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Economic Cycles and Employment Growth in the WAEMU Zone: An Analysis Using a Non-Linear ARDL Panel Model

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Abstract: *The West African Economic and Monetary Union (WAEMU) is facing frequent and diverse crises that are affecting economic stability and employment opportunities in the region. It is important to analyze the impact of economic cycles on employment, as the response of employment supply differs during economic growth and contraction. This article uses a lagged non-linear auto-regressive model (NARDL) on panel data from 1990 to 2022, along with various filters, to examine the relationship between employment and business cycles. The study found that there is an asymmetric relationship between economic growth and employment, with the impact of economic recessions being stronger on long-term employment than on short-term employment. The study suggests that countries have not fully utilized their economic potential to benefit employment. To achieve sustainable economic growth and reduce the proliferation of the informal sector, economies should focus their efforts on translating their potential into action.*

Keywords: Economic Cycles, Economic Growth, Employment, NARDL Model, WAEMU

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1. Introduction

The frequent occurrence of external factors, such as health, finance, politics, and climate, has brought the relationship between economic activity and employment to the forefront of concerns for decision-makers and researchers. While Okun's law (1962) proposes a direct relationship between economic growth and unemployment, numerous subsequent studies have failed to confirm this theory (Sadiku et al., 2015; Ademola & Badiru, 2016; Ramzan, 2021; Hlongwane & Daw, 2021). This may be because the correlation is not consistent, and the varying adjustment costs resulting from labor market frictions throughout different time intervals could be responsible for this law's invalidity. The response to job offers differs during economic expansions versus contractions (N'guessan, 2022). Economic contractions often lead to job losses, while economic recoveries do not necessarily lead to job creation at the same level. In cases where the economy does create jobs, the majority of them tend to be low-productivity and vulnerable.

Many nations in sub-Saharan Africa, particularly those that belong to the West African Economic and Monetary Union (WAEMU)[1], have experienced significant production shocks in recent decades. These shocks are primarily due to political, health, and climatic crises. The conflicts in countries like Côte d'Ivoire, Mali,

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Burkina Faso, and Niger have greatly impeded economic activity in the region and frequently resulted in economic sanctions. The Ebola outbreak that occurred from 2013 to 2016 had a similar effect on certain countries in the region. Additionally, these countries are heavily reliant on agriculture, making them susceptible to the impacts of climate change. Unfortunately, these effects disproportionately affect Africa when compared to other continents.

From 2011 to 2019, the WAEMU countries experienced an average annual real GDP growth rate of 5.7%. Unfortunately, the COVID-19 pandemic caused a severe economic impact in 2020, which brought down the GDP growth to 1.7%. The region rebounded in 2021 with a 5.9% growth rate. However, the recent conflict in Ukraine had an impact on the region's economy, resulting in a slight decline in GDP growth to 5.7% in 2022, as stated in the report by the Treasury General Directorate (2023). According to Trinnou (2022), some production sectors have suffered from a reduction in annual rainfall of around 4 cm between 2001 and 2017. Additionally, the West African Development Bank's study suggests that a 1.5°C increase in temperature will result in a 15-20% drop in GDP per capita in all the WAEMU countries, compared to a scenario without climate change (BOAD, 2023). Since the WAEMU countries gained their independence, the region has undergone economic fluctuations resulting in social impacts such as job losses and migration. Therefore, it is essential to evaluate the effect of economic fluctuations on employment to mitigate uncertainties and anticipate responses during an economic recession.

Several studies have investigated the relationship between economic growth and unemployment, including research by Harris and Silverstone (2001), Cuaresma (2003), Silvapule et al. (2004), Marinkov and Geldenhuys (2007), Knotek (2007), Jardin and Stephan (2010), Gouider et al. (2018), and N'Guessan (2022), among others. While some have confirmed an asymmetrical relationship between the two, the conclusions have varied. Some researchers have found that economic contractions have a greater impact on unemployment rates than periods of expansion, while others have found the opposite. Currently, there are no studies that focus on the WAEMU countries, which have experienced numerous economic cycles with periods of growth and contraction since gaining independence. The World Bank (2023) has extensively documented this trend. Insufficient job opportunities have led to an increase in precarious employment scenarios and left many people living in poverty. The economic and monetary framework shared by the WAEMU countries provides a suitable platform for addressing common issues and providing an effective response. The primary goal is to examine how employment levels respond to fluctuations in economic growth and how positive and negative growth differentials impact employment sensitivity.

The study's empirical contribution is centered around the relationship between economic growth and employment, specifically, the asymmetries that arise from this relationship and the impact on stable job creation. The creation of secure job opportunities not only boosts productivity but also stimulates domestic demand and fosters a positive social climate, ultimately promoting economic growth. This is why development partners are interested in promoting quality job creation through the Sustainable Development Goals. To analyze this relationship, the study utilizes a NARDL panel model that incorporates both short-term and long-run equilibrium links, accounting for built-in time lags to address endogeneity and auto-correlation issues. Panel data analysis is also used to control for differences across countries and unobservable components associated with their employment policies. This model builds upon the non-linear autoregressive distributed lag (NARDL) model introduced by Shin et al. (2014) and estimated by Salisu and Isah (2017) in panel data. The NARDL model decomposes economic growth into positive and negative episodes to better evaluate the linearity of panel data, using the test by Campbell and Thompson (2008). In analyzing data over 32 continuous years, from 1990 to 2022, this article provides decision-makers with valuable insight into the capacity of growth to tackle employment problems and anticipate economic uncertainties.

The paper is structured as follows: Section 2 provides a summary of the empirical analysis that examines the asymmetric relationship between economic growth and employment. Section 3 analyzes the trends of economic growth and employment within the study area. Section 4 introduces the non-linear approach of the ARDL model used in this study. Finally, Section 5 presents the results before concluding in Section 6.

2. Literature Review

The relationship between economic growth and employment is a topic that has been extensively studied, with most research assuming a linear relationship between the two variables. However, this approach fails to fully account for economic cycles, regime shifts, and trend breaks during periods of economic growth, especially in the West African context. Recent studies have shown that non-linear specifications are necessary to capture the true relationship between the two variables. In particular, incorporating the asymmetry factor is effective in analyzing the Okun relationship. Studies by several researchers have indicated that economic expansion and contraction have different impacts on unemployment rates. On average, unemployment rates decrease more during periods of expansion than during contractions. Therefore, it's important to consider the asymmetry factor when analyzing the relationship between economic growth and employment.

In the United States, Silvapulle et al. (2004) utilized a dynamic model to investigate the asymmetry in the correlation between cyclical output and unemployment using post-war data. Their findings indicate that the immediate impacts of favorable cyclical output on cyclical unemployment differ significantly from the effects of negative output. Cyclical unemployment is more responsive to negative cyclical output compared to positive output. A similar study conducted by Holmes and Silvertone (2006) analyzed the relationship between unemployment and output using the Markov regime-switching method. Their results indicated that from 1991 to 2001, economic activity underwent a recovery period without the creation of employment opportunities. Another study by Valadkhani and Smyth (2015) investigated the stability of Okun's law through a nonlinear approach. The authors employed a Markov switching model and analyzed data ranging from 1948 to 2015. The findings indicate that the degree of asymmetry within a single regime is significantly greater than the asymmetry among different regimes. Therefore, the results signify a reduction in the strength of Okun's law following the 1981-1982 recession, thus supporting the argument that the current jobless recovery is not unprecedented in the US. In Gunduz's (2020) study, the author examines the relationship between unemployment and industrial production in the US from 1948 to 2018, specifically during structural breaks. The Fourier test was used to identify a long-term relationship between the US unemployment rate and industrial production index variables. The study found that sudden structural changes in the industrial production index affect the long-term unemployment rate. According to Ferraro (2022), the classical search-and-match model is unable to produce the cyclical asymmetry that is observed in the US unemployment rate. To demonstrate this, the author utilized a first-order autoregressive model and analyzed data from 1950-2015. The results indicate that the unemployment rate increases rapidly and sharply at the beginning of recessions, and decreases slowly and gradually during expansions. The trend creates a positive asymmetry in the distribution of changes in the unemployment rate. However, the model generates a counterfactually negative asymmetry.

In Europe, Fouquau (2008) applies a non-dynamic transition regression model to a panel of 20 OECD countries. Based on the annual data from 1970 to 2004, the findings suggest an asymmetrical effect with four distinct regimes. A strong negative correlation between the unemployment rate and output is observed at lower or higher levels of cyclical unemployment. However, this correlation weakens at intermediate levels of unemployment. The Economou and Psarianos (2016) study differentiates the transitory and permanent impacts of output variations on joblessness and examines the impact of employment market safeguards on the Okun coefficients. They employ the Mundlak decomposition technique utilizing data from 13 European Union nations between 1993 and 2014. The findings suggest that the permanent effect of output alterations on unemployment rates holds more significance as compared to the transitory impact. Moreover, heightened labor market safeguards alleviate the adverse impact of a decrease in the output growth rate on unemployment. Tang and Bethencourt (2017) investigated the asymmetrical trade-off relationship between unemployment and output in 12 different countries during a specific period. Using the NARDL model, they discovered an asymmetrical effect between the two variables in seven out of those 12 countries. While the unemployment rate in the Euro area reacts to cyclical outputs in the short term, the adjustment towards a new equilibrium becomes weak in the long term. Zwick (2018) analyzes the stability over time, differences between countries, and asymmetry of behavior in various systems of unemployment and output relationship

in the Eurozone. To achieve this, the author employs a Markov-switching autoregressive model which examines quarterly data from 12 countries within the region ranging from 2001 to 2017. The study shows that the Okun coefficient demonstrates asymmetric and fluctuating behavior in both positive and negative cyclical unemployment scenarios. The response of output to changes in cyclical unemployment is less sensitive during a recession period than it is during an expansion period. Moreover, for most countries, the response of output is less sensitive to changes in cyclical unemployment when it is positive than when it is negative. Boga (2020) conducted a similar study in Turkey, examining the correlation between economic growth and unemployment from 2000 to 2019. The cointegration analysis between GDP and unemployment did not reveal any connection. However, after decomposing the two variables into positive and negative values, the results confirmed an asymmetrical cointegration and a unidirectional causal relationship between GDP and unemployment. Periods of economic contraction have been found to increase unemployment rates in Turkey. Conversely, economic recovery has been shown to not affect unemployment rates. In their 2021 study, Mihajlovic and Fedajev analyzed the asymmetric effects of the relationship between unemployment and output in Southeast European countries from 2000 to 2019. Using a NARDL approach, the authors found an asymmetry in Okun's law in five out of the eight observed countries, suggesting that unemployment reacts more strongly during economic slowdowns than during periods of recovery.

Recent studies have examined the relationship between economic growth and unemployment at the borders of European countries. In their analysis of time series data from 1986 to 2020, Rehman et al. (2022) investigate the impact of inflation, poverty, unemployment, and population growth on economic growth in Pakistan. The authors employ a NARDL model and find a positive correlation between unemployment and economic growth, while inflation and poverty hurt economic growth. Hameed et al. (2023) analyzed the labor market consequences of Afghanistan's civil war from 2004 to 2020 using a NARDL model. The study found that positive asymmetric shocks related to the cost of war, GDP growth, final public expenditure, foreign direct investment, and the rule of law significantly decreased the unemployment rate. Conversely, negative asymmetric shocks increased the unemployment rate in both the short and long term.

In Africa, Marnikov and Geldenhuys (2007) analyzed how changes in output impact unemployment in South Africa using annual data from 1970 to 2005. The results of both linear and non-linear models confirm the positive effect of output on unemployment, yet with varying coefficients. However, only a small fraction of the observed unemployment in South Africa can be attributed to cyclical unemployment, indicating that an expansionary macroeconomic policy may not have a significant impact on overall unemployment. Mazorodze and Siddiq (2018) conducted a comparable study in South Africa, using the NARDL model applied to quarterly data from 1994 to 2017. They discovered a long-term asymmetrical labor market for each 10% slice of contraction and expansion, with the economy shedding more employees during contraction periods than it employs during recovery periods. In Tunisia, Gouider et al. (2018) conducted an analysis of the Okun relationship employing data from 1980-2015 and the NARDL model. The study confirmed the existence of a non-linear relationship between growth and unemployment. It was found that cyclical unemployment in particular is more responsive to changes in GDP (output gap) during recessions as opposed to expansions. In Morocco, Saoudi (2019) examined the asymmetric effects of economic cycles on unemployment and poverty utilizing a vector autoregressive model (VAR) on quarterly data from 2003 to 2012. The findings reveal that unemployment in Morocco responds asymmetrically to production shocks, exhibiting reduced sensitivity when the economy is initially in the downward phase of the cycle (periods when overall production is lower than potential production). However, it appears that fluctuations in the economy do not have a statistically significant impact on poverty levels in Morocco. N'Guessan (2022) examined the growth of employment intensity in Côte d'Ivoire by utilizing data from 42 industries spanning from 1996 to 2016. For the analysis, the NARDL model was employed. The findings demonstrate that these industries present a consistent long-term relationship between employment levels and output growth, even though it is non-linear. It was found that decreases in economic activity have a greater impact on levels of employment than periods of economic growth. Abid et al. (2023) analyzed the asymmetric short- and long-term effects of cyclical output on the unemployment rate in Algeria from 1970 to 2018. The study utilized a NARDL model and found that the unemployment gap in Algeria responds proportionally to both recession and economic expansion in the long term. Additionally, the current unemployment gap is positively affected by the unemployment gap of the

previous period. In the short term, the unemployment gap responds only to recession but not to recovery. The study also shows that the unemployment gap reacts more slowly to negative changes than to positive changes in the output gap at the start of the period, but they converge in the long term.

3. Economic Growth and Jobs in WAEMU: The Stylized Facts

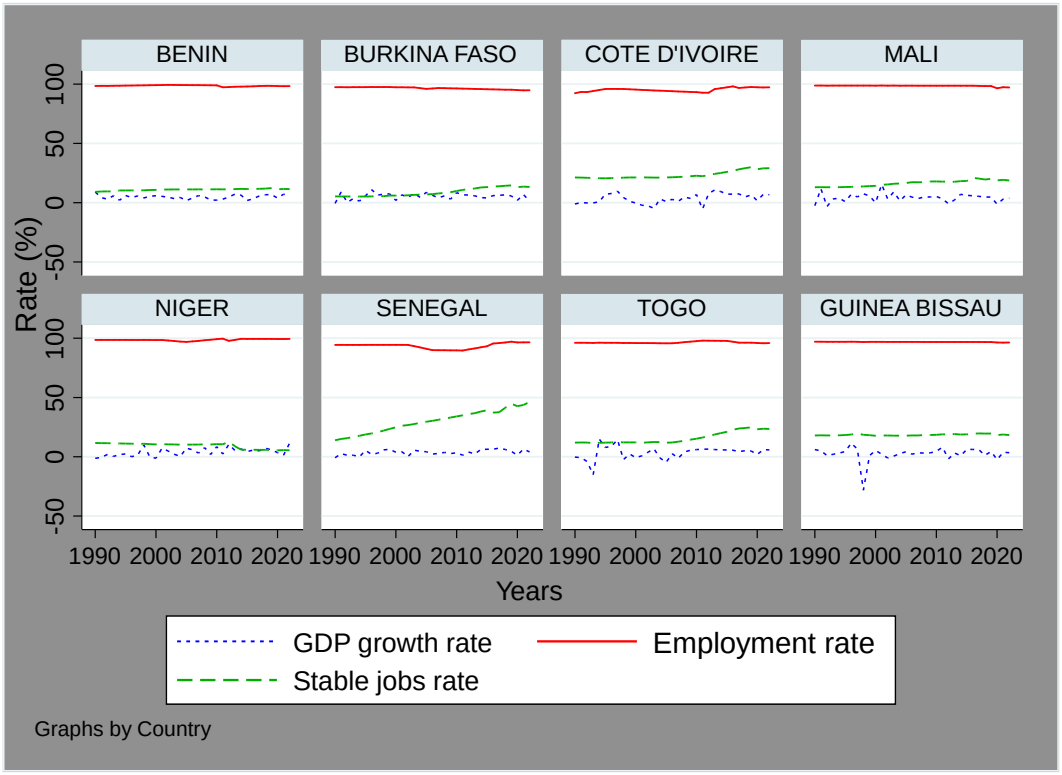
Economic growth in the WAEMU nations has exhibited high variability throughout history. Following independence, these nations experienced an average growth rate of 4%, especially from 1961 to 1979. The advancement of agriculture and government intervention in economic management were the primary factors contributing to economic growth at that time. However, a sharp decline in commodity prices in the early 1980s led to a recession in all economies. The structural adjustment programs the International Monetary Fund and World Bank implemented played a vital role in revitalizing the economy. From 1994 to 2011, economic growth surged to 3.8% after an initial average growth rate of 1.82% until 1993, prompted by the devaluation of the shared currency, CFA franc. In the last decade, the region has sustained a 6% annual growth rate, which has been possible due to the implementation of economic emergency policies in all member states (World Bank, 2023). Each country within the WAEMU has implemented a national investment plan and various development programs intended to direct investments toward priority sectors. This has contributed to the region's position as one of the world's fastest-growing economies.

However, slower periods of economic growth have had employment-level consequences. The situation was exacerbated by the introduction of structural adjustment programs, which obligated several national companies to close and others to be privatized. This led to a wave of redundancies and significant job loss. Although economic growth has resumed in the region, economic activity remains feeble, with a downward trend between 1991 and 2021. The proportion of employed individuals decreased from 67.38% to 62.02%. In terms of numbers, the figures rose from 2,663,847 to 6,105,041 individuals who participated in the labor market. Consequently, the average unemployment rate was reduced by 0.15%, from 3.20% to 3.05%, according to the World Bank (2023). The current low unemployment rate in the region indicates a robust labor market performance. However, the issue of precarious employment persists, as a considerable number of employees are facing underemployment. According to Afristat's report in 2019, a significant proportion of workers, 31%, are affected by inadequate working hours. Despite this, vulnerable employment has decreased by 6 percentage points, with an average rate of 86.77% declining to 80.37% between 1996 and 2021, largely due to a drop in family labor, which fell from 34.01% to 20.32%, according to World Bank records. Between 1991 and 2021, the percentage of self-employed individuals in the WAEMU region declined from 87.8% to 81.56% (World Bank, 2023). Nevertheless, job stability improved for salaried positions with both employees and employers. Throughout this time frame, the proportion of employees rose from 12.19% to 18.43%, while the share of employers in the job market increased slightly from 0.7% to 1.19%. These statistics emphasize the continuing challenge of attaining high-quality employment opportunities in the WAEMU region.

Graph 1 illustrates the progression of economic growth, employment, and stable employment rates across each country in the zone. The employment rate indicates the proportion of working people out of the active population[2], while the stable employment rate quantifies the proportion of salaried workers and employers among the overall employment, as opposed to vulnerable employment. Vulnerable employment denotes a particular group of informal sector self-employed workers and unpaid family workers. These individuals encounter working conditions that hinder their access to formal employment and the advantages that come along with decent jobs. Negative growth peaks have been witnessed in several countries, such as Guinea Bissau, Togo, and Côte d'Ivoire, due to the volatility of economic growth rates in each country. The low unemployment rate across all countries in the zone results in a high employment level, however, there exists a disparity in the distribution and quality of jobs across nations. Senegal provides an example, with a decade-long decrease in employment rates from the early 2000s to 2012, followed by an increase. Meanwhile, stable job opportunities are relatively scarce, although countries like Senegal and Côte d'Ivoire have higher rates of stable employment on an upward trend. This positive trend is also evident in Togo and Mali and to a lesser extent in Burkina Faso. On the other hand, Niger has experienced a decrease in its stable

employment rates since 2010, when those rates were already low. Lastly, job quality seems to be relatively stable in Benin and Guinea Bissau, but the level remains low in Benin, while that of Guinea Bissau is relatively high.

Graph 1. Trends of Economic Growth, Employment, and Stable Jobs Rates in the WAEMU Countries (1990-2022)



Source: Authors, using data from the World Bank (2023).

4. Methodology

4.1. Data

The dataset encompasses the period from 1990 to 2022 and encompasses all eight countries within the West African Economic and Monetary Union: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The information was sourced from the 2023 edition of the World Bank database. The study variables comprise the following: Gross domestic product (GDP) at a constant value, serving as a measure of the overall production of the economy and accounting for price fluctuations; the number of people employed, which encompasses all paid workers; and the stable employment rate indicating the proportion of individuals with stable employment (including salaried staff and formal-sector employers) relative to the total number of available jobs. The definition of these variables aligns with that provided by the World Bank and the International Labor Organization.

To examine the connection between business cycles and employment, this study calculates output and employment gaps utilizing three filters: The Hodrick and Prescott (HP) filter, the Christiano-Fitzgerald (CF) filter, and the Butterworth (BW) filter. These filters determine deviations of employment and production from their cyclic components. Thus, Emp_cf represents the deviation of jobs as per the (CF) filtering method, while Emp_hp represents the deviation of jobs based on the (HP) filtering method, and Emp_bw represents the deviation of jobs as per the (BW) filtering method. The variables Emps_cf, Emps_hp, and Emps_bw express the deviation of the stable order rate based on the CF filtering method, the HP filtering method, and the BW filtering method, respectively. The variable Prod_cf represents the output gap according to the (CF)

filtering method, Prod_hp is the output gap according to the (HP) filtering method and Prod_bw is the output gap according to the (BW) filtering method.

4.2. Model

The analysis employs Okun's (1962) "gap version" model, which links the difference in employment rates with the corresponding divergence in observed output. The model is expressed as follows:

$$Emp_{it} - Emp_{it}^{*} = \alpha_i + \beta(Y_{it} - Y_{it}^{*}) + \in_{it} \quad (1)$$

At Emp_{it} represents the current level of employment, while Emp_{it}^{*} denotes the employment level needed for demand and supply of labor to equilibrium within the economy. Y_{it} denotes the present output levels, whereas Y_{it}^{*} captures the potential output level through constant-value GDP. The potential output reflects the highest achievable output by utilizing all available resources. α_i captures the specific effects in the panel, where i refers to the eight countries comprising the panel and t refers to the number of periods represented by T. ϵ_{it} represents the error term, while β is the coefficient determining the extent to which cyclical employment fluctuates when the output gap changes by 1%. The levels of employment and real output are directly observable, but their potential levels cannot be directly observed. Various scholarly publications have recommended numerous filtering techniques to address this limitation, such as the Hodrick and Prescott filter (1997), the Baxter and King filter (1999), the Christiano and Fitzgerald filter (2003), and the Butterworth filter. These techniques dismantle a stochastic distribution at a designated interval into a trend component (τ_t) and a stationary cyclic component (c_t), which allows for a coherent link between statements.

$$\tau_t = y_t - c_t \quad (2)$$

To assess employment and output discrepancies related to cyclical elements, three filtering techniques were utilized: The Hodrick and Prescott (HP) filter, the Christiano-Fitzgerald (CF) filter, and the Butterworth (BW) filter. The Baxter King (BK) filter unfortunately does not provide an adequate decomposition. The estimation of Equation 1 relies on the application of an auto-regressive linear delay (ARDL) model from Pesaran et al. (2001). The results were further extended utilizing Shin et al.'s (2014) non-linear model. In its linear form, the general specification of the model is as follows:

$$Emp_{it} = \alpha_i + \sum_{j=1}^{p} \lambda_{ij}\, Emp_{i,t-j} + \sum_{j=0}^{q} \theta_{ij}\, Y_{i,t-j} + \epsilon_{it} \quad (3)$$

Using λ_{ij} to measure the effect of past employment gaps on present gaps and θ_{ij} to measure the impact of both present and past output gaps on current employment gaps. The error correction equation is as follows:

$$\Delta Emp_{it} = \alpha_i + \emptyset Emp_{i,t-1} + \beta\, Y_{i,t} + \sum_{j=1}^{p-1} \lambda_{ij_{\text{j}}}^{*} \Delta\, Emp_{i,t-j} + \sum_{j=0}^{q-1} \theta_{ij}^{*}\, \Delta Y_{i,t-j} + \epsilon_{it} \quad (4)$$

Δ represents the first difference operator, individual effects are denoted by α_i, and the error correction coefficient is represented by ∅, also referred to as the restoring force. The restoring force measures the adjustment of employment toward its equilibrium level following output changes. The model's stability ensures that the restoring force has a negative sign and is statistically significant, indicating a long-term, stable relationship between employment and output. The θ_{ij}^{*}, represents the short-term correlation between the two variables, while β reflects the long-term relationship between employment and output. Detecting a co-integration relationship between employment and output is crucial for the statistical significance of coefficients ∅ and β. To investigate the asymmetry between employment and output, Shin et al.'s (2014) non-linear ARDL model dissects output gaps into positive partial sums (Y_{it}^{+}) associated with periods of increasing output and negative partial sums (Y_{it}^{-}) associated with periods of declining output.

$$Y_{it}^{+} = \sum_{j=1}^{t} \Delta Y_{it}^{+} = \sum_{j=1}^{t} \max(\Delta Y_{it}, 0) \quad (5)$$

$$Y_{it}^{-} = \sum_{j=1}^{t} \Delta Y_{it}^{-} = \sum_{j=1}^{t} \min(\Delta Y_{it}, 0) \quad (6)$$

The non-linear relationship described in equation 4 may be expressed as follows:

$$\Delta Emp_{it} = \alpha_i + \emptyset Emp_{i,t-1} + \beta^{+} Y_{it}^{+} + \beta^{-} Y_{it}^{-} + \sum_{j=1}^{p-1} \lambda_{ij_j}^{*} \Delta\, Emp_{i,t-j} + \sum_{j=0}^{q-1} (\theta_{ij}^{*+} \Delta\, Y_{it}^{+} + \theta_{ij}^{*-} \Delta\, Y_{it}^{-}) + \epsilon_{it} \quad (7)$$

Where β^{+} and β^{-} represent the decomposed long-term coefficients, while θ^{*+} and θ^{*-}denote the decomposed short-term coefficients. The ratios $\varphi^{+} = \beta^{+}/-\emptyset$ and $\varphi^{-} = \beta^{-}/-\emptyset$ represent the parameters associated with long-term asymmetry. The assessment process for asymmetry is conducted individually for both long-term and short-term coefficients. For long-term coefficients, asymmetry testing is performed based on the following assumptions:

$$H_0 : \beta^{+} = \beta^{-}$$

$$H_1 : \beta^{+} \neq \beta^{-}$$

In the short term, the asymmetry is tested based on the following assumptions:

$$H_0 : \sum_{j=0}^{q-1} \theta_{ij}^{*+} = \sum_{j=0}^{q-1} \theta_{ij}^{*+}$$

$$H_1 : \sum_{j=0}^{q-1} \theta_{ij}^{*-} \neq \sum_{j=0}^{q-1} \theta_{ij}^{*-}$$

To analyze the relationship between short-term and long-term variables, a linear ARDL model was used. This model is symmetrical if the results of the tests indicate a symmetrical relationship in both the short and long terms. However, if the tests show an asymmetrical relationship only in the long term, an asymmetrical model is estimated. The estimated model is a non-linear auto-regressive distributed lag model that considers long-run asymmetry. On the other hand, if the tests demonstrate short-run asymmetry but not long-run asymmetry, the estimated model accounts for short-run asymmetry only, making it a nonlinear ARDL model that accounts for short-run asymmetry only. If the tests validate both short-term and long-term asymmetry, the estimated model is a non-linear ARDL that takes both factors into account. A similar approach is used to analyze the sensitivity of the share of stable jobs to periods of rising and falling output.

The initial hypothesis suggests that the series are heterogeneous and interdependent. A test to verify this hypothesis employs Pesaran's (2004) cross-sectional dependence test. The study also covers a prolonged period during which numerous political instability episodes had an impact on the region's economic pathways. To verify the cointegration relationship between employment and output, the Westerlund (2007) test is used to account for structural breaks. For the analysis, the best estimator is provided by the Pooled Mean Group (PMG). The model estimates the mean group while considering short-run heterogeneity between economies, assuming homogeneous long-run relationships for the entire panel.

4.3. Variable Transformation, Descriptive Statistics, and Econometric Tests

The study variables of GDP, employment headcount, and stable employment rate are subjected to three filtering methods - the Hodrick and Prescott (HP) filter, the Christiano-Fitzgerald (CF) filter, and the Butterworth (BW) filter - and their descriptive statistics are presented in Table 1. The variables Emp_cf, Emp_hp, and Emp_bw represent the employment gap resulting from the use of the CF, HP, and BW filtering methods, respectively. The corresponding output gaps are represented by the variables Prod_cf, Prod_hp, and Prod_bw. The data shows that all variable series tend to slope towards the right (skewness greater than

0), except for the Prod_hp and Prod_bw production variances, which slope towards the left (negative skewness). All coefficients of kurtosis are positive, indicating a higher concentration of data. Interestingly, the applied filters produce inconsistent outcomes. The employment periods comprise comparable instances of both rising and falling series. However, while the Hodrick-Prescott and Butterworth filters yield a greater number of negative output gaps when compared to positive ones, the Christiano-Fitzgerald filter produces a different outcome. Non-identical coefficients and reactions are expected.

Table 1. Descriptive Statistics of Variables

Variables	N	Positive Observations			Negative Observations			Skewness	Kurtosis
		n	Min	Max	n	Min	Max		
Emp cf	264	131	343.405	494346.6	133	-425167.2	-104.9321	0.047	4.698
Emp hp	264	131	89964.5	100.7606	133	-372508.9	-89.2779	0.388	5.866
Emp bw	264	132	90.94312	363081.6	132	-315396	-8.797215	0.069	5.908
Emps cf	264	139	0.000027	0.0269492	125	-0.020768	-8.39e-06	0.318	4.244
Emps hp	264	124	0.000181	0.0406041	140	-0.029465	-0.0000772	0.447	6.051
Emps bw	264	127	0.000018	0.0390576	137	-0.028843	-0.0001059	0.531	7.253
Prod cf	264	134	2.85e+08	3.32e+12	130	-3.21e+12	-1.06e+09	0.676	13.353
Prod hp	264	123	2.64e+09	3.92e+12	141	-3.84e+12	-6.68e+07	-0.151	14.781
Prod bw	264	123	5.04e+08	2.57e+12	141	-3.12e+12	-3.57e+08	-0.129	16.037

Note: N = number of total observations; n = number of partial observations; Min = minimum; Max = maximum

The results of the series independence assessment are presented in Table 2, which shows that the hypothesis of cross-sectional independence is rejected at the 1% level. The production variables are found to have significant cross-sectional correlations, with the CF filter showing a stronger correlation for jobs than other filters. These findings confirm the importance of the Pesaran (2007) stationarity test.

Table 2. Cross-sectional Dependence of Series

Variables	CD-test	p-value	Correlation	abs(corr.)
Emp_cf	23.160	0.000	0.762	0.762
Emp_hp	10.480	0.000	0.345	0.444
Emp_bw	7.880	0.000	0.259	0.389
Emps_cf	2.420	0.016	0.080	0.428
Emps_hp	3.080	0.002	0.101	0.328
Emps_bw	4.400	0.000	0.145	0.359
Prod_cf	20.420	0.000	0.672	0.672
Prod_hp	17.420	0.000	0.573	0.573
Prod_bw	11.900	0.000	0.391	0.399

Note: abs(corr.): absolute correlation; the p-values represent the significance thresholds for the test.

Table 3 displays the outcomes of the stationarity analyses performed. The analyses assessed the stationarity of the variables using level and first difference with two lags. The level analysis discovered that some of the series exhibited stationary behavior. In contrast, all variables displayed stationary properties in the first differences with a lag. Thus, the evidence confirms that the order of integration of the series ranges between 0 and 1.

Table 3. Series Stationarity

	Level			First Difference		
Lags	**0**	**1**	**2**	**0**	**1**	**2**
Emp_cf	1.000	0.000	1.000	1.000	0.000	1.000
Emp_hp	0.902	0.684	0.579	0.000	0.003	0.959
Emp_bw	0.860	0.729	0.832	0.000	0.000	0.862
Emps_cf	1.000	0.000	0.942	1.000	0.000	0.307
Emps_hp	0.708	0.062	0.887	0.000	0.000	0.223
Emps_bw	0.638	0.027	0.842	0.000	0.000	0.140
Prod_cf	0.999	0.000	1.000	0.887	0.000	0.744
Prod_hp	0.636	0.137	0.382	0.000	0.000	0.000
Prod_bw	0.416	0.062	0.209	0.000	0.000	0.000

Note: 0 = no lag, 1= one lag, 2 = two lags. The null hypothesis is the existence of a unit root. The values in the table are p-values, which indicate significance at the 1%, 5%, and 10% thresholds.

Table 4 presents the results of evaluating the co-integration of a series while considering structural breaks. The statistical evidence shows that there is no contradiction to the null hypothesis of co-integration between employment and output gaps. However, the CF filter suggests co-integration without a trend, while the HP and BW filter results suggest co-integration with a trend. Therefore, when estimating these relationships, it is important to consider the trend in the HP and BW filters. Since the stable employment rate is directly linked to the number of jobs, we can expect a co-integration between the stable employment rate and output.

Table 4. Series Co-integration

Dependent Variables	**Independent Variables**	**Partial Co-Integration**	**Group Co-Integration**
Emp_cf	Prod_cf	0.0081	0.0145
Emp_hp	Prod_hp	0.0021	0.0034
Emp_bw	Prod_bw	0.0015	0.0029
Emps_cf	Prod_cf	_	-
Emps_hp	Prod_hp	-	-
Emps_bw	Prod_bw	-	-

Note: The values in the table are p-values, which indicate significance at the 1%, 5%, and 10% thresholds.

5. Results and Discussion

The study examines how employment reacts to output fluctuations. The models implemented have a type (2, 1) and allow us to measure the influence of prior employment levels on the current state. PMG estimators are utilized, and we present the estimated coefficients along with their level of significance. Asymmetry tests are presented using the Chi2 statistic along with the level of significance. The first subsection presents the correlation between output and total employment, followed by the second subsection which discusses the correlation between output and stable employment. Lastly, the third subsection analyzes the unique short-term effects in various countries.

5.1. Analyzing the Linear and Non-Linear Relationship Between Output and Employment

The results displayed in Table 5 show the correlation between the output and the aggregate employment level. The speed of adjustment coefficients is negative and statistically significant at the 1% and 10% thresholds, which confirms the use of an auto-regressive model with staggered lags (ARDL). However, the adjustment coefficients may vary depending on the filter used. For instance, the CF and HP filters produce

similar adjustment coefficients in both the linear model (-0.1530 and 0.1732) and the non-linear model (0.1466 and 0.1463). Meanwhile, the BW filter produces considerably larger adjustment coefficients in both models (0.2659 and 0.2365). Despite these differences, the negative sign of the adjustment coefficients indicates a consistent long-term balance between output and employment levels.

In the linear model, economic shocks can help maintain employment levels at annual rates of 15.30% and 17.32% for the CF and HP filters, respectively. In contrast, the BW filter can absorb shocks at an annual rate of 26.59%. When non-linear modeling is applied, the adjustments are relatively smaller with the CF, HP, and BW filters experiencing adjustments of 14.66%, 14.63%, and 23.65%, respectively.

The effect of the previous employment level on the current level varies depending on the filter used. In the linear model, the previous employment level hurts the current level with the CF filter. However, in the non-linear model, the previous employment level has a positive impact on the current level with the CF filter. The previous employment level remains insignificant with the HP and BW filters.

In the short-term linear model, production leads to increased variation in employment when using the HP and BW filters. However, the effect is negative and statistically insignificant when using the CF filter. Despite this, the positive impact of production on employment remains minimal. Looking at the long-term, production has a positive influence on employment opportunities that is significant at the 1% threshold. Nevertheless, the effect remains weak, regardless of the filter used. A one percent increase in production results in proportional employment growth of 6.93e-08%, 9.24e-08%, and 8.73e-08% for the CF, HP, and BW filters respectively.

The analysis shows that there is an imbalance between long-term and short-term effects, depending on the filter used. Specifically, the asymmetry is confirmed only in the long term with the CF filter, while it is only confirmed in the short term with the HP and BW filters. After accounting for this asymmetry, the estimates indicate that increasing production has a favorable effect on employment in the short term, at both 1% and 5% thresholds. For instance, a 1% increase in output leads to a 2.13e-07% increase in employment, according to HP filters, while with BW filters, the rise in employment is 2.03e-07%. However, a decrease in output has no significant impact on employment levels.

There are several reasons for this, including the prevalence of informal employment, especially in agriculture, retail trade, and basic services. These sectors are less susceptible to economic fluctuations. Additionally, jobs related to the production and export of natural resources, such as oil, wood, and minerals, are also less vulnerable to economic downturns because the worldwide demand for these items remains relatively stable. Moreover, the countries in the WAEMU region have low trade participation, which makes them less susceptible to economic fluctuations. Finally, communities in the region develop resilient livelihood strategies to safeguard against job losses in the event of a shock.

Increased production, in the long term, has been found to have no significant effect on employment. This indicates that the economy can still thrive without job growth. There are several reasons behind this trend, including the cyclical periods of political unrest and violence, the reliance on industries that require less labor, and inadequate funding in the private sector. The unstable conflicts in the region prevent foreign investors from reinvesting a significant portion of their earnings, which they usually take back to their home country. This impediment results in economic stagnation and fewer employment opportunities. Additionally, the natural resources and mining sectors, which are rapidly expanding in the region, employ fewer workers and only provide temporary employment without promoting sustainable, long-term job creation. The lack of funding for an underdeveloped and inactive local private sector also limits its ability to grow and create sustainable employment, even during economic upturns. On the other hand, a decrease in output significantly affects employment rates, as a 1% decrease in output leads to a decline of 9.87e-08% in employment.

In times of economic contractions, companies frequently mitigate expenses by laying off staff. Similarly, governments may also cut public spending, leading to layoffs within the public sector. This ultimately results in reduced long-term employment opportunities, as investors are less inclined to finance

new projects and businesses. Thus, in the long term, employment levels are more responsive to periods of contraction than to periods of economic expansion. Additionally, in the short term, employment levels are more reactive to periods of production expansion. The findings validate the asymmetrical relationship between economic growth and employment, especially in the case of the WAEMU countries. They align with the findings of Tang and Bethencourt (2015) and N'Guessan (2022). Tang and Bethencourt (2015) conducted a study on Eurozone countries, while N'Guessan (2022) examined the relationship between output and employment in the specific context of Côte d'Ivoire. The authors demonstrated that the relationship between output and employment is asymmetric, with varying coefficients in times of expansion and contraction.

Table 5. Analysis Results on the Relationship Between Employment and Output

Dependent variable: Overall employment

	Symmetrical Model (ARDL)			**Asymmetrical Model (NARDL)**		
	CF filter	HP filter	BW filter	CF filter	HP filter	BW filter
Long-term Coefficients						
$Prod$	6.93e-08*	9.24e-08*	8.73e-08*		8.80e-08*	8.33e-08*
$Prod^{+}$				3.22e-08		
$Prod^{-}$				9.87e-08*		
Adjustment coefficients						
$\emptyset$	-0.1530*	-0.1732**	-0.2659*	-0.1466*	-0.1463***	-0.2365*
Short-term Coefficients						
ΔEmp	-0.1530*	0.2129	0.2448**	1.0135*	0.1640	0.2214
$\Delta Prod$	-5.65e-09	9.66e-08*	8.64e-08*	-3.95e-09		
$\Delta Prod^{+}$					2.13e-07**	2.03e-07*
$\Delta Prod^{-}$					-2.30e-08	1.91e-08
Trend		890.71**	556.123**		703.5632	241.017
Constant	237.4713	-17833**	-11129**	1908.614	-1407707	-481100.1
Long-term asymmetry test						
$Prod^{+} = Prod^{-}$				3.80**	0.02	0.86
Short-term asymmetry test						
$\Delta Prod^{+} = \Delta Prod^{-}$				1.06	3.93**	3.45***

Note: ***, significant at 1%; **, significant at 5%; * significant at 10%.

5.2. Analyzing the Linear and Non-Linear Relationship Between Output and Stable Employment

The study examines the relationship between output and stable employment levels using both linear and non-linear models. The findings indicate a negative correlation between the two, with a fit coefficient statistically significant threshold of 1%. The adjustment coefficients remain consistent across all filters used in both models. However, the CF filter has a comparatively lower fitted coefficient than the HP and BW filters. The negative coefficient of the adjustment implies a stable long-term balance between permanent employment and production.

The linear models have a restoring force that can restore stability at an annual rate of 19.41% in the linear relationship and 19.76% in the non-linear relationship for the CF filter after a disturbance. For the HP and BW filters in the linear model, the shock must be attenuated annually at rates of 36.80% and 41.40%, respectively. In the non-linear model, the rates of attenuation are 32.33% and 42.45%. Overall, regardless of the filter type or relationship, the study suggests a negative correlation between output and stable employment levels.

The study found that the percentage of stable jobs in a particular field is positively influenced by the number of stable jobs in the past. The linear model showed that production has a positive effect on stable job proportions in the short term when using the HP and BW filters, but the effect is negative and insignificant when using the CF filter. This suggests that production has an overall positive effect on employment when using the HP and BW filters, but the effect is insignificant when using the CF filter. The impact of output on stable job proportions appears to be weak. In the long term, the effect of output on employment rates

depends on the filter used. The CF filter shows a positive and significant effect on the proportion of stable jobs at a 1% level of confidence. However, the outcome is negative and significant when using the HP filter at a 10% threshold. On the other hand, when using the BW filter, the result is negative but not significant.

There is a relationship between output and stable employment. When the HP and BW filters are applied, an increase in output has a positive effect on the share of stable employment. However, a decrease in output doesn't have a significant effect on the share of stable employment in the short run. However, in the long term, a reduction in output has a significant impact on the proportion of secure employment. During a period of growth, a 1% increase in output leads to a small increase in the share of secure jobs (HP and BW filters show 5.00e-14% and 4.27e-14%, respectively). On the other hand, a decrease in production significantly impacts the percentage of secure employment, as found by the CF filter. When the economy is in a recession, a 1% decrease in output leads to a 2.86e-15% decrease in the share of secure jobs. Therefore, contractions have a more significant effect on the rate of secure employment in the long term than expansions. In the short term, the proportion of secure jobs is more affected by periods of expansion than contraction, as indicated by previous research on the relationship between economic growth and total employment. However, the elasticities of stable employment in response to economic growth remain relatively low.

Table 6. Analysis Results on the Relationship Between Stable Employment and Output

Dependent variable: Stable employment

	Symmetrical Model (ARDL)			**Asymmetrical Model (NARDL)**		
	CF filter	HP filter	CF filter	HP filter	CF filter	HP filter
Long-term Coefficients						
$Prod$	1.39e-15*	-4.35e-15***	-2.48e-15		-8.09e-15**	-4.18e-16
$Prod^{+}$				5.12e-16		
$Prod^{-}$				2.86e-15*		
Adjustment coefficients						
∅	-0.1941*	-0.3680*	-0.4140*	-0.1976*	-0.3233*	-0.4245*
Short-term Coefficients						
$\Delta Emps$	0.8812*	0.1974**	0.2096**	0.8780*	0.2279**	0.2377**
$\Delta Prod$	1.10e-14	3.19e-14**	3.10e-14**	1.10e-14		
$\Delta Prod^{+}$					5.00e-14**	4.27e-14**
$\Delta Prod^{-}$					6.57e-16	3.99e-15
Trend	-4.64e-06	-0.0001*	-0.0001*	0.0001***	-0.0001*	-0.0001*
Constant		0.1801*	0.1250*		0.2656*	0.1281*

Note: ***, significant at 1%; **, significant at 5%; * significant at 10%.

5.3. Short-term Analysis of Country-Specific Effects of the Relationship Between Production and Employment

When analyzing the economic trajectories of multiple countries, it is essential to look at their short-term asymmetries to determine their impact on employment levels during periods of output expansion and contraction. Table 7 lists the unique country-specific short-term results obtained using HP and BW filters. It is noteworthy because each country has its own unique economic, political, and institutional context, which impacts their labor markets and economic paths, despite being part of the same economic zone.

Countries like Benin and Senegal display small negative adjustment coefficients regardless of the filtering technique used. This suggests a lack of a sustainable correlation between employment and output gaps in these countries. Senegal's economy depends heavily on agriculture, while its industrial sector is heavily capital-intensive, requiring fewer labor-intensive measures (Cabral, 2009). Economic growth does not necessarily lead to significant job creation, especially in countries like Benin, where informal sector jobs are common, poorly regulated, and unproductive. These jobs are less susceptible to economic fluctuations and

hinder long-term economic growth. According to the World Bank (2023), 90.1% of Benin's working population engaged in informal employment in 2019, with 72% of workers being underemployed. Furthermore, Benin's economy leans heavily on exporting unprocessed cotton and cashew nuts, as well as re-exporting imported goods like second-hand cars and rice. Low-income nations with a high level of trade openness but a limited presence in manufacturing trade, such as Benin, face a disadvantage when it comes to employment opportunities (Zerbo, 2010).

The long-term stable relationship between output and employment in Niger is uncertain. The adjustment coefficient indicates negative and statistically significant outcomes only for the BW filter, while for the HP filter, it remains negative, but not significant. The country struggles with an unstable political and security climate, high demographic growth, and weak economic diversification, which significantly impact its economy. Niger's heavy reliance on rain-fed agriculture as the primary economic driver makes it increasingly susceptible to the effects of climate change. Uranium mining, which is a significant contributor to Niger's economic growth, is unstable, and job prospects are limited. Additionally, Niger has one of the highest population growth rates globally, reaching 3.7% in 2021, with a fertility rate of 6.89 children per woman in 2023, according to the World Bank's 2023 report. This puts substantial pressure on all aspects of society, particularly the labor market.

In Burkina Faso and Guinea Bissau, the adjustment coefficients are positive, regardless of the filter used, indicating that the non-linear auto-regressive lag model (NARDL) is not suitable for representing the impact of output on long-term employment in these nations. Conversely, the adjustment coefficients for Côte d'Ivoire, Mali, and Togo are negative and significant, indicating that employment levels adjust to their long-term equilibrium levels in these countries, but the rate of adjustment depends on the selected filter. After an economic shock, using the HP filter, employment in Côte d'Ivoire, Mali, and Togo returns to its long-term equilibrium level with annual growth rates of 61.44%, 28.67%, and 23.89%, respectively. In contrast, the BW filter leads to adjustments of 55.93%, 58.89%, and 27.49% per year for these three countries. The time frames for complete adjustment vary between 1.63 and 1.79 years for Côte d'Ivoire, from 1.70 to 3.49 years for Mali, and between 3.64 and 4.18 years for Togo.

Certain nations such as Benin, Burkina Faso, Niger, and Togo experience a positive and significant impact on their current employment levels due to their previous levels of employment, irrespective of the filter used. This is because the establishment of job opportunities in these nations creates fresh employment prospects, which promotes job creation. However, this is not the case in Senegal, where the outcome is unfavorable regardless of the filter utilized.

In Mali, previous employment levels have a negative and significant impact on current employment under the HP filter, while it has a negative and insignificant effect under the BW filter. This could be due to the dependency effect that occurs when employment levels are low, leading to decreased employability due to inactivity, resulting in the loss of qualifications and skills. This vicious cycle arises as past unemployment hampers present job search endeavors (Abraham et al., 2019).

Continuing periods of unemployment discourage job-seekers, causing them to exit the job market, thereby reducing the level of employment. The pessimism and economic instability felt in certain sectors may have a ripple effect, causing other sectors to consider reducing their investments. Additionally, during a decline in business demand, companies tend to reduce their investment in human resources, which includes training and skill enhancement. This decrease could lead to a decrease in productivity and inefficient labor, subsequently creating an impact on current employment levels.

However, the coefficients for Côte d'Ivoire and Guinea Bissau are not significant, regardless of the filter option selected. Except in Senegal and Togo, an increase in production results in a rise in employment rates, regardless of filter preference. Guinea Bissau, however, presents a mixed effect; while the HP filter shows a positive and significant effect, the BW filter suggests no statistical significance. In Benin, Burkina Faso, Côte d'Ivoire, Senegal, and Guinea Bissau, there is no significant correlation between a decrease in production and employment, regardless of filter choice. In Togo, during periods of output contraction, employment decreases regardless of the chosen filter. However, in Mali, the impact is more diverse. An

output contraction does not have a significant impact on employment when the HP filter is applied. In contrast, the results from the BW filter indicate that output contraction can increase employment levels. This characteristic of Mali can be attributed to companies reducing production costs during economic downturns by cutting salaries and employee benefits, which allows them to increase production and competition by hiring additional personnel at lower rates.

Table 7. Short-term Differentiated Results by Country

	HP Filter				BW Filter			
	$\emptyset$	$\Delta Emps$	$\Delta Prod^{+}$	$\Delta Prod^{-}$	$\emptyset$	$\Delta Emps$	$\Delta Prod^{+}$	$\Delta Prod^{-}$
Benin	-0.061	0.476*	2.22e-07*	-5.39e-08	-0.096	0.522*	2.28e-07*	4.47e-10
Burkina Faso	0.035	0.685*	2.39e-07*	-1.88e-08	0.008	0.740*	2.56e-07*	2.27e-08
Côte d'Ivoire	-0.614*	0.043	4.48e-08**	5.01e-09	-0.559*	-0.059	5.51e-08*	5.48e-08
Mali	-0.287***	-0.237***	8.68e-07*	2.27e-08	-0.589*	-0.103	5.37e-07*	-2.59e-07**
Niger	-0.069	0.320***	1.75e-07***	-3.82e-07*	-0.224***	0.403**	4.11e-07**	2.07e-07
Senegal	-0.058	-0.512*	4.25e-08	2.60e-07	-0.220	-0.458**	6.96e-08	1.29e-07
Togo	-0.239**	0.435*	3.94e-08	6.08e-08***	-0.275*	0.439*	3.76e-08	7.34e-08**
Guinea Bissau	0.123***	0.101	7.71e-08*	-7.76e-08	0.0623	0.2882	2.75e-08	-7.57e-08

Note: ***, significant at 1%; **, significant at 5%; * significant at 10%.

6. Conclusion

The purpose of this article was to examine how economic fluctuations over the last thirty-two years (1990-2022) have impacted employment sensitivity in the WAEMU countries. We used three filtering methods - the Hodrick and Prescott (HP) filter, the Christiano-Fitzgerald (CF) filter, and the Butterworth (BW) filter - to enhance the dependability of our results. These filters allowed us to separate the stochastic distribution of a specific time interval into two separate parts, a trend, and a stationary cyclical component. To analyze the asymmetry, we used the panel-estimated non-linear auto-regressive lag model (NARDL).

The study revealed six key findings:

- The filtering technique used impacts the analysis of the relationship between economic growth and employment.
- The correlation between economic growth and employment is significantly lower than that of the employment level, which ensures labor supply and demand equilibrium.
- The relationship between economic growth and employment is asymmetric within the WAEMU zone.
- In the short run, the employment level is sensitive to output expansion. An increase in output leads to a rise in employment levels, while a decrease in output has a negligible impact on employment levels.
- In the long run, contraction periods have a greater impact on employment levels than periods of economic growth. An increase in output does not significantly affect the level of employment compared to a decrease in output, which results in a decline in employment levels.
- A country's ability to respond to periods of economic growth and recession is determined by its short-term economic trajectory.

In economic terms, these findings suggest that the current level of actual economic growth is far from its potential growth frontier. Consequently, there is minimal fluctuation in the employment rate. In contrast, economic contractions impose greater long-term employment costs. It would be advantageous for the economies of WAEMU countries to translate their economic potential into real growth and to limit the expansion of the informal sector. To stimulate genuine economic growth and bolster the economic potential

of nations, the region must confront numerous challenges, such as investing in high-productivity industries and services, improving infrastructure, and ensuring sound governance and political stability. Institutional arrangements can enhance the appeal of business formalization by streamlining start-up procedures, aligning tax reforms with market trends, enabling access to credit for small enterprises, and offering training and technical coaching support for entrepreneurs in the informal sector. These actions will minimize informality in the economy and enhance job quality.

Although economic growth is important for employment, the current production processes in almost every country are being questioned due to their lack of sustainability and environmental preservation. Future studies should explore how green growth can improve job supply and quality.

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End Notes

1. *The WAEMU zone consists of eight countries: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo.*
2. *The active population is the sum of the employed and the unemployed.*

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