test or Pesaran *et al.* test (2001) [27] is an important test in the exclusive verification of cointegrated variables in an ARDL model. It is based on a comparison between the calculated F-statistics and the critical values that form limits, to detect a cointegration relationship as stated by the following hypotheses:

- If Fisher > upper bound: cointegration exists.
- If Fisher < lower bound: cointegration does not exist.
- If lower bound < Fisher < upper bound: no conclusion.

Discussion

The empirical results of this study reveal a positive and statistically significant relationship between inflation and unemployment in the Republic of Congo across both short-run and long-run horizons, a finding that fundamentally challenges the inverse trade-off posited by the traditional Phillips curve (Phillips, 1958; Samuelson & Solow, 1960) [29, 30]. The ARDL bounds test confirms cointegration among the variables (F-statistic = 4.53, exceeding the upper bound at the 5% significance level), while the model explains over 96% of the variance in unemployment ($R^2 = 0.969$), demonstrating strong explanatory power. The error correction mechanism is valid and statistically significant, confirming the existence of a stable long-run equilibrium relationship. These findings are discussed below considering the extant theoretical and empirical literature.

The most central finding of this study shows a positive and statistically significant effect of inflation on unemployment in the Republic of Congo, in both the short and long run. This result stands in direct contrast to the Keynesian Phillips curve tradition, which posits that higher inflation, driven by expanding aggregate demand, reduces unemployment by stimulating output and labor absorption (Lipsey, 1960) [22]. Under the classical Phillips curve framework, policymakers face a trade-off: accepting higher inflation to lower unemployment or tolerating higher unemployment to control inflation. The Congolese evidence decisively rejects this trade-off.

Instead, the positive inflation–unemployment relationship observed in this study aligns with the structural stagflation frameworks advanced by Tobin (1972) [32] and Fitoussi (1973) [12], which argue that in structurally weak economies, inflation and unemployment can rise simultaneously due to

supply-side rigidities, cost-push pressures, and the absence of effective labor market adjustment mechanisms. This pattern is sometimes described as stagflation is well documented in economies heavily dependent on commodity exports and characterized by shallow financial markets, inadequate productive diversification, and persistent institutional fragilities. In Congo-Brazzaville, the dependence on oil revenues, which generate limited employment relative to GDP, means that inflationary episodes often imported through rising import prices or triggered by monetary expansion erode real purchasing power without stimulating domestic job creation. This simultaneously squeezes household incomes and discourages labor-intensive private investment, pushing unemployment higher.

This positive relationship between inflation and unemployment is not unique to the Congolese context but has been documented in several comparable developing economies. (Idenyi *et al.*, 2017) [17] found similar results in Nigeria using the ARDL and DOLS models, attributing the co-movement of inflation and unemployment to structural supply-side constraints and the dominance of the informal sector. (Ehi-Okoebor *et al.*, 2023) [9], employing FMOLS and ARDL methods across the period 1999-2021, likewise confirmed a positive inflation–unemployment dynamic in Nigeria, consistent with the Tobin-Fitoussi hypothesis. In contrast, (Besso, 2010), studying Cameroon over 1993-2003 using maximum likelihood estimation, found support for the standard Phillips curve a discrepancy that may reflect differences in monetary policy regimes, oil dependence, and labor market structures between the two CEMAC economies. In developed country contexts, (Kaletsky, 2010) [18] similarly found that inflation positively influences the unemployment rate in the United Kingdom, while (Zaman *et al.*, 2011) [34] identified a long-run cointegrating relationship between the two variables in Greece, suggesting that the classical inverse relationship is by no means universal even in more advanced economic settings.

Furthermore, the monetarist critique of the Phillips curve (Friedman, 1968; Milton, 1986) [10, 11] argues that in the long run, the curve becomes vertical at the natural rate of unemployment (NAIRU), rendering monetary expansion ineffective in permanently reducing unemployment. The Congolese results are broadly consistent with this monetarist prediction: persistent inflation has not reduced unemployment but has, in fact, been associated with its increase. The new classical school (Lucas, 1972; Sargent & Wallace, 1976) [23, 31] further supports this through the principle of policy invariance rational agents anticipate inflationary monetary policies, neutralizing their real effects on employment. While these frameworks were developed in the context of advanced economies, their implications are instructive for Congo, where inflationary pressures repeatedly failed to translate into employment gains during the study period (1990-2022).

Consistent with theoretical expectations and the study's second hypothesis (H2), GDP per capita growth exerts a significant negative effect on unemployment in both the short and long run. This finding aligns with Okun's Law (Okun, 1962), which establishes an inverse relationship between real economic growth and unemployment: as output per capita expands, labor demand increases, absorbing previously unemployed workers. The result underscores the primacy of economic growth as the most reliable lever for reducing joblessness in resource-dependent

economies such as Congo-Brazzaville. This result is consistent with evidence from several comparable developing economies. (Caporale & Skare, 2011) ^[6] in a study of 119 OECD and emerging economies using dynamic fixed-effects and VECM models, confirmed a unidirectional cointegration relationship between output growth and employment, affirming the existence of the "Golden Triangle" of growth, inflation, and employment. (Wulandari *et al.* 2019), studying Indonesia, similarly found that per capita income growth is significantly associated with lower unemployment rates. In the Congolese context, the negative effect of GDP per capita growth on unemployment was particularly pronounced during the 2005–2019 period, when improved oil revenues, debt relief under the Heavily Indebted Poor Countries (HIPC) initiative, and expanding non-oil sectors collectively reduced unemployment from approximately 22% to under 10%, consistent with the pattern observed in the stylized facts analysis. These dynamics confirm that growth-oriented fiscal and structural policies are substantially more effective than inflation management alone in addressing unemployment in the Congolese context.

The study finds that exports reduce unemployment in the short run, consistent with hypothesis H3a, but paradoxically increase unemployment in the long run a result that warrants careful interpretation. In the short run, export earnings generate fiscal revenues that finance public wages and government-led employment programs, particularly in the oil sector and related services, thereby temporarily reducing open unemployment. This is consistent with findings by (Otame, 2016) ^[25], who documented positive short-run employment effects of export revenues in resource-rich Sub-Saharan African economies. However, the long-run positive effect of exports on unemployment reflects a well-known structural pathology of resource-dependent economies: the enclave nature of extractive export sectors (predominantly oil in Congo's case), which generate high revenues but minimal domestic employment, particularly for low- and medium-skilled workers. This dynamic is consistent with the "resource curse" literature (Sachs & Warner, 1995), which demonstrates that commodity export dependence tends to crowd out labor-intensive manufacturing and services, concentrates wealth in capital-intensive enclaves, and ultimately weakens employment generation capacity over time. The Toda-Yamamoto causality results further reveal that gross fixed capital formation Granger-causes exports at the 10% level, suggesting that public investment decisions influence Congo's export trajectory, but without ensuring that these investments are channeled toward employment-generating productive sectors.

Imports are found to increase unemployment in the short run consistent with hypothesis H3b as imported goods substitute domestic production, reducing demand for local labor. This result echoes standard trade theory predictions and has been documented in comparable African contexts. In the long run, however, imports exert a negative effect on unemployment, reflecting the role of capital goods and intermediate inputs in enabling domestic production capacity. The causality analysis shows that imports significantly influence gross fixed capital formation (at the 5% level), suggesting that the importation of machinery and equipment supports capital accumulation processes that eventually sustain employment. Gross fixed capital formation (GFCF) reduces unemployment in the short run,

consistent with hypothesis H4, as public investment particularly through special economic zones and infrastructure programs absorbs labor directly and stimulates multiplier effects in downstream sectors. However, in the long run, GFCF is associated with higher unemployment, a result that reflects the capital-intensive and import-dependent nature of public investment in Congo, which tends to generate limited domestic employment while crowding out private sector activity.

This finding is consistent with evidence from other Central African economies where public investment returns are constrained by governance deficits and implementation bottlenecks (African Development Bank, 2018). Population growth is found to increase unemployment in the short run, as hypothesis H5 anticipates, reflecting the well-established challenge that rapid demographic expansion outpaces the economy's job creation capacity (ILO, 2020). In the long run, however, population growth becomes statistically insignificant, suggesting that its unemployment effects dissipate once structural economic adjustments are accounted for. This long-run neutrality may indicate that population growth gradually shifts from a labor supply pressure to a domestic demand stimulus, contingent on growth-enabling institutional conditions that Congo has yet to fully consolidate.

Conclusion, Limitations and Future Research Direction

Conclusion

This study investigated the relationship between inflation and unemployment in the Republic of the Congo over the period 1990-2022 using the Autoregressive Distributed Lag (ARDL) approach. By incorporating additional macroeconomic variables, including exports, imports, gross fixed capital formation, population growth, and GDP per capita growth, the study sought to provide a more comprehensive understanding of the structural determinants of unemployment within a resource-dependent African economy. The empirical findings confirm the existence of a long-term cointegration relationship among the variables. More importantly, inflation was found to exert a positive and statistically significant effect on unemployment in both the short run and the long run. This outcome contradicts the traditional Phillips curve hypothesis and instead supports the structuralist and stagflation perspectives, suggesting that inflationary pressures in the Republic of the Congo coexist with persistent unemployment due to structural rigidities and economic vulnerabilities.

The findings further demonstrate that GDP per capita growth contributes to reducing unemployment, confirming the importance of economic expansion for labor-market improvement. However, the limited employment elasticity of growth suggests that the current growth model remains insufficiently inclusive and excessively dependent on the oil sector. Similarly, exports and investment generate short-run employment benefits but fail to produce strong long-run labor-market improvements because of the dominance of capital-intensive economic activities and weak productive diversification. Overall, the results indicate that unemployment in the Republic of the Congo is less driven by conventional demand-management dynamics and more by structural economic constraints, including commodity dependence, external vulnerability, institutional inefficiencies, weak industrialization, and limited productive transformation. Consequently, focused exclusively on inflation stabilization are unlikely to produce substantial

employment gains without complementary structural reforms.

From a policy perspective, the findings suggest the need for a comprehensive development strategy centered on productive diversification and employment-intensive growth. Policymakers should prioritize the development of non-oil sectors, particularly manufacturing, agro-industries, services, and small and medium-sized enterprises capable of generating sustainable employment opportunities. Investment policies should increasingly target labor-intensive productive sectors rather than capital-intensive extractive industries. In addition, strengthening vocational education, entrepreneurial ecosystems, technological capabilities, and industrial competitiveness remain essential for improving labor-market absorption capacity. Since monetary policy is centralized under the Bank of Central African States framework, fiscal policy, industrial policy, and structural reforms should play a more prominent role in employment creation strategies within the Republic of Congo.

Limitations

This study is subject to several limitations that should inform the interpretation of its findings and guide future research. First, the analysis is based on annual data from a single country over 33 observations, which, while sufficient for ARDL estimation, limits the statistical power and generalizability of the results. Future research could extend this analysis to a panel of CEMAC member states to allow cross-country comparison and more robust identification of region-wide dynamics. Second, the study relies exclusively on official World Bank and national statistical data, which may understate the true extent of informal sector employment a structural characteristic that is pronounced in Congo-Brazzaville and is not fully captured by formal unemployment statistics. Third, while the ARDL model controls key macroeconomic variables, unobserved institutional factors including governance quality, political stability, and regulatory environment may confound the estimated relationships. Incorporating institutional proxies in future specifications could strengthen the robustness of the findings. Finally, the absence of high-frequency (quarterly or monthly) data precludes a more granular examination of short-run dynamics and cyclical turning points.

Future Research Direction

Future research could extend the present study in several theoretical and empirical important directions.

First, future studies could incorporate institutional and governance dimensions into the analysis of inflation-unemployment dynamics in developing economies. Variables such as institutional quality, political stability, corruption control, regulatory effectiveness, government capacity, and labor-market institutions may help explain why macroeconomic stabilization policies produce heterogeneous employment outcomes across countries.

Second, future research may apply nonlinear econometric approaches, including nonlinear ARDL (NARDL), threshold models, smooth transition models, and Markov-switching techniques, to capture asymmetric and regime-dependent relationships between inflation and unemployment. These approaches may provide deeper insights into how macroeconomic shocks, commodity-price

volatility, and structural crises affect labor-market dynamics in resource-dependent economies.

Third, comparative panel studies involving Central African or Sub-Saharan African countries could help determine whether the stagflation dynamics identified in this study are specific to the Republic of the Congo or representative of broader structural patterns within resource-dependent African economies.

Finally, future studies may explore the interaction between regional monetary integration and employment outcomes within the Central African Economic and Monetary Community (CEMAC). Research examining the effectiveness of regional monetary arrangements and coordinated macroeconomic policies in addressing unemployment challenges could provide important policy implications for member states operating under shared monetary frameworks.

Declaration of Competing Interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability statement

The data that support this study will be available on request.

References

1. Ayad H, Djedaiet A. Does the unemployment rate matter for environmental issues in the G7 nations? New testing for the environmental Phillips curve using the load capacity factor. *Environment, Development and Sustainability*,2024;28(1):187-217. <https://doi.org/10.1007/s10668-024-04956-0>
2. Barsky RB, Kilian L. Oil and the Macroeconomy Since the 1970s. *Journal of Economic Perspectives*,2004;18(4):115-134. <https://doi.org/10.1257/0895330042632708>
3. Blanchard O, OBlanchard@imf.org, Cerutti E, ECerutti@imf.org, Summers L, LSummers@imf.org. Inflation and Activity—Two Explorations and their Monetary Policy Implications. *IMF Working Papers*,2015;15(230):1. <https://doi.org/10.5089/9781513536613.001>
4. Bordo MD. The Imbalances of the Bretton Woods System 1965 to 1973: U.S. Inflation, the Elephant in the Room. *Open Economies Review*,2020;31(1):195-211. <https://doi.org/10.1007/s11079-019-09574-2>
5. Bükey AM, Kalkan M. Unemployment-Inflation Relationship in Germany. *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*,2024;27(1):106-118. <https://doi.org/10.29249/selcuksbmyd.1408903>
6. Caporale GM, Skare M. Employment Growth, Inflation and Output Growth: Was Phillips Right? Evidence from a Dynamic Panel. *SSRN Electronic Journal*, 2011. <https://doi.org/10.2139/ssrn.1898553>
7. Décret n° 2009-735 du 18 juin 2009 portant publication de l'accord de consolidation de dettes entre le Gouvernement de la République française et le

- Gouvernement de la République du Congo, signé à Paris le 11 décembre 2008, 2009.
8. Dickey DA, Fuller WA. Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica*,1981:49(4):1057. <https://doi.org/10.2307/1912517>
 9. Ehi-Okobor C, Salawu EY, Afolalu SA, Ajayi OO, Kayode JF, Lawal SL. Importance of hybrid organic carburizers on the Mechanical properties of mild steel: A Review. 2023 International Conference on Science, Engineering and Business for Sustainable Development Goals (SEB-SDG), 2023, 1-12. <https://doi.org/10.1109/SEBSDG57117.2023.10124621>
 10. Friedman M. ECONOMISTS AND ECONOMIC POLICY. *Economic Inquiry*,1986:24(1):1-10. <https://doi.org/10.1111/j.1465-7295.1986.tb01793.x>
 11. Friedman M, Schwartz AJ. Has government any role in money? *Journal of Monetary Economics*,1986:17(1):37-62. [https://doi.org/10.1016/0304-3932\(86\)90005-X](https://doi.org/10.1016/0304-3932(86)90005-X)
 12. Fitoussi JP. Inflation, équilibre et chômage. Paris: Cujas, 1973.
 13. Gbaguidi D. La courbe de Phillips: Temps d'arbitrage et/ou arbitrage de temps. *L'Actualité Économique*,2013:88(1):87-119. <https://doi.org/10.7202/1014027ar>
 14. Hall RE, Sims C, Solow R, Gordon RA. The Rigidity of Wages and the Persistence of Unemployment. *Brookings Papers on Economic Activity*,1975:1975(2):301. <https://doi.org/10.2307/2534105>
 15. Ho SY, Iyke BN. Finance-growth-poverty nexus: A re-assessment of the trickle-down hypothesis in China. *Economic Change and Restructuring*,2018:51(3):221-247. <https://doi.org/10.1007/s10644-017-9203-8>
 16. Hoover KD. The Genesis of Samuelson and Solow's Price-Inflation Phillips Curve. *History of Economics Review*,2015:61(1):1-16. <https://doi.org/10.1080/18386318.2015.11681269>
 17. Idenyi O, Favour EO, Johnson N, Thomas O. Understanding the Relationship between Unemployment and Inflation in Nigeria. *Advances in Research*,2017:9(2):1-12. <https://doi.org/10.9734/AIR/2017/32218>
 18. Kaletsky A. *Capitalism 4.0: The birth of a new economy*. 1. publ. Bloomsbury, 2010.
 19. Kuma JK. Modélisation ARDL, Test de cointégration aux bornes et Approche de TodaYamamoto: éléments de théorie et pratiques sur logiciels. cel - 01766214f, 2018.
 20. Kumaraswamy PR. Revisiting the Yom Kippur War: Introduction. *Israel Affairs*,1999:6(1):1-10. <https://doi.org/10.1080/13537129908719544>
 21. Lipsey RG. The Theory of Customs Unions: Trade Diversion and Welfare. *Economica*,1957:24(93):40. <https://doi.org/10.2307/2551626>
 22. Lipsey RG. The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957: A Further Analysis. *Economica*,1960:27(105):1. <https://doi.org/10.2307/2551424>
 23. Lucas RE. Expectations and the neutrality of money. *Journal of Economic Theory*,1972:4(2):103-124. [https://doi.org/10.1016/0022-0531\(72\)90142-1](https://doi.org/10.1016/0022-0531(72)90142-1)
 24. Makris IA, Stavroyiannis S. Short and long-run linear and nonlinear causality between FDI and GDP for the US. *International Journal of Economics and Business Research*,2019:18(4):466. <https://doi.org/10.1504/IJEBR.2019.103098>
 25. Otame L. Does Earnings from Exports reduce or aggravate Poverty and Unemployment in Nigeria. *International Journal of Economics and Business Management*, 2016, 2(1).
 26. Pegkas P. The Asymmetric Effects of Unemployment and Output on Inflation in Greece: A Nonlinear ARDL Approach. *Economies*,2024:12(12):346. <https://doi.org/10.3390/economies12120346>
 27. Pesaran MH, Shin Y, Smith RJ. Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*,2001:16(3):289-326. <https://doi.org/10.1002/jae.616>
 28. Phelps ES. Money-Wage Dynamics and Labor-Market Equilibrium. *Journal of Political Economy*,1968:76(4, Part 2):678-711. <https://doi.org/10.1086/259438>
 29. Phillips AW. The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957. *Economica*,1958a:25(100):283-299. <https://doi.org/10.1111/j.1468-0335.1958.tb00003.x>
 30. Phillips AW. The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957. *Economica*,1958b:25(100):283-299. <https://doi.org/10.1111/j.1468-0335.1958.tb00003.x>
 31. Sargent TJ, Wallace N. Rational expectations and the theory of economic policy. *Journal of Monetary Economics*,1976:2(2):169-183. [https://doi.org/10.1016/0304-3932\(76\)90032-5](https://doi.org/10.1016/0304-3932(76)90032-5)
 32. Tobin J. Inflation and Unemployment. *American Economic Review*,1972:62:1-18.
 33. Toda HY, Yamamoto T. Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*,1995:66(1-2):225-250. [https://doi.org/10.1016/0304-4076\(94\)01616-8](https://doi.org/10.1016/0304-4076(94)01616-8)
 34. Zaman K, Khan MM, Ahmad M, Ikram W. Inflation, Unemployment and the NAIRU in Pakistan (1975-2009). *International Journal of Economics and Finance*,2011:3(1):245. <https://doi.org/10.5539/ijef.v3n1p245>