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Labour Force Participation and Economic Growth in Nigeria

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Abstract

This paper has examined empirically the effect of labour force participation on economic growth in Nigeria. Time series data for both the dependent and independent variables were sourced from World Bank Development Indicators 2018 database for the period 1990-2017. Johannsen's Cointegration, and Vector Error Correction model (VECM) econometric tools were used. Finding shows that the variables have long-run relationship and also long-run causality was found running from LFPR and GFCF to RGDP. The study recommends that it is necessary for policy makers to address the problems of unemployment and gender inequality in employment.

JEL classification numbers: JEL J20, J60, O40, C10, O55
Keywords: Labor Force participation, Unemployment, Economic growth, Econometrics, Nigeria

1. Introduction

It is often said that a vital labor force is an asset for a country, this implies that Labour force participation is a pervasive feature in many developing countries. The gaps between male and female outcomes and opportunities are present in several dimensions: education, earnings, occupation, access to formal employment, access to managerial positions, access to productive inputs, political representation, or bargaining power inside the household (Cuberes and Teignier, 2011). Gender gap has become a fact of life all over the world, specifically in developing nations like

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Nigeria. According to World Bank report Nigeria's labor force participation rate dropped to 55.1% in December 2017, compared with 55.2% in the previous year, with an average rate of 55.1%. The data reached an all-time high of 56.4% in December 1990 and a record low of 54.7% in December 2004. Therefore, the objective of this paper is to analyze the effect of labour force participation on economic growth in Nigeria. This research will contribute to existing literature as it contains the current analysis of the effect of LFP on GDP in Nigeria. For this purpose, the paper is organized thus; the next sections give the literature review, methodology, analysis of results, conclusion and recommendations.

2. LITERATURE REVIEW

Efforts have been made by researchers such as Duflo (2012), Klasen and Pieters (2012), Rahaman and Islam (2013), Gaddis and Klasen (2014), Faridi and Rashid (2014), Hakura et al. (2016), Khera (2016) to authenticate or refute the arguments on the effect of labour force participation on economic growth.

Cavalcanti and Tavares (2007) examined output cost of gender discrimination using a model-based macroeconomics estimates and their model was designed to imitate the behavior of the US economy in the long-run. They found that in the steady state 50% increase in the gender wage gap leads to a 35% decrease in income per capita.

Parrotta et al. (2011) employing a matched employer-employee data-set analyzed how work force diversity in cultural background, education and demographic characteristics affects productivity of firms in Denmark. They found that labour diversity in education significantly enhances productivity and adds value while diversity in ethnicity and demographics induces negative effects on firm productivity.

Kargi (2014) attempted to establish a suitable explanation for the concept of the Jobless Growth". He found that despite the high population growth rates, the labor force participation rate has been too small. During the period under review, Turkey experienced an average growth of the economy which has not created any employment. He recommended that new openings for work will be vital keeping in mind the end goal to wipe out this opposing circumstance situation align with participation of women in labor force. He further stated that it will have a compelling commitment to the economic development process.

Shahid (2014) examined the relationship between labor force participation, Gross Fixed Capital Formation and economic growth. Using time series data for the time period of 1980 to 2012, he used the Johnson Co-integration test and found that a long run relationship exists between the variables.

Chen, et al (2014) examined labor force and the relationship between long run growth and unemployment. They opined that increases in unemployment compensation, increases in hiring costs, increases in workers bargaining power all lower employment and long run economic growth affecting female labor participation.

Table 1: Overview of selected studies on LFP and GDP nexus

Authors	Period	Empirical Methods	Countries	Findings
Appiah (2018)	1975-2015	System GMM estimator	Developing countries in SSA	Found that the female labor participation has a positive impact on economic growth, in developing countries, and that of SSA countries only
Lechman and Kaur (2015)	1990-2012	U-shaped feminization hypothesis	162 countries	The findings supported the hypothesis on U-shaped relationship between FLFP and GDP
Mujahid and Zafar (2012)	1980-2010	ARDL and Granger Causality	Pakistan	Long-run and U-shaped relationship was found between economic development and female labour force participation
Gaywan and Adeboyo (2015)		logistic model with geo-additive predictors	Nigeria	It was discovered that while a north-south divide existed in the likelihood of women engaging in all-year employment against not working, an east-west divide was found in seasonal/occasional jobs
Thevenon, et al (2012)	1960-2008	ECM	OECD	They found a positive and significant impact of educational attainment of women relative to men on GDP per capita.
Iweagu et al (2015)		logistic regression survey		The results imply that marital status, religion, poverty rate and per capita income affects the rural sector significantly, while age and literacy rate affect the urban sector significantly.

3. DATA AND MODEL SPECIFICATION

3.1 Data

The data used in this research is annual time series data from 1990 to 2017. The data used for both dependent (real gross domestic product) and explanatory (labor force participation rate, and gross fixed capital formation) variables were sourced from World Bank Development Indicators 2018 database.

3.2 Model Specification

According to Gujarati (2003) "Models should be formulated on the basis of the relevant theory as being postulated". One of the assumptions of the Classical Linear Regression Model (CLRM) states that the regression model used in an empirical analysis ought to be correctly specified in order to avoid the problem of model specification error or model specification bias (i.e. model misspecification).
In order to examine the effect of labour force participation rate on economic growth in Nigeria the econometric model is specified below:

$$RGDP = f\,(LFPR, GFCF) \tag{1}$$

From the above the variables are transformed to logarithmic form thus;

$$\ln RGDP_t = \beta_o + \beta_1 \ln(LFPR_t) + \beta_2 \ln(GFCF_t) + \varepsilon_t \tag{2}$$

Where:
Ln = Natural Log
RGDP = Real GDP
LFPR = labour force participation
GFCF = gross fixed capital formation
$\beta_1+\beta_2$ = Parameters to be estimated for each Independent variable.
ε = error term
t= time otherwise the scope 1990-2017

Furthermore, Vector Error Correction Model was estimated and the model shows the speed of adjustment towards the long-run equilibrium after a short-run shock. To achieve this the following error correction equation was estimated.

$$\Delta RGDP = \beta_o + \beta_1 \Delta(LFPR_t) + \beta_2 \Delta(GFCF_t) + ECM(-1) + \varepsilon_t \tag{3}$$

Where:
RGDP = Real GDP
LFPR = labour force participation
GFCF = gross fixed capital formation
ECM (−1) = error correction term
$\beta_1+\beta_2$ = Parameters to be estimated for each Independent variable.
ε = error term
t= time otherwise the scope 1990-2017
Δ = Differenced data (1^{st} difference)

4. DATA ANALYSIS AND RESULTS

4.1 ADF Test Results

Table 2: ADF Test

Variables	Order of Integration	Remark
ΔRGDP	I(1)	Stationary at 1st difference
ΔLFPR	I(1)	Stationary at 1st difference
ΔGFCF	I(1)	Stationary at 1st difference

Source: Stata Output, 2019

The variables used in the model were tested for stationarity using the ADF unit root test, it was found that the variables were not stationary at level but became stationary at 1st difference.

4.2 Estimated Model

Table 2: OLS Regression Model

LNRGDP	Coef.	Std. Err.	t	P>|t|
LNGFCF	.06266	.0509092	1.23	0.030
LNLFPR	-2.251099	.1825406	-12.33	0.000
_cons	37.18893	1.906131	19.51	0.000
R2=0.90	$\hat{R}2 = 0.90$	F= 124.97	Prob> F= 0.0000	

Source: Stata Output, 2019

From the above table the equation shows the constant value of 37.18893 which implies that without any change in the independent variables in the model, the constant independently changes the RGDP by 37.18.

Furthermore, labour force participation rate has the coefficient value of -2.251099 this means that LFPR negatively impacted on RGDP during the period under review i.e. 1990-2017 and also shows that a change in LFPR will negatively change RGDP of Nigeria by -2.25.

The result also shows that gross fixed capital formation has a positive and significant effect on GDP of Nigeria and a unit change in GFCF would increase GDP of Nigeria by 0.06.

The R squared value in the multiple linear regression equation above shows that the

explanatory variables in terms of LFPR, and GFCF describe Gross domestic product of Nigeria by 90 %. the remaining portion cannot be explained by the model as it was attributed to other macroeconomic variables outside the model which is only 10%.

Looking at the F-statistic 124.97 and the probability value of 0.0000 we can conclude that the overall model is statistically significant i.e. the explanatory variables are jointly significant to explain the dependent variable, this is because the probability value of 0.0000 is less than 0.05% level of significance.

To check if there is multi-collinearity between the variables we used the Variance inflation factor (VIF). It was found that the VIF of 1.46 which is less than 10 made possible for us to conclude that the model is free from multi-collinearity problem.

We also checked for heteroscedasticity and from the result the probability value of 0.3514 was well above 5% which implies that residuals are homoscedastic that is constant variance, which is desirable.

The next step is to test if the variables have a long-run relationship using Johansen test for cointegration. If the variables are cointegrated we will run the VECM model and if they are not cointegrated we run the VAR model. The results of the Johansen test are presented below:

4.3 Lag Selection Criteria

Before proceeding to test for cointegration it is important to select an appropriate lag that will be applicable to both cointegration and the VECM.

Table 3: Lag Selection Criteria

Lag	LL	LR	FPE	AIC	HQIC	SIC
0	-5.29792	NA	.000401	.691493	.73056	.83875
1	88.6948	187.99	3.4e-07	-6.39123	6.23496	-5.80221
2	107.397	37.405	1.6e-07	-7.19976	-6.92629	-6.16896
3	114.083	13.373	2.1e-07	-7.00695	-6.61628	-5.53438
4	139.521	50.875*	6.8e-08*	-8.37676*	-7.86888*	-6.46242*

Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
HQIC: Hannan-Quinn information criterion
SIC: Schwarz information criterion

Source: Stata output, 2019

4.4 Johansen Cointegration Test

Table 4: Johansen Test for Co-integration

Table 4: Johansen Test for Co-integration	**Eigenvalue**	**Trace statistic**	**5% critical value**
Table 4: Johansen Test for Co-integration		58.6688	29.68
Table 4: Johansen Test for Co-integration	0.83248	17.5754	15.41
Table 4: Johansen Test for Co-integration	0.53368	0.0293*	3.76
Table 4: Johansen Test for Co-integration	0.00127		3.76

Source: Stata output, 2019

Table 5: Johansen Test for Co-integration

Max Test			
Maximum rank	**Eigenvalue**	**Max statistic**	**5% critical value**
0		41.0934	20.97
1	0.83248	17.5461	14.07
2	0.53368	0.0293	3.76
3	0.00127		

Source: Stata output, 2019

From the above results, cointegration is found when the Trace and Max statistic are more than 5% critical value. So, the Trace statistic of 58. 6 and 17.5 are more than the critical values of 29.6 and 15.4 respectively indicating that there are two cointegrating equations. Also, the Max statistic of 41.0 and 17.5 are well above the critical values of 20.97 and 14.07 respectively further confirming that there are two cointegrating equations. This implies that the variables have a long run relationship or they move together in the long-run. So, with this result we proceed to run the Vector Error Correction Model thus:

4.5 Vector Error Correction Model

Here there are three steps which are selecting the lag criteria, running cointegration to find out if the variables have a long run relationship as tested above and then finally running the VECM, the result of the model is presented below:

Table 6: Vecm Model

	Coef.	Std. Err.	z	P>|z|
D_RGDP				
_ce1 L1.	-.133768	.383549	-0.35	0.027
_ce2 L1.	-.0342767	.2387957	-0.14	0.88
RGDP				
LD.	.3136808	.5987032	0.52	0.600
L2D	.3875115	.7930828	0.49	0.625
L3D.	-.1730853	.919712	-0.19	0.851
L4D.	.1623442	1.133373	0.14	0.886
GFCF				
LD.	2325904	.2644721	0.88	0.379
L2D.	.0855793	.2415316	0.35	0.723
L3D.	.0599545	.166196	0.36	0.718
L4D.	.0697839	.1438269	0.49	0.628
LFPR				
LD.	-.1362942	2.146499	-0.06	0.949
L2D.	.0429752	1.935277	0.02	0.982
L3D.	1.682741	1.950246	0.86	0.388
L4D.	-1.56199	5.230272	-0.30	0.765
_cons	.0614539	.0362981	1.69	0.090

Source: Stata output, 2019

From the above model, ce1 is known as the error correction term or the speed of adjustment towards equilibrium. Two issues are involved in VECM model which are long-run causality and short-run causality.

4.6 Analysis of Long-Run Causality

The long-run causality occurs in the Error Correction Term, so if the error correction term is negative and significant then there is long-run causality. Given this condition, from the model above the error correction term -.133768 is negative and given the probability of 0.027 which is less than 5% level of significance means the error correction term is negative and significant which implies that the there is a long-run causality funning from labour force participation rate (LFPR) and gross fixed capital formation (GFCF) to real gross domestic product (RGDP).

4.7 Analysis of Short-Run Causality

Table 7: Short-Run Causality

test	**([D_RGDP]: LD.GFCF L2D.GFCF L3D.GFCF L4D.LNGFCF**
1	[D_RGDP]LD.GFCF = 0
2	[D_RGDP]L2D.GFCF = 0
3	[D_RGDP]L3D.GFCF = 0
4	[D_RGDP]L4D.GFCF = 0
chi2 (4) = 1.99	
Prob > chi2 = 0.7385	

Source: Stata output, 2019

From the table above, we check if the LAG1-LAG4 of GFCF can jointly cause RGDP. Here we say that the null hypothesis is that there is no short-run causality running from GFCF (LAG1-LAG4) to RGDP.

Since the probability value of 0.7386% is more than 5% we cannot reject null hypothesis, instead we accept null hypothesis meaning that there is no short-run causality running from GFCF to RGDP.

Table 8: Short-Run Causality

.test	**([D_RGDP]: LD.LFPR L2D.LFPR L3D.LFPR L4D.LFPR)**
1	[D_RGDP]LD.LFPR = 0
2	[D_RGDP]L2D.LFPR = 0
3	[D_RGDP]L3D.LFPR = 0
4	[D_RGDP]L4D.LFPR = 0
chi2(4) = 1.16	
Prob > chi2 = 0.8853	

Source: Stata output, 2019

From the table above, the null hypothesis is that there is no short-run causality running from LFPR (LAG2-LAG4) to RGDP since the probability value of 0.8853% is more than 5% level of significance it implies that we cannot reject null hypothesis but we accept the null hypothesis that there is no short-run causality running from LFPR and RGDP.

In summary, long-run causality was found running from LFPR and GFCR to RGDP while no short-run causality running from LFPR and GFCF to RGDP in the model. At this stage it is important to do a diagnostic check i.e. to check the VECM model as a whole using the Lagrange multiplier test thus:

4.8 VECM Diagnostic Check

Table 9: Lagrange-Multiplier Test Autocorrelation

. veclmar			
Lagrange-multiplier test			
lag	**chi2**	**df**	**Prob > chi2**
1	6.4745	9	0.69164
2	3.9895	9	0.91210
H0: no autocorrelation at lag order			

Source: Stata output, 2019

Here we check if the VECM has autocorrelation or not using the LM test, so from

the test since the probability value is more than 5%, we cannot reject the null hypothesis we therefore accept the null hypothesis of no autocorrelation in the VECM model which is desirable.

Table 10: Jarque-Bera Test

. vecnorm, jbera			
Jarque-Bera test			
Equation	**chi2**	**df**	**Prob > chi2**
D_RGDP	8.884	2	0.11178
D_GFCF	2.676	2	0.26235
D_LFPR	3.289	2	0.19308
ALL	14.849	6	0.32146

Source: Stata output, 2019

We also test if the residuals of the VECM are normally distributed or not using the Jarque-Bera test. From the above table looking at the probability values of the variables as a whole (ALL= 0.32146) and individually means that the variables are normally distributed since the prob. values are well above 5%.

5. CONCLUSION

The main aim of this paper is to examine the effect of labor force participation on economic growth in Nigeria. It can be deduced that labor force participation is an important driver of economic growth. It is therefore essential to increase the level of labor force participation in Nigeria because increasing LFP can serve as an engine for economic growth and development of the country.

From the findings of the study the OLS model shows that the coefficient of labor force participation has a negative but significant effect on economic growth in Nigeria. The cointegration test shows that a long-run relationship exists between the variables and also the VECM model shows the existence of long-run causality between the variables used in the study.

The negative effect of LFP on economic growth can be attributed to the fact that there is high rate of unemployment in Nigeria further accompanied by inequality in employment opportunities. It is quite evident that there is high rate of gender inequality in employment opportunities in Nigeria as some part of the population is highly favored.

Therefore, we conclude that there is a log-run causality running from LFPR and GFCF to RGDP in Nigeria.

6. RECOMMENDATIONS

The findings of this study made it necessary to put forward a set of policy recommendations for the country to achieve substantial increase in economic growth. It is therefore necessary for policy makers to address the problems of unemployment and gender inequality in employment.

To address the issue of unemployment, policy makers should put a great deal of energy in order to device policies that will bring about increase in the proportion of the adult population seeking for jobs; particularly, the young, talented and able graduates that are produced yearly in the country.

There is need for policy makers to take into consideration the value and importance of women's education as it has not been adequately considered. Particular emphasis should be made on keeping young females in school and making sure that they receive quality education as it will increase their chances of getting decent jobs.

In Nigeria, the female is accorded low socio-economic status and there is high rate of illiteracy and low enrollment rate particularly in secondary schools which affects the ability of women to obtain the necessary skills needed for income generating activities that will boost economic growth in Nigeria.

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