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DOI: https://doi.org/10.64388/IREV9I8-1714693

Does Capacity Utilization Reduce Unemployment? Evidence from Nigeria

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Abstract- ***This study empirically investigated the effect of capacity utilization on unemployment in Nigeria over the period of thirty-five years, ranging from 1990 to 2024. The study proxied capacity utilization (independent variable) by capacity utilization, industrial production index and labour force participation rate while unemployment (dependent variable) was measured by unemployment rate. Okun's Law and Keynesian theory of employment were the theories adopted in the study. Annual time series data were used and these data were sourced from World Development Index (WDI) of the World Bank and National Bureau of Statistics (NBS) reports. The main data analysis technique adopted is Autoregressive Distributed Lag (ARDL) technique. The data analysis was facilitated by E-views 13 statistical package. The findings of the study indicated that, there is a negative and significant relationship between capacity utilization and unemployment rate in Nigeria, there is a negative and significant relationship between industrial production index and unemployment rate in Nigeria while there is a negative and significant relationship between labour force participation rate and unemployment rate in Nigeria. Based on the findings, the study concluded that, capacity utilization plays a significant role in reducing unemployment generation in Nigeria. The researchers recommended among others that government and relevant stakeholders should make genuine efforts towards boosting Nigeria's capacity utilization.***

Index Terms- ***Capacity, Utilization, Unemployment, Production Index, Labour force, Participation rate***

I. INTRODUCTION

Unemployment remains one of the most pressing economic challenges confronting developing economies, including Nigeria, where industrial underperformance continues to undermine labor absorption and economic growth. A critical factor influencing unemployment is capacity utilization. Capacity utilization refers to the degree to which an economy or an industry employs its productive resources to generate goods and services. It is expressed as the percentage of actual output relative to the potential output when all resources are efficiently used (Olorunfemi & Ehinomen, 2020). High capacity utilization indicates that industries are operating near full efficiency, utilizing labor, machinery, and raw materials optimally, while low capacity utilization implies idle resources and inefficiencies. It serves as a key indicator of economic performance and industrial health because it reflects both production capacity and economic demand. When aggregate demand increases, firms are motivated to expand production, thereby raising capacity utilization. Conversely, when demand falls or production constraints exist, firms tend to operate below capacity, which may have adverse implications for employment levels and economic growth. On the other hand, unemployment occurs when individuals who are willing and able to work cannot find jobs that match their skills or qualifications. It is a critical macroeconomic problem that affects economic stability, productivity, and social welfare (Todaro & Smith, 2010). Persistent unemployment leads to income inequality, reduced aggregate demand, and slower economic development. Unemployment can take various forms—structural, cyclical, and frictional—depending on the causes. Structural unemployment arises from mismatches between workers' skills and job requirements, while cyclical unemployment is linked to economic downturns and reduced production activities. In developing countries, such as Nigeria, unemployment remains a major challenge due to low industrialization, inadequate investment, and the underutilization of productive capacity, which limits firms' ability to

absorb labor efficiently. The level of capacity utilization has a direct and significant influence on unemployment. When firms operate below capacity, it indicates that they are not fully utilizing their available resources, including labor. As a result, fewer workers are needed, leading to job cuts or hiring freezes (Samuelson & Nordhaus, 2019). Conversely, higher capacity utilization signifies increased production activity, which creates more employment opportunities as firms expand operations to meet rising demand. The relationship between capacity utilization and unemployment can thus be described as inverse—when capacity utilization rises, unemployment tends to fall, and vice versa. This relationship aligns with Okun's Law, which posits that output growth above potential levels leads to a reduction in unemployment (Okun, 1962). Therefore, maintaining high-capacity utilization through increased investment, innovation, and market efficiency is critical for achieving full employment and sustainable growth.

In the Nigerian context, low-capacity utilization has been a persistent factor contributing to high unemployment rates. The manufacturing sector, which is a major employer of labor, has operated below 60% capacity utilization for most of the past two decades due to inadequate infrastructure, unstable power supply, and foreign exchange constraints (Central Bank of Nigeria [CBN], 2023). These challenges limit firms' ability to produce at optimal levels, thereby reducing labor demand and worsening unemployment. Moreover, macroeconomic instability, high production costs, and low consumer purchasing power have further weakened industrial output (Adenikinju, 2021). Conversely, periods of improved capacity utilization—often associated with better energy supply and favorable investment climates—have seen modest reductions in unemployment levels. Thus, for Nigeria to achieve inclusive economic growth, policies must focus on improving capacity utilization through industrial diversification, stable macroeconomic policies, and infrastructure development. Enhancing productive efficiency will enable industries to operate closer to full capacity, thereby increasing labor absorption and reducing unemployment. Hence, this study aimed to empirically examined the effect of capacity utilization on unemployment in Nigeria. Specifically, the study sought to:

i. evaluate the effect of capacity utilization rate on unemployment rate in Nigeria.
ii. determine the effect of industrial production index on unemployment rate in Nigeria.
iii. analyze the effect of labour force participation rate on unemployment rate in Nigeria.

II. LITERATURE REVIEW

2.1 Theoretical Literature

a. Okun's Law

Proposed by Arthur Okun in 1962, Okun's Law establishes an empirical relationship between output (Gross Domestic Product) and unemployment. The theory posits that for every percentage point by which actual output falls below potential output; the unemployment rate increases by a predictable amount. In essence, unemployment is inversely related to capacity utilization—when an economy operates below its full capacity, it experiences higher unemployment due to idle labor and underused resources (Okun, 1962). The law highlights that higher capacity utilization signifies that industries are producing closer to their potential output, which necessitates employing more workers, thereby reducing unemployment. In practical terms, when firms operate at a high level of capacity utilization, it reflects increased demand for goods and services, leading to higher production and, consequently, greater labor demand. Conversely, low-capacity utilization indicates economic slack, reduced production, and layoffs. This relationship has been supported by several empirical studies, showing that economic slowdowns or underutilization of industrial capacity often lead to job losses (Blanchard & Johnson, 2017). In the Nigerian context, when the manufacturing sector operates below 60% of its installed capacity, as often reported by the Central Bank of Nigeria, it results in significant job losses and rising unemployment. Thus, Okun's Law effectively explains how enhancing capacity utilization through investment, improved infrastructure, and stable energy supply can directly contribute to reducing unemployment rates.

b. Keynesian Theory of Employment

The Keynesian Theory of Employment, developed by John Maynard Keynes in 1936 in his seminal work The General Theory of Employment, Interest, and Money, also provides a theoretical framework linking capacity utilization and unemployment. Keynes argued that employment levels depend on aggregate demand for goods and services. When aggregate demand is low, firms reduce output, leading to idle capacity and layoffs. Conversely, when aggregate demand increases, firms expand production by utilizing more of their capacity, thus creating more employment opportunities. In this framework, capacity utilization serves as a bridge between aggregate demand and employment—as firms utilize more of their productive capacity to meet demand, they employ more labor, thereby reducing unemployment (Keynes, 1936). In developing economies like Nigeria, inadequate aggregate demand, frequent energy crises, and infrastructural bottlenecks often lead to low industrial capacity utilization, which directly contributes to rising unemployment. The Keynesian perspective emphasizes the role of government intervention through fiscal and monetary policies to stimulate demand, enhance industrial activity, and increase capacity utilization. By boosting demand through investment in infrastructure, credit expansion, and public spending, capacity utilization rises, prompting firms to hire more workers. This theoretical viewpoint underscores the cyclical relationship between production capacity, output, and labor market dynamics.

2.2 Empirical Literature

Eze and Ude (2023) assessed the relationship between capacity utilization, industrial productivity, and economic growth using annual data from 1991 to 2022 and employing the Ordinary Least Squares (OLS) and Granger Causality techniques. Their study found a unidirectional causality running from capacity utilization to economic growth, suggesting that industrial efficiency drives GDP performance rather than the reverse. The findings showed that low capacity utilization due to infrastructural deficits, exchange rate volatility, and weak investment climate significantly constrains Nigeria's productive capacity. The authors concluded that boosting capacity utilization across key sectors—particularly manufacturing and agriculture—remains essential for achieving broad-based economic growth and reducing overdependence on imports.

Similarly, Akinola and Ojo (2022) examined capacity utilization and its macroeconomic implications for Nigeria's economic growth between 1990 and 2021 using a Vector Error Correction Model (VECM) approach. Their analysis focused on how underutilization of industrial capacity constrains output expansion and GDP growth. The empirical findings indicated a long-run equilibrium relationship between capacity utilization, capital formation, and economic growth, confirming that declining utilization levels significantly dampen growth prospects. The study further established that a 1% increase in capacity utilization could raise GDP growth by approximately 0.4%, underscoring its critical role in economic recovery.

Oniyide and Ogunjinmi (2021) investigated the impact of manufacturing capacity utilization on Nigeria's economic growth in light of the persistent decline in the manufacturing sector. Using annual data spanning 1980 to 2018 obtained from the World Development Indicators (WDI) and the Central Bank of Nigeria Statistical Bulletin, the study employed the Johansen and Canonical Cointegration techniques alongside the Impulse Response Function to analyze how manufacturing capacity utilization responds to shocks in gross domestic product (GDP), a proxy for economic growth. The Johansen cointegration test confirmed the existence of a long-run relationship among the variables. Empirical findings showed that while manufacturing capacity utilization had an insignificant negative effect on GDP in the first model, it demonstrated a significant positive influence on economic growth in the subsequent models over the long run.

Olorunfemi and Adediran (2021) investigated the impact of capacity utilization on Nigeria's economic growth from 1985 to 2020 using the Autoregressive Distributed Lag (ARDL) model. The study aimed to determine how fluctuations in industrial capacity utilization contribute to changes in gross domestic product (GDP). The results revealed a significant positive relationship between capacity utilization and economic growth both in the short and long run. The

authors concluded that improved industrial capacity utilization—achieved through stable energy supply, better infrastructure, and access to finance—enhances industrial output and stimulates overall economic performance in Nigeria.

Olorunfemi and Ehinomen (2020) assessed capacity utilization dynamics and their labour market implications across Nigerian industries. Employing vector autoregression (VAR) and Granger causality tests on sectoral output and employment series, the authors showed that shocks to capacity utilization lead to contemporaneous and lagged reductions in unemployment: a sustained rise in utilization lowers unemployment after a short adjustment period. The study concluded that addressing supply-side constraints to lift utilization is an effective route to lower structural unemployment in Nigeria.

Nwanne and Okon (2019) focused on capacity utilization in the agro-processing sub-sector and its effect on rural employment using difference-in-differences and instrumental variables to address endogeneity. They found that projects that improved processing capacity (e.g., new plants or rehabilitated mills) significantly increased local employment and reduced seasonal under-employment. The study concluded that targeted capacity expansion in agro-processing yields high local employment multipliers and helps absorb rural labour.

Malachy and Awujola (2018) examined the relationship between capacity utilization and unemployment in Nigeria from 1981 to 2016, adopting the empirical model developed by Asta and Zaneta (2010). The study employed time series secondary data and analyzed it using the Two-Stage Least Squares (2SLS) regression technique with the aid of E-Views 9 software. The findings revealed a statistically significant positive relationship between capacity utilization and unemployment at the 5% significance level ($p < 0.05$), implying that a 100% increase in capacity utilization corresponds to a 3.4% rise in unemployment. This result contradicts the conventional economic expectation that higher capacity utilization should reduce unemployment.

Chukwuma, Eze and Okeke (2018) explored the short-run impact of capacity utilization on unemployment using quarterly macroeconomic data and an error-correction model (ECM). The study found that declines in capacity utilization during demand downturns rapidly increased unemployment, but the adjustment back to long-run equilibrium was gradual, implying hysteresis in the labour market. The authors recommended counter-cyclical fiscal and industrial policies to sustain utilization during downturns and prevent persistent job losses.

Akinlo and Ojo (2017) used a structural vector error-correction model (SVECM) to analyze national-level links between capacity utilization, GDP growth and unemployment. Their findings show that raising capacity utilization contributes positively to GDP and that roughly one quarter of utilization shocks are transmitted into lower unemployment over a two-year horizon. They concluded that macroeconomic stabilization that raises productive utilization is an important complement to labour-market reforms for job creation.

Adeleye and Oladipo (2016) examined manufacturing capacity utilization and informal employment in Nigeria, using panel data from selected states and fixed-effects estimation. Their results indicated that higher capacity utilization in formal plants crowds in formal jobs but can also displace some informal employment as production modernizes. The authors concluded that increasing utilization should be complemented with retraining programs to smoothly transition informal workers into formal jobs, maximizing the employment dividend of higher utilization.

Adenikinju (2005) investigated the relationship between industrial capacity utilization and employment in Nigeria's manufacturing sector, aiming to determine whether higher utilization translated into greater labour absorption. Using firm-level manufacturing survey data and time-series regression analysis, the study found a strong positive relationship between capacity utilization and employment growth: periods of higher utilization were associated with increased hiring and reduced layoffs. The study concluded that policies which raise utilization—through reliable power supply and improved infrastructure—would have a direct and measurable effect on employment creation in the manufacturing sector.

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DOI: https://doi.org/10.64388/IREV9I8-1714693

III. METHODOLOGY

This study utilized yearly time series data as obtained from World Development Index (WDI) of the World Bank and National Bureau of Statistics (NBS) reports. The data covered the periods from 1990 to 2024. The Autoregressive Distributed Lag (ARDL) model was used for estimation because the variables exhibited mixed levels of stationarity — some being stationary at level [I(0)] while others became stationary after first differencing [I(1)] via ADF unit root test.

Model Specification

The model for this study was adapted from the work of Malachy and Awujola (2019) on the effect of capacity utilization rate on unemployment in Nigeria. This model was adapted in line with the broad aim and specific objectives of this study but was slightly modified in order to capture all the variables adopted in this study. This model is specified as follows:

Functionally, the mode is specified as:

UMR = f(CUR, IPI, LFPR) ---------- (1)

More explicitly, the model above can be stated as:

UMR = $\alpha_0 + \alpha_1 CUR + \alpha_2 IPI + \alpha_3 LFPR + \varepsilon_t$ ----- (2)

A Priori Expectation: $\alpha_1 < 0$, $\alpha_2 < 0$, and $\alpha_3 < 0$.

The Autoregressive Distributed Lag (ARDL) model specification of model is given as;

$$\Delta(UMR_t) = \alpha_0 + \alpha_{1i}\Delta(UMR_{t-1}) + \alpha_{2i}\Delta 1n(CUR_{t-1}) + \alpha_{3i}\Delta(IPI_{t-1}) + \alpha_{4i}\Delta(LFPR_{t-1}) + \sum_{t=1}^{p}\beta_{1i}\Delta(UMR_{t-1}) + \sum_{t=1}^{q}\beta_{2i}\Delta(CUR_{t-1}) + \sum_{t=1}^{p}\beta_{3i}\Delta(IPI_{t-1}) + \sum_{t=1}^{q}\beta_{4i}\Delta(LFPR_{t-1}) + \delta ECT_{t-1} + \varepsilon_t \quad (3)$$

Where: f = functional relationship, In = Natural logarithm, UMR = Unemployment Rate

CUR = Capacity Utilization Rate, IPI = Industrial Production Index, LFPR = Labour Force Participation Rate, α_0 = Regression constant, α_1 - α_4 = Long-run dynamic coefficients, β_1 - β_4 = Short-run dynamic coefficients, δ = Speed of adjustment which is expected to be negative, ECT = Lagged error correction term derived from the long run cointegrating relationships, ε_t = Stochastic or error term

IV. RESULTS AND DISCUSSION

4.1 Pre-Estimation Tests

The section presents the result of descriptive analysis and unit root test.

Table 1: Descriptive Statistics of Research Variables

	UMR	CUR	IPI	LFPR
Mean	4.642286	36.74686	74.76382	58.64229
Std. Dev.	2.036966	10.81496	14.96816	2.486579
Skewness	1.317443	-0.060383	-0.490137	-1.016141
Kurtosis	3.388817	2.178701	2.256075	2.575691
Jarque-Bera	10.34512	1.004961	2.145347	6.285726
Probability	0.005670	0.605028	0.342093	0.043159
Sum Sq. Dev.	141.0738	3976.755	7393.511	210.2246
Observations	35	35	35	35

Source: Authors' EViews Based Results, 2025.

The descriptive statistics in Table 1 provide a summary of the key characteristics of the study variables: unemployment rate (UMR), capacity utilization rate (CUR), industrial production index (IPI), and labour force participation rate (LFPR), all measured in percentages over 35 observations. On average, the unemployment rate (UMR) stood at 4.64%, with a minimum of 1.9% and a maximum of 9.85%, suggesting noticeable fluctuations in Nigeria's unemployment levels over the study period. The capacity utilization rate (CUR) recorded a mean value of 36.75%, indicating that Nigerian industries operated, on average, at about one-third of their full productive potential—signifying underutilization of industrial capacity. The Industrial Production Index (IPI) averaged 74.76%, reflecting moderate industrial performance, while the labour force participation rate (LFPR) averaged 58.64%, showing that slightly over half of the working-age population was active in the labor market. The standard deviations reveal

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moderate variability, especially for industrial production index (14.97) and capacity utilization rate (10.81). The Jarque-Bera probability values show that unemployment rate (UMR) and labour force participation rate (LFPR) are not normally distributed ($p < 0.05$), while capacity utilization rate (CUR) and industrial production index (IPI) are normally distributed ($p > 0.05$). Overall, these descriptive results indicate that Nigeria's industrial and labor market dynamics have experienced significant variability, with relatively low-capacity utilization potentially contributing to fluctuations in unemployment over the years.

Table 2: Augmented Dickey-Fuller (ADF) Test Results

	ADF					
Variables	Level	Critical Value @ 5%	1st Difference	Critical Value @ 5%	I(d)	Stationary @
UMR	-1.289826	-2.951125	-5.840152	-2.954021	I(1)	1st Difference
CUR	-3.514943	-2.951125	-	-	I(0)	Level
IPI	-1.497698	-2.951125	-5.381928	-2.954021	I(1)	1st Difference
LFPR	-1.567684	-2.951125	-3.158018	-2.986225	I(1)	1st Difference

Source: Authors' EViews Based Results, 2025

The Augmented Dickey-Fuller (ADF) unit root test results reveal the stationarity properties of the variables: unemployment rate (UMR), capacity utilization rate (CUR), industrial production index (IPI), and labour force participation rate (LFPR). The findings indicate that the capacity utilization rate (CUR) is stationary at level, suggesting it is integrated of order zero, I(0), meaning its statistical properties such as mean and variance remain stable over time without the need for differencing. However, the unemployment rate (UMR), industrial production index (IPI), and labour force participation rate (LFPR) are all stationary only after first differencing, indicating that they are integrated of order one, I(1). This combination of I(0) and I(1) variables implies that the dataset is suitable for the Autoregressive Distributed Lag (ARDL) estimation technique, which can accommodate variables with different integration orders without requiring all to be stationary at the same level. Therefore, the mixed order of integration supports the appropriateness of employing ARDL to explore both short-run and long-run dynamics between capacity utilization and unemployment in Nigeria.

4.2 Estimation Tests

Table 3: ARDL Bounds Cointegration Test

	Critical Value Bound		F-Statistics
F_{UMR}(UMR/CUR, IPI, LFPR)			9.050677***
K = 3			
Significance	I(0) Bound	I(1) Bound	

10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Note: Null hypothesis: No level relationship; K = number of regressors; *, ** and *** denote significance at 10%, 5% and 1% level, respectively.
Source: *Authors' EViews Based Results, 2025.*

Bounds cointegration test result indicates a strong long-run relationship among unemployment rate (UMR), capacity utilization rate (CUR), industrial production index (IPI), and labour force participation rate (LFPR) in Nigeria. The computed F-statistic value of 9.050677 is significantly higher than the upper bound critical value of 4.66 at the 1% significance level. Since the F-statistic exceeds all the upper bound values across the 10% (3.20), 5% (3.67), 2.5% (4.08), and 1% (4.66) significance levels, the null hypothesis of no cointegration is rejected. This result confirms the existence of a long-run equilibrium relationship between unemployment and its determinants. In practical terms, it implies that changes in capacity utilization, industrial production, and labour force participation have long-lasting effects on unemployment dynamics in Nigeria. The finding supports the suitability of employing the ARDL model to capture both short-run adjustments and long-run relationships between capacity utilization and unemployment, emphasizing that economic policies influencing these variables will have enduring impacts on the labour market.

Autoregressive Distributive Lag (ARDL) Long-Run and Short-Run Dynamics

The Autoregressive Distributive Lag (ARDL) was used to estimate the long-run and short-run dynamic effect of capacity utilization indicators on the proxy of unemployment (unemployment rate) in Nigeria. The results are presented in Table 4:

Table 4: Estimated Long-Run and Short-Run Coefficients of ARD

Dependent Variable = UMR				
Long-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CUR	-7.542992	1.447506	-5.211027	0.0000
IPI	-0.021058	0.033030	-0.637532	0.5314
LFPR	-9.349233	1.241922	-7.528034	0.0000
C	40.25177	5.241591	7.679305	0.0000
EC = UMR - (-7.5430*CUR - 0.0211*IPI - 9.3492*LFPR + 40.2518)				
Short-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(UMR(-1))	0.252843	0.117125	2.158756	0.0439
D(CUR)	-0.286191	0.069554	4.114659	0.0006
D(CUR(-1))	-0.091719	0.069224	-1.324957	0.2009
D(IPI)	-0.254567	1.024320	-0.248523	0.8064
D(LFPR)	-5.027494	1.135661	-4.426932	0.0003
D(LFPR(-1))	-3.986869	1.313672	-3.034904	0.0068
D(LFPR(-2))	0.254567	0.838901	0.303453	0.7648

D(LFPR(-3))	5.204462	1.072568	4.852338	0.0001
CointEq(-1)*	-0.806803	0.109007	-7.401379	0.0000

R^2 = 0.780679
Adjusted R^2 = 0.713929
Durbin-Watson stat = 1.990296

Source: Authors' EViews Based Results, 2025

Interpretation of Long-Run and Short-Run ARDL Model Results

Capacity utilization rate (CUR) and Unemployment Rate (UMR)

The result shows that capacity utilization rate (CUR) has a negative and statistically significant effect on the unemployment rate (UMR) in both the long and short run. In the long run, the coefficient of capacity utilization rate (CUR) is -7.542992 with a p-value of 0.0000, indicating that the relationship is highly significant at the 1% level. This implies that a 1% increase in capacity utilization rate leads to approximately a 7.54% decrease in the unemployment rate, holding other variables constant. Conversely, a decline in capacity utilization reduces industrial productivity, leading to job losses and higher unemployment. The short-run result also supports this relationship, where the coefficient of capacity utilization rate D(CUR) is -0.286191 with a p-value of 0.0006, showing that the impact is both immediate and statistically significant. This finding suggests that improved utilization of productive capacity in Nigeria's industries stimulates employment generation and reduces the rate of joblessness in the economy.

Industrial Production Index (IPI) and Unemployment Rate (UMR)

The relationship between the industrial production index (IPI) and unemployment rate (UMR) is found to be negative and statistically insignificant in both the long and short run. The long-run coefficient of industrial production index (IPI) is -0.021058 with a p-value of 0.5314, indicating that industrial production index (IPI) has an inverse but non-significant effect on unemployment. This means that although an increase in industrial production index (IPI) tends to reduce unemployment, the effect is too weak to be statistically meaningful. In the short run, the coefficient of industrial production index D(IPI) is also -0.254567 with a p-value of 0.8064, reinforcing the lack of short-term impact. The insignificance could be attributed to structural bottlenecks in Nigeria's industrial sector, such as inadequate infrastructure, high production costs, and overdependence on imported inputs, which limit the capacity of the industrial sector to generate sufficient employment.

Labour Force Participation Rate (LFPR) and Unemployment Rate (UMR)

The labour force participation rate (LFPR) shows a negative and statistically significant impact on the unemployment rate (UMR) in both the long and short run. In the long run, the coefficient is -9.349233 with a p-value of 0.0000, signifying that an increase in labour force participation reduces unemployment. This may reflect the productive absorption of labour into active employment when economic opportunities expand. In the short run, labour force participation rate D(LFPR) has a coefficient of -5.027494 with a p-value of 0.0003, also significant at the 1% level, while D(LFPR(-1)) has a coefficient of -3.986869 and a p-value of 0.0068, further confirming the strong inverse relationship. Interestingly, D(LFPR(-3)) turns positive (5.204462, p=0.0001), suggesting that in the longer lag, increases in the labour force may temporarily raise unemployment if job creation does not keep pace. This finding implies that policies promoting labour market expansion must be matched with economic reforms that create sufficient jobs to absorb new entrants.

Interpretation of CointEq(-1) Result

The CointEq(-1) coefficient of -0.806803 with a p-value of 0.0000 is negative and highly significant, indicating a strong and stable long-run adjustment mechanism. This suggests that approximately 80.68% of short-run deviations from the long-run equilibrium between unemployment and its determinants—capacity utilization rate, industrial production index, and labour force participation rate—are corrected annually. In other words, when unemployment deviates from its long-run path due to short-term

shocks, the system quickly adjusts back to equilibrium. The magnitude of this coefficient underscores the robustness of the long-run relationship among the variables and confirms that the ARDL model is dynamically stable, with rapid convergence toward equilibrium.

Interpretation of Adjusted R-Squared (Adj. R^2) Value
The Adjusted R-Squared (Adj. R^2) value of 0.713929 indicates that approximately 71.39% of the variations in the unemployment rate (UMR) are jointly explained by the capacity utilization rate (CUR), industrial production index (IPI), and labour force participation rate (LFPR) in the model. This high explanatory power implies that the selected independent variables are strong predictors of unemployment in Nigeria. The remaining 28.61% of the variation is attributed to other factors not captured in the model. Overall, the high Adjusted R^2 value confirms that the model is statistically reliable and that the independent variables provide a good fit in explaining unemployment trends in Nigeria.

Interpretation of Durbin-Watson Statistic Value
The Durbin-Watson statistic value of 1.990296 is very close to the ideal benchmark of 2.0, suggesting that there is no evidence of serial correlation or autocorrelation in the residuals of the model. This means the error terms are independent over time, which validates the efficiency and reliability of the model estimates. The absence of autocorrelation implies that the model's predictions are unbiased and that the estimated coefficients can be interpreted with confidence.

4.3 Post Estimation Tests
The results of the diagnostic tests are presented and discussed below:

Table 5: Post-Estimation Test Results

Test	Null Hypothesis	X^2 Value	X^2 Prob	Remark
Jarque-Bera	Normal distribution exists	1.331194	0.5139	Normal residuals
Breusch-Godfrey LM	Serial correlation does not exist	0.084435	0.9194	Serial independence
Breusch-Pagan-Godfrey	Homoscedasticity exists	1.826462	0.0851	Constant Variance
Ramsey RESET	Model is stable	1.455318	0.2284	correctly specified model

Source: Authors' EViews Based Results, 2025.

The post-estimation diagnostic test results confirm that the estimated Autoregressive Distributed Lag (ARDL) model examining the relationship between unemployment rate (UMR), capacity utilization rate (CUR), industrial production index (IPI), and labour force participation rate (LFPR) is statistically reliable and well-specified. The Jarque-Bera normality test indicates that the residuals are normally distributed, implying that the model's errors follow a normal pattern and thus satisfy one of the key assumptions of regression analysis. The Breusch-Godfrey LM test shows no evidence of serial correlation, suggesting that the residuals are independent over time and that the model's estimates are not biased by autocorrelation. The Breusch-Pagan-Godfrey test confirms the presence of homoscedasticity, meaning the variance of the error term is constant, and the model does not suffer from heteroscedasticity problems. Finally, the Ramsey RESET test result shows that the model is stable and correctly specified, indicating that no important variable has been omitted and that the functional form is appropriate. Overall, these diagnostic results validate the robustness, reliability, and internal consistency of the

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DOI: https://doi.org/10.64388/IREV9I8-1714693

ARDL model used in assessing the effect of capacity utilization on unemployment in Nigeria.

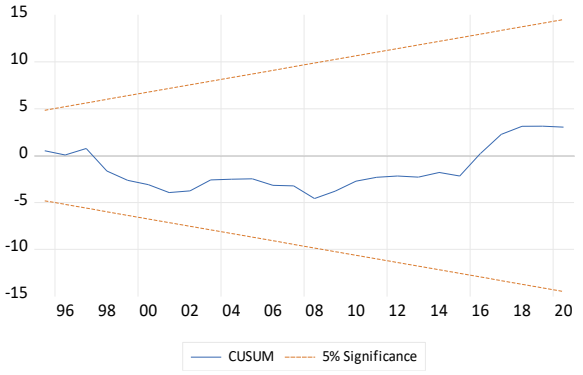

Figure 1: Cusum Test

As shown in Figure 1 the line of CUSUM stayed within the 5 percent critical bounds. This therefore proves the stability of the coefficients of the regressors that have an effect on unemployment as measured by unemployment rate in Nigeria.

4.4 Discussions of Findings

The findings of this study reveal that the capacity utilization rate (CUR) and labour force participation rate (LFPR) have significant and negative effects on the unemployment rate (UMR) in Nigeria, both in the short run and long run, while the industrial production index (IPI) shows an inverse but statistically insignificant relationship with unemployment rate in Nigeria. This implies that higher capacity utilization and increased labour force participation lead to a reduction in unemployment levels, reflecting the productive engagement of the workforce in the economy. The result for capacity utilization supports the Keynesian view that improved industrial efficiency and productive use of existing resources stimulate job creation and reduce unemployment. Similarly, the negative and significant relationship between labour force participation and unemployment suggests that as more people enter the workforce and find employment opportunities, the overall unemployment rate declines. However, the insignificant effect of industrial production index on unemployment implies that growth in industrial output has not been sufficient to translate into broad-based job creation, possibly due to Nigeria's heavy reliance on capital-intensive rather than labour-intensive production processes. These findings are consistent with several related empirical studies. For instance, Malachy and Awujola (2018) found a significant relationship between capacity utilization and unemployment in Nigeria, emphasizing that industrial productivity directly affects labour absorption capacity. Likewise, Oniyide and Ogunjinmi (2021) reported that capacity utilization significantly enhances economic growth, which indirectly reduces unemployment by boosting industrial activity. The negative relationship between labour force participation and unemployment aligns with Akinlo and Ojo (2017), who argued that active participation of the labour force promotes output growth and reduces idle manpower. Conversely, the insignificant relationship between industrial production index and unemployment corroborates Eze and Ude (2023), who found that industrial output growth in Nigeria has limited employment effects due to structural bottlenecks, low capacity utilization, and inadequate investment in labour-intensive industries. Overall, the findings underscore that while productive capacity and labour engagement are key to reducing unemployment, Nigeria's industrial sector must undergo structural transformation to achieve inclusive job-led growth.

V. CONCLUSION AND RECOMMENDATIONS

This study has examined capacity utilization and its effect on unemployment in Nigeria. and the findings of the study showed that, to a considerable extent, different capacity utilization rate variables influence unemployment in Nigeria. Overall, the study has provided evidence on capacity utilization rate, industrial production index and labour force participation rate in explaining and predicting unemployment in Nigeria and found that capacity utilization rate, industrial production index and labour force participation rate have negative effect on unemployment rate in Nigeria. Based on the findings, the study concludes that capacity utilization rate plays a significant role in reducing unemployment in Nigeria.

Based on the findings and conclusions of the study, the following recommendations are hereby presented:

i. The government should prioritize policies that enhance industrial productivity by addressing infrastructural and energy constraints that

limit production efficiency. Reliable electricity supply, improved transport networks, and access to affordable raw materials are essential to increase capacity utilization across manufacturing and industrial sectors. When firms operate closer to full capacity, they will require more labour, thereby reducing unemployment levels and stimulating broader economic activity in Nigeria.

ii. To ensure that economic growth translates into employment opportunities, the government should promote labour-intensive industries such as agro-processing, textiles, and light manufacturing. In addition, targeted vocational training and technical education programs should be implemented to equip the workforce with the skills required by modern industries. This will enhance the employability of the labour force, reduce structural unemployment, and improve labour market productivity in the long run.

Stable macroeconomic policies, particularly in exchange rate management, fiscal discipline, and investment incentives, should be adopted to attract both domestic and foreign investors into productive sectors. The government should also offer tax incentives and credit facilities to firms that expand production and employ more workers. By creating a business-friendly environment that encourages industrial expansion and continuous operation at higher capacity levels, Nigeria can significantly reduce unemployment and achieve inclusive economic growth.

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