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Labor Force Dynamics and Economic Growth Sustainability in Nigeria

Nijerya'da İşgücü Dinamikleri ve Ekonomik Büyümenin Sürdürülebilirliği

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Abstract

The dynamics of a country's labor force are closely tied to economic growth, which plays an essential part in deciding the path that a nation will take. This paper investigates the relationship between labor force dynamics and economic growth, emphasizing their importance in fostering sustainable development in Nigeria from 1990 to 2021. Based on the results of the augmented Dickey-Fuller test, it is observed that the variables exhibit stationarity both at levels and first differences, necessitating the application of the autoregressive distributed lag estimation approach the findings showed that Nigeria's labor force rates and gross domestic product growth are intertwined throughout time. The results specifically demonstrate that the labor force, gross fixed capital formation, and female primary school enrollment have positive and significant long-term effects on economic growth. When compared, the negative effects on economic growth from the age dependency ratio and net migration are significant in the long term. According to the study's findings, policymakers should focus on policies that support the growth and development of the labor force, including investments in education, training, and initiatives to promote labor force participation. Ensuring a conducive work environment and addressing unemployment and underemployment are vital for maximizing the positive impact of a growing labor force on long-term growth.

Keywords: Age dependency, GDP per capita, investment, labor force, migration, school enrollment

Öz

Bir ülkenin işgücü dinamikleri, ulusun izleyeceği yolu belirlemede önemli bir rol oynayan ekonomik büyüme ile yakından ilişkilidir. Bu makale, 1990'dan 2021'e kadar Nijerya'da sürdürülebilir kalkınmayı teşvik etmede işgücü dinamikleri ile ekonomik büyüme arasındaki ilişkiyi araştırmaktadır. Araştırma bulgularına göre, işgücü oranları ve GSYİH büyümesi zaman içinde iç içe geçmiştir. Özellikle, işgücü, sabit sermaye oluşumu ve kız çocuklarının ilkokula kaydolması ekonomik büyüme üzerinde uzun vadede olumlu ve anlamlı etkilere sahiptir. Yaşa bağlı bağımlılık oranı ve net göçün ekonomik büyüme üzerindeki olumsuz etkileri uzun vadede önemlidir. Çalışmanın bulgularına göre, politika yapıcıların eğitim, eğitim ve işgücüne katılımı teşvik eden girişimler dahil olmak üzere işgücünün büyümesini ve gelişimini destekleyen politikalara odaklanması gerekmektedir.

Anahtar Kelimeler: İşgücü, kişi başına GSYİH, yaşa bağlı bağımlılık, göç, yatırım, okula kayıt

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Introduction

There has been a lot of interest in the field of economics regarding the connection between labor force dynamics and economic expansion. Understanding how shifts in the workforce affect economic growth is particularly essential for countries like Nigeria, which have recently seen large demographic and labor market shifts. Nigeria, the largest economy in Africa, has been working to achieve inclusive and sustained economic growth in order to address pressing developmental issues and raise the standard of living for its people.

Nigeria's labor force dynamics have been significantly impacted by demographic changes, such as population growth, urbanization, and migration patterns. By 2050, Nigeria is expected to have the third-largest population in the world (United Nations, 2022). This rapid population growth is expected to continue. These demographic changes have a significant impact on the labor force participation rate, workforce skills, and overall employment structure.

In addition, the relationship between the dynamics of the labor force and economic growth depends heavily on the quality of employment. Like many developing nations, Nigeria struggles with issues like a sizable informal workforce, underemployment, and low-paying jobs. For sustained economic growth and poverty reduction, it is essential to improve the quality of employment by fostering decent employment opportunities, ensuring job security, and improving working conditions.

Concurrently, urbanization is reshaping major cities, influencing lifestyles, and altering employment structures. The vast and diverse labor force is a focal point, with attention on participation rates, the prevalence of informal employment, and challenges related to underemployment and low-paying jobs. Economic growth, gauged through gross domestic product (GDP) growth rates and sectoral contributions, reflects the nation's overall economic health. Migration patterns, both internal and external, play a pivotal role, influencing labor markets and contributing to the phenomenon of brain drain or gain. This comprehensive understanding of demographic data, employment statistics, growth rates, and migration dynamics forms a holistic lens through which the intricate relationship between labor force dynamics and economic expansion in Nigeria can be examined.

Numerous studies have examined the relationship between labor force dynamics and economic growth in different nations, offering insightful information on the subject. Several significant factors affecting Nigeria's economic growth have been identified through research. Yakubu et al. (2020), for example, found that an increase in the number of people actively participating in the labor force contributed to higher economic growth in Nigeria. A positive association between employment and GDP growth was shown by Sodipe and Ogunrinola (2011), who studied this question for Nigeria. This finding highlights the importance of job creation for sustained economic expansion.

With this context in mind, this article investigates the dynamics of Nigeria's labor force in connection to the country's economic growth in an effort to shed light on the key elements influencing Nigeria's economic performance. Policymakers and other stakeholders can develop targeted strategies to support inclusive and sustainable economic development in Nigeria as a result of the research's findings.

The remaining portions of this paper are divided into four groups. The literature review, which includes conceptual, theoretical, and empirical reviews as well as gaps in the literature, is presented in the second section after the introduction. The third section is methodology while the fourth section presents results and discusses the findings. The final section concludes the study and presents some policy recommendations.

Literature Review

Brief Conceptual Review

Different facets of labor force dynamics reflect the features of the Nigerian labor market. The size and composition of the labor force, or the number of people who are either employed or actively seeking employment, are important considerations. Age dependency structure, net migration, and demographic factors like population growth all have an impact on the size of the labor force. The dynamics of the working-age population must be understood in order to evaluate the potential labor force that can support economic expansion.

Labor force dynamics are significantly influenced by labor force participation rates as well. It speaks of the percentage of people who are of working age and who are either employed or actively looking for work. A number of variables, such as customs and social expectations, academic achievement, and the availability of employment opportunities, can have an impact on the labor force participation rate. A more active and engaged workforce is generally indicated by a higher labor force participation rate, which can have a positive effect on economic growth (Yakubu et al., 2020).

According to Soava et al. (2020), employment rates is a crucial component of labor force dynamics. The percentage of the labor force that is employed is measured. Government policies, industry-specific trends, the state of the labor market, and technological advancements all have an impact on employment rates. To determine the degree of productive economic activity and the scope of job creation in Nigeria, it is essential to comprehend the dynamics of employment rates.

In the analysis of labor force dynamics, the quality of employment is also a key factor. It covers a wide range of topics, such as the type of employment (whether formal or informal), job security, working conditions, income levels, and eligibility for social benefits. The well-being of individuals, the distribution of income, and overall economic growth can all be significantly impacted by the quality of employment. Sustainable economic growth can be facilitated by encouraging decent employment opportunities and enhancing the standard of employment.

Economic growth, in addition to labor force dynamics, is a key idea in this investigation. Economic expansion is the steady rise in real GDP over time. It displays the development of economic activities, elevated output, and raised standards of living. Numerous factors, such as the composition of the labor force, technological development, capital accumulation, institutional factors, and governmental policies, have an impact on economic growth. In order to develop policies that support inclusive and sustainable development in Nigeria, policymakers and researchers must have a thorough understanding of

the relationship between labor force dynamics and economic growth.

Understanding the key ideas and variables related to labor force dynamics and economic growth in Nigeria is made possible thanks to the conceptual review. It lays the groundwork for further investigation into the precise relationship between labor force dynamics and economic growth in the Nigerian context using theoretical frameworks and empirical analysis.

Brief Theoretical Review

The human capital theory, for example, offers a theoretical framework for comprehending the relationship between labor force dynamics and economic growth. Investments in education and skill development, according to Becker (2009), improve human capital, resulting in higher labor productivity and economic growth. The human capital theory has received extensive empirical support in a variety of national contexts, highlighting the beneficial effects of education and skill development on economic growth (Langthaler & Bazafkan, 2020; McGrath et al., 2020).

The human capital theory emphasizes the value of education and skill development in the context of labor force dynamics. When people have access to high-quality education and training, they develop the skills and knowledge required to perform effectively. As a result, people are better able to contribute to the production process and produce more revenue, which raises labor productivity.

The theory also emphasizes the importance of lifelong learning and education in preserving and enhancing human capital. To stay relevant and competitive in the labor market, people must regularly update their knowledge and skills as technology and industries change. Governments and organizations that place a high priority on funding education and lifelong learning initiatives can encourage the development of a flexible labor force that can respond to shifting economic conditions and promote long-term economic growth.

A theoretical framework for comprehending how investments in education and skill development can result in increased labor force productivity and, ultimately, economic growth is provided by the human capital theory. For policymakers developing strategies to support human capital development through educational reforms, career training programs, and policies a skilled and productive labor force, fostering sustainable economic growth and development, this theory has significant implications.

Brief Empirical Review

Table 1 displays a structured overview of the existing empirical literature. Despite a substantial body of literature on labor force dynamics and economic growth in Nigeria, the impact of gender on the labor force has received little attention. While some research has been conducted on gender differences in labor market participation and economic growth (Young, 2018), more research is required to investigate how gender inequalities in education and other areas affect the labor force and economic growth, as well as how policies can address these inequalities. The current study attempts to fill this research gap.

Material and Methods

Model for Estimating the Effect of Labor Force dynamics on Economic Growth

Following the empirical work of previous studies stated above, the study modeled economic growth as a function of the labor force, including the relevant main and control variables, i.e., GDP per capita, gross fixed capita formation, labor force, primary school enrollment female, primary school enrollment male, age dependency ratio, and net migration. The baseline model for the time series analysis is specified below as:

$$gdppc_t = f(gfcf_t, lf_t, psef_t, psem_t, adr_t, nmi_t) \quad (1)$$

To estimate the parameters, the function is transformed into the generalized equation as below:

$$\log gdppc_t = \theta_0 + \theta_1 gfcf_t + \log\theta_2 \log lf_t + \theta_3 psef_t + \theta_4 psem_t + \theta_5 adr_t + \theta_6 \log nmi + v_t$$

where economic is proxy by *gdppc* (gdp per capita); *gfcf* is gross fixed capita formation; *lf* is labor force; *psef* is primary school enrollment in female; *psem* is primary school enrollment in male; *adr* is age dependency ratio and *nmi* represents net migration; θ_0, θ_{1-6} are parameters; *t* denotes time; and *v* is disturbance term. The autoregressive distributed lag (ARDL) representation of Eq.u (2) is thus specified as follows:

$$\begin{aligned}\Delta\log gdppc_t = {} & \alpha_0 + \sum_{i=1}^{n}\alpha_{1i}\Delta\log gdppc_{t-i} + \sum_{i=1}^{n}\alpha_{2i}\Delta gfcf_{t-1} + \sum_{i=1}^{n}\alpha_{3i}\Delta lf_{t-i} \\ & + \sum_{i=1}^{n}\alpha_{4i}\Delta psef_{t-i} + \sum_{i=1}^{n}\alpha_{5i}\Delta psem_{t-i} + \sum_{i=1}^{n}\alpha_{6i}\Delta adr_{t-i} \\ & + \sum_{i=1}^{n}\alpha_{7i}\Delta\log nmi_{t-i} + \beta_2\log gdppc_t + \beta_3 gfcf_t \\ & + \beta_4 lf_t + \beta_5 psef_t + \beta_6 psem_t + \beta_7 adr_t + \beta_8\log nmi_t + \varepsilon_t\end{aligned} \quad (2)$$

where Δ indicates the first difference operator, α0 is the drift component, and ε_t is the error term.

Prior to estimating the parameters, the study employs the augmented Dickey–Fuller (ADF) test to assess the stationarity, specifically the presence of a unit root, in the variables. The study subsequently examines the presence of cointegration among the variables, taking into account the results obtained from assessing the stationarity of the variables. In this study, the ARDL model was employed to ascertain the long-run and short-run estimates of the correlation between labor force dynamics and economic growth. The determination of the lag length is conducted by employing the Akaike information criteria (AIC). The calculation of cointegration involves the utilization of the *F*-statistic value. The significance of the calculated

Table 1.
Brief Review of Existing Studies

Authors	Objectives	Methodology	Findings
Yakubu et al. (2020)	Examine the relationship between labor force participation and economic growth in Nigeria from 1990 to 2017.	Vector Error Correction Model (VECM)	The results demonstrate the variables' long-term relationships, and long-term causality was discovered connecting LFPR (Labor Force Participation Rate) and GFCF to RGDP (Real Gross Domestic Products).
Soava et al. (2020)	To analyze the progression and impact of various factors, namely the labor force participation rate, GDP per capita, personal remittances, and gross fixed capital formation, on the economic growth of countries within the European Union (EU).	The Granger Casualty test	The study's findings reveal a distinct and varied progression of the indicators, with all indicators being significantly impacted by both the 2008 financial crisis and the onset of the COVID-19 issue in early 2020.
Liu et al. (2022)	To examine the correlation between demographic factors and economic progress in China.	The overlapping generations model and a numerical simulation approach	The significant contribution of the ageing labor force, characterized by a delayed retirement age, plays a crucial role in overall output and serves as a fundamental catalyst for sustainable economic growth in the long run.
Doré and Teixeira (2023)	To investigate how much human capital, structural change, and institutional quality contributed to Brazil's economic growth.	ARDL cointegration technique	The results showed that years of education (human capital) had a favorable and long-lasting effect on Brazil's economic growth.
Wang and Conesa (2022)	Examine the impact of demographics and migration on China's potential economic growth.	Two-sector overlapping generations model.	They discovered that population aging is to blame for the slowdown in economic growth between 2020 and 2040 through a counterfactual with a fixed age distribution.
Cylus and Tayara (2021)	Examine the relationship between the size of the older working-age population and economic growth in 180 countries from 1990 to 2017	Country and year fixed effects models	A rise in the proportion of the population aged 55–69 is linked to slower growth in real GDP per capita. However, this effect subsides when the older demographic is in good health.
Colacchio and Vergori (2022)	Examine the causal relationship between economic growth, tourism development, and labor market dynamics in Italy from 1997 to 2019.	Granger causality test	Their findings indicated a substantial estimated level of employment intensity associated with growth on average.
Polyzos et al. (2022)	Examine the potential impact of demographic change on economic development in the Middle East and North Africa region	Fixed-effects panel analysis	Natural rents exert a detrimental influence on the association between the working-age population and economic growth.
Han and Lee (2020)	To quantify the overall amount of human capital in Korea and assess its impact on the pace of economic growth (GDP) between 1986 and 2017.	Construction of a measure of human capital using micro datasets on the labor composition of age, gender, education, and wage rate.	Human capital plays a substantial role in fostering economic growth, contributing 0.5% to the annual increase in GDP during the specified time frame.
Pham and Vo (2021)	Examine the impact of an aging population on economic growth in 84 developing countries from 1971 to 2015.	Panel fixed effects and quantile regression	A large proportion of young people (14 years old and younger) has a negative long-term effect on economic growth.
Maity and Sinha (2021)	Examine the relationship between population aging and economic growth in the context of India	VECM	The population aging exerts a detrimental influence on economic growth.
Young (2018)	Analyze the effect of labor force dynamics on economic expansion in Nigeria from 1970 to 2015	New bounds testing method for co-integration	The results suggest that there are significant and positive effects of labor force dynamics on both short-term and long-term economic growth in Nigeria.
Yıldırım and Akinci (2020)	Investigate the relationship between female labor force participation and economic growth in middle-income countries from 2001 to 2016	System-Generalized Methods of Moments (GMM)	The results show that the System-GMM model supports the U feminization Theory for middle-income countries while controlling for all other variables.

Note: COVID-19 = coronavirus disease 2019; GDP = gross domestic product; gfcf = gross fixed capita formation.

value is assessed in comparison to the two tabulated values that were derived, namely the upper bound and lower bound. Cointegration is deemed to be supported when the calculated value exceeds the upper bound value. Conversely, if the calculated value falls below the lower bound value, no cointegration is supported. In cases where the calculated value lies between the two bound values, the determination of cointegration is inconclusive.

Results and Discussion

Model Results

The summary statistics of the variables understudy show their respective mean, standard deviation, skewness, and peakedness is presented in Table 2. From Table 2, it shows that the mean of labor force, primary school enrollment in females, and primary school enrollment in males are 17.7%, 84.8%, and 112.9% respectively. In the same order, the table revealed their maximum values to be 17.9%, 94.3%, and 358.9%, respectively. Also, the minimum values are 17.2%, 74.5%, and 84.6% respectively.

The results of Table 2 revealed that some variables are positively skewed while others are negatively skewed, implying long right and left tails. The table result showed that the value of psem exceeded 3, indicating peakedness or leptokurtic behavior. The other variables have values less than 3, implying flatness or platykurticity. As a result, the variables are not normally distributed.

Table 3 shows the correlation analysis of the variables. The coefficients indicate the degree of association between the variables used to explain the existing relationship between Nigeria's labor force dynamics and economic growth. Except for gfcf, adr, and nmi, the results show that labor force variables are positively correlated with economic growth.

Consequently, these results are just preliminary analysis subject to confirmation using the appropriate estimation method to reveal the parameter signs and magnitudes of the variables. This subsection displays the results of the unit root test while analyzing the degree of stationarity of the variables. It is used to determine whether a unit root exists, that is, whether the variables are not stationary at levels. The ADF is used to conduct this unit root test. Its widespread acceptance and use make it easier for researchers to communicate and compare results, contributing to the consistency of analyses across studies. This is the first test carried out before the co-integration analysis and is known as the pre-estimation test. The ADF was carried out using the E-views software package and the results from the test are presented in Table 4. The table shows that adr is stationary at levels while other variables are stationary at first difference.

The long-run relationship among labor force dynamics, economic growth, and other controlling variables in the suggested hypotheses is explored by ARDL bound cointegration tests before short-run and long-run parameters are estimated. Since the ARDL bound test can be applied to variables of varying integration orders, it is utilized here. Table 5 presents the *F*-statistics estimate used to test the hypothesis of a long-term correlation between Nigeria's changing labor force, economic growth, and other controlling variables.

Using a significance threshold of 5%, the estimated *F*-statistics of the normalized equation (Farb=4.2859) is larger than the lower and upper critical bounds. This means, at a 5% level of significance, that there is a rejection of the null hypothesis that there is no long-term relationship. The meaning of the above estimation is that the dependent and independent variables all have an equilibrium condition that keeps them together in the long run. Thus, there exists a long-run relationship between labor force dynamics and economic growth in Nigeria.

Table 2.
Descriptive Statistics

	loggdppc	gcfc	loglf	psef	psem	adr	lognmi
Mean	7.0113	28.2243	17.6533	84.8228	112.9887	88.0745	-12.0905
Maximum	8.0389	53.1222	17.9819	94.2854	358.911	91.7736	-11.4231
Minimum	5.5993	14.1687	17.2756	72.4805	84.6407	85.4124	-12.6115
Standard deviation	0.7783	11.3821	0.2107	6.0069	64.8873	1.5813	0.5351
Skewness	-0.2448	0.4169	-0.2384	-0.4721	3.5197	0.9052	0.1948
Kurtosis	1.4823	2.0673	1.8503	2.2415	13.6396	3.3148	1.2287
Jarque-Bera	3.3909	2.0875	2.0655	1.9559	217.004	4.5026	4.23856
Probability	.1835	.3523	.3560	.3761	.0000	.1053	.1116
Observations	32	32	32	32	32	32	32

Source: Author's computation (2023).
Note: adr = age dependency ratio; gdppc = gross domestic product per capita; gfcf = gross fixed capita formation; lf, labor force; nmi = net migration; psef = primary school enrollment in female.

Table 3.
Correlation Matrix

	logdppc	gfcf	loglf	psef	psem	adr	lognmi
logdppc	1						
gfcf	-0.8834	1					
loglf	0.9096	-0.8506	1				
psef	0.5042	-0.5345	0.5377	1			
psem	0.1712	0.0692	0.3491	0.2500	1		
adr	-0.4396	0.5132	-0.6794	-0.5354	-0.4168	1	
lognmi	-0.9607	0.8831	-0.9282	-0.4748	-0.2109	0.4531	1

Source: Author's computation (2023).
Note: adr = age dependency ratio; gdppc = gross domestic product per capita; gfcf = gross fixed capita formation; lf, labor force; nmi = net migration; psef = primary school enrollment in female.

Table 4.
Augmented Dickey–Fuller Unit Root Test Results [Trend and Intercept]

	Augmented Dickey–Fuller Test			Unit Root with Break Test		
Variables	Stationary at Level	Stationary at First Difference	Remarks	Break	t-Statistics	Remarks
loggdppc	-1.3494(0) [-3.5629]	-4.2327*(0) [-3.568]	I(1)	2014	-6.1770***	I(1)
gfcf	-1.1455(0) [-3.5629]	-4.3181***(0) [-3.568]	I(1)	1999	-5.0419***	I(1)
loglf	-3.1124(1) [-3.568]	-4.4990***(0) [-3.574]	I(1)	2011	-14.162***	I(1)
psef	-3.5381*(2) [-3.574]	-	I(0)	2007	-4.8587**	I(1)
psem	-0.7443(0) [-3.5629]	-5.800***(0) [-3.5684]	I(1)	2003	-5.9520***	I(1)
adr	-14.235***(5) [-3.595]	-	I(0)	2017	-15.969***	I(0)
lognmi	-1.6917(0) [-3.3563]	-5.643***(0) [-3.5684]	I(1)	2001	-7.3728***	1(1)

Source: Authors' computation (2023).
Note: adr = age dependency ratio; gdppc = gross domestic product per capita; gfcf = gross fixed capita formation; lf, labor force; nmi = net migration; psef = primary school enrollment in female.
***, **, and * signify significance level at 1%, 5%, and 10% respectively.

Table 5.
Existence of Long-Run Cointegration Between Labor Force Dynamics and Economic Growth

Test Statistic	Value	*k*
F-statistics (loggdppc, gfcf, loglf, psef, psem, adr, lognmi) (2, 3, 3, 3, 1, 3, 2)	4.2859	6
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2023).
Note: adr = age dependency ratio; gdppc = gross domestic product per capita; gfcf = gross fixed capita formation; lf, labor force; nmi = net migration; psef = primary school enrollment in female.

Short-Run and Long-Run Estimates

This discussion addresses the null hypothesis, which holds that labor force dynamics in Nigeria have no significant impact on economic growth. The ARDL method was used to examine both short and long-run projections of the dynamics of the Nigerian labor force dynamics, economic growth, and other explanatory variables. This study's estimated ARDL model incorporates both short- and long-term estimations of the association between the series under consideration. The pace or intensity of adjustment can be gauged from the short-run estimation results, which reveal the error correction mechanism. How quickly a dependent variable responds to shifts in independent variables is referred to as its "rate of adjustment." The dynamic pattern of the model is displayed in the short run analysis, which also checks to see if the dynamics of the model have not been restricted by incorrect lag length specifications. Based on the automatic selection of the AIC, the model was set to four degrees of freedom, and the ARDL test automatically selected the lag length on all variables. Table 6 shows the short-run and long-run estimates. of the labor force dynamics

Table 6.
Autoregressive Distributed Lag Estimated Model of Economic Growth

Dependent Variable: Economic Growth (gdppc, log)				
Selected Model: ARDL (4, 1, 2, 3, 1, 3, 2)				
Sample: 1990 2021			Included observations: 29	
Variable	Coefficient	Std. Error	*t*-Statistic	Probability
Short-run estimates				
Δ(log(gdppc(-1)))	0.697770	0.106849	6.530447	.0000
Δ(log(gdppc(-2)))	0.578051	0.105975	5.454612	.0001
Δ(log(gdppc(-3)))	0.179730	0.092144	1.950525	.0730
Δlog(gfcf)	-0.025332	0.004947	-5.120464	.0002
Δ(log(lf))	4.018753	1.023975	3.924659	.0017
Δ(log(lf(-1)))	-3.686597	1.127125	-3.270797	.0061
Δ(psef)	-0.0243	0.0020	4.2582	.0080
Δ(psef(-1))	-0.0174	0.0025	-9.6350	.0002
Δ(psef(-2))	-0.03194	0.0029	-11.1173	.0001
Δ(psem)	-0.0041	0.0002	-16.3411	.0000
Δ(adr)	0.170603	0.082608	2.065202	.0594
Δ(adr(-1))	0.2179	0.0646	3.37083	0199
Δ(adr(-2))	-0.4913	0.0502	-9.7929	.0002
Δ(log(nmi))	-0.044959	0.097969	-0.458906	.6539
Δ(log(nmi(-1)))	-0.385504	0.161425	-2.388132	.0328
ECT(-1)	-0.988907	0.136157	-7.262971	.0000
Long-run estimates				
log(gfcf)	0.010542	0.010696	0.985580	.3423
log(lf)	3.622741	0.692736	5.229611	.0002
psef	0.013399	0.005020	2.669194	.0193
psem	-0.000974	0.000632	-1.541975	.1471
adr	0.172516	0.048282	3.573104	.0034
log(nmi)	-0.435291	0.229508	-1.896631	.0803
c	-78.70706	14.02622	-5.611423	.0001
Goodness-of-fit measures				
R^2	0.7894	**F-stat**	145.47(0.0000)	
Adj. R^2	0.7157	**D-Watson**	2.0827	

Source: Author's computation (2023).

on economic growth relationship. The coefficient of the Error Correction Term (ECT) is shown to be negative and statistically significant at the standard level.

The positive coefficients between the log of GDP per capita and economic growth at the current, first lag, and second lag suggest a positive relationship between past and current economic growth, indicating persistence or momentum in the short run. The decreasing magnitude of coefficients for the second and third lags implies that the impact of past economic changes diminishes over time, indicating a fading effect.

The negative coefficients suggest an inverse relationship between changes in gross fixed capital formation and

short-term economic growth. In other words, an increase in gross fixed capital formation is associated with a decrease in short-term economic growth, and vice versa. This could be as a result of the crowding out effect where an increase in gross fixed capital formation may divert resources away from other productive uses, leading to a temporary negative impact on overall economic growth. Similarly, investments in fixed capital often involve adjustment periods, during which the immediate impact on economic growth might be negative. For instance, if there is a surge in capital investment, it might take time for these investments to translate into increased productivity and economic growth.

The positive coefficient suggests a positive relationship between changes in the labor force and economic growth at the current level in the short run. An increase in the labor force is associated with an immediate increase in economic output per capita. An expanding labor force can contribute to economic growth by providing a larger workforce that can contribute to production and output. However, at the first lag the negative coefficients suggest an inverse relationship between changes in the lagged labor force and short-term economic growth. An increase in the labor force in the previous period is associated with a decrease in economic output per capita in the current period. This could reflect short-term adjustments in the economy. For example, a sudden increase in the labor force in the previous period might strain resources, leading to a negative short-term impact on economic growth.

In terms of psef on economic growth, the negative coefficients suggest an inverse relationship between changes in female school enrollment and short-term economic growth. An increase in female school enrollment in the current period, first lag, and second lag is associated with a decrease in economic output per capita in the short run. This, however, can be explained with the immiserizing growth theory whereby in the short run, gender-based disparities in female education in Nigeria can impede economic growth by contributing to labor market inefficiencies, reduced productivity, under-utilization of human capital, increased income inequality, and limited innovation and adaptability.

In terms of psem on economic growth, the negative coefficients suggest an inverse relationship between changes in male school enrollment and short-term economic growth. An increase in male school enrollment in the current period is associated with a decrease in economic output per capita in the short run. Short-term resource constraints or adjustments might occur when there is a sudden increase in male school enrollment.

The positive coefficient indicates a positive short-term relationship between changes in the age dependency ratio and economic growth. The persisting positive effect of the lagged age dependency ratio suggests a sustained impact over time. The diminishing effect of the second lag implies that the short-term demographic dividend weakens as time passes.

The persistently negative coefficient for the lagged net migration suggests that the short-term challenges associated with changes in net migration in the previous period continue to impact economic output per capita in the current period. The lagged effect might indicate that adjustments and challenges related to net migration take time to play out in the economy.

The long-run estimates in Table 5 show that the impact of the labor force on economic growth is positive and statistically significant at 5%, implying that an increase in the size of the labor force in the long run is associated with an increase in economic output per capita. A growing labor force can contribute to economic growth through increased production, consumption, and innovation. A larger labor force, if effectively utilized, can lead to higher productivity and output over the long term. This, however, is consistent with theoretical expectations.

In terms of the impact of psef on economic growth, it is positive and statistically significant at 5%, implying that an increase in female education in the long run is associated with an increase in economic output per capita. Education, particularly among females, can have a profound impact on a nation's human capital. A more educated female population may contribute to increased productivity, innovation, and overall economic development.

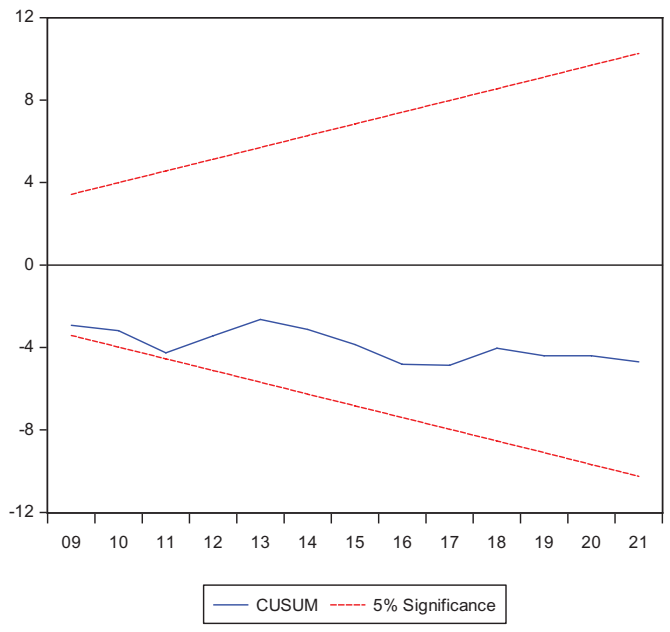
In terms of the effect of psem on economic growth, it is negative and statistically significant at 5%, implying that an increase in male primary school enrollment will result in a corresponding decrease in economic growth in the long run. However, this contradicts theoretical expectations.

The negative coefficient suggests a negative relationship between long-term changes in the age dependency ratio and economic growth. An increase in the age dependency ratio in the long run is associated with a decrease in economic output per capita. The age dependency ratio reflects the ratio of dependent populations (young and elderly) to the working-age population. A higher age dependency ratio indicates a larger proportion of dependents, potentially straining resources and negatively affecting economic productivity.

The model's variables can account for roughly 79% of the total variation in economic growth, owing to the high adjusted-R2 coefficient of determination (72%). The *F*-statistic (145.47) from the overall test shows that the model is well defined and significant at 5%. Serial auto-correlation is not present in the model, as indicated by the Durbin–Watson statistic (2.0827).

The calculated ARDL model tests for non-normality, normality, heteroscedasticity, serial correlation, and misspecification of the functional form. Table 6 displays the outcomes of these analyses. The serial correlation, normality, and heteroskedasticity tests were all passed by the estimated ARDL model. That is, there is no serial correlation between the error terms, and they all follow the same standard normal distribution. The ARDL

Figure 1.
Cumulative Sum (CUSUM).



model is also well-distributed, as demonstrated by its passing of the Ramsey RESET test. Figures 1 and 2 also display stable cumulative sum (CUSUM) and CUSUM of squares (CUSUMSQ) values.

Figure 2.
Cumulative Sum of Squares (CUSUMQ).

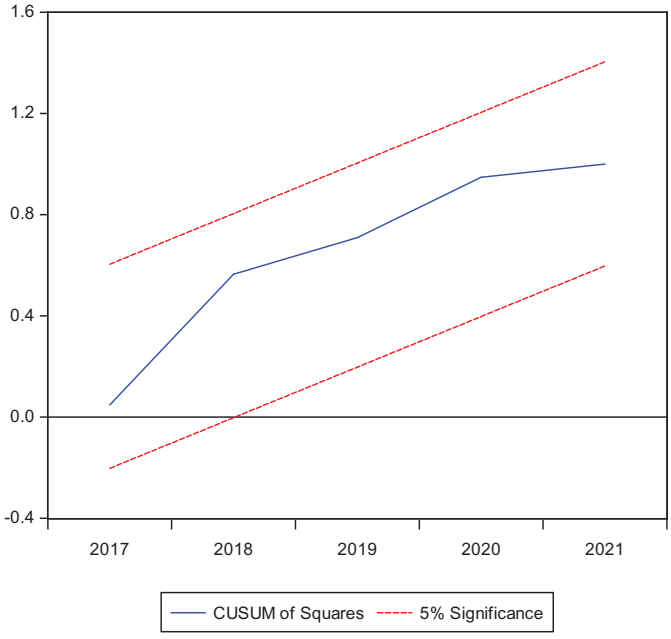


Table 7.
Diagnostic Tests of Selected Autoregressive Distributed Lag Model

Results	
Serial correlation: 8.1033 [0.0854]	**Normality Test:** 0.5130 [0.7737]
Functional form: 0.0771 [0.9398]	**Heteroskedasticity test:** 1.1672 [0.3930]

Source: Author's computation (2023).

Conclusion and Recommendations

In this study, the relationship between Nigeria's labor force dynamics and economic growth from 1990 to 2021 was examined. GDP per capita, the labor force, gross fixed capital formation, primary school enrollment for males and females, the age dependency ratio, and net migration are among the variables used in the study. The study came to the conclusion that in the long run, an increase in gross fixed capital formation is associated with economic growth. Policymakers should prioritize creating a favorable investment climate, encouraging both private and public investments in infrastructure, technology, and other capital assets. Monitoring the efficiency and effectiveness of these investments is crucial for maximizing their positive impact on long-term growth.

As regards the labor force, a larger labor force is positively associated with long-term economic growth. These findings align with the works of Karaki (2023); Kolinug and Winerungan (2022); Annisa and Taher (2022), and Baerlocher et al. (2021). Policymakers should focus on policies that support the growth and development of the labor force, including investments in education, training, and initiatives to promote labor force participation. Ensuring a conducive work environment and addressing unemployment and underemployment are vital for maximizing the positive impact of a growing labor force on long-term growth.

Increased female school enrollment is positively associated with long-term economic growth. Policymakers should implement policies that promote and support female education, addressing gender disparities in educational opportunities and creating an environment conducive to the retention and advancement of educated females in various sectors with a focus on structural reforms and public awareness training, rather than solely relying on increased education expenditures as the main solution. Quality education for females should be a priority to ensure a well-educated and skilled workforce.

The study concluded that in the short run, increased male school enrollment is associated with short-term challenges and potential negative impacts on economic growth. Policymakers should carefully navigate the short-term dynamics related to the integration of educated males into the workforce. Policies supporting effective integration, addressing unemployment or underemployment, and aligning skills with job requirements are essential for ensuring positive long-term outcomes.

The findings regarding age dependency ratio led to the conclusion that an increase in the age dependency ratio is negatively associated with long-term economic growth. Policymakers should consider comprehensive policies to address the challenges posed by an aging population, including strategies to enhance the productivity of the working-age population, promote savings for retirement, and improve healthcare for the elderly. Holistic approaches are necessary to balance the needs of dependents and the capacity of the working-age population.

Lastly, increased net migration is associated with short-term challenges and potential negative impacts on economic growth. Policymakers should focus on policies that facilitate the smooth integration of migrants into the workforce, housing markets, and public services to mitigate the short-term challenges. Long-term strategies should include efforts to address cultural integration, provide education and training opportunities, and create a supportive environment for a diverse population.

Ethics Committee Approval: Clearance from an ethics council is not necessary for this study as it utilizes pre-existing datasets collected by reputable organizations like the Central Bank of Nigeria and the World Bank.

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