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Male and Female Employment in Agriculture and Agricultural Productivity in Nigeria

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Abstract: The contribution of women to labour in African agriculture is quoted regularly in the range of 60–80%. Using available statistical data, to compare the level of employment and productivity of both male and female on an individual basis, and consequently proffer ways of improve that with a lower turn-out is the one major aim of the study. The contribution of females in the agricultural sector is substantially lower in Nigeria (37%), and some other developing countries. In order to get appropriate estimation of the model, the Augmented Dicky-Fuller and the Phillips-Perron test are used to check the variables level of stationarity. This also helps to explain the existing relationship between and among the following variable: employment in agriculture, male, employment in agriculture, female, trade and inflation. The result informs the need to enhance the employment of female in the Nigerian economy for higher agricultural productivity. Therefore the study suggests that policies geared towards female empowerment in agriculture and services alongside other concerned sectors should be promoted.

1. Introduction

According to [18], the contribution of several sectors in Nigeria to the economy's gross domestic product (GDP) in 2018 was 21.2%, 25.75%, 52.01% from the agricultural sector, industry and services sector respectively. The output from the agricultural sector at some years were similar to the contribution of the service sector. However, current statistics reveal growth that has improved the general performance of the service sector. The contribution from the petroleum sector seem to be less compared to the contribution of the previous sector mentioned, despite the fact that the sector could source through which the economy's public revenue and earnings from foreign exchange are raised. This reveals that the petroleum sector has a relatively low connection with the contribution of other sectors.

Agriculture in Nigeria is one of the very important sectors that is needed to be groomed for the attainment of economic development. Hence constructive efforts need to be put in place to ensure that the sector is well revived into its best state and efficient enough to reduce economy's poverty level to a less significantly stage. Agricultural participation and production alongside agricultural exchange at the international level contributed largely to the growth in Nigerian economic performance. During the colonial period of the Nigerian economy, government officials were able to use the profits gotten from agricultural product international exchange to execute a major investment project. Rural women contribute substantially to the agricultural labour force in many African countries resulting in a level of influence. [19, 20]. [20] records that women provide over 50% of the agricultural labour force in countries such as Nigeria, Cameroon and Zambia. However, agriculture has been underperforming in most developing countries. Between

2011 and 2013, 21.2% of the people in Africa were estimated to be undernourished, approximately 24.8 % of them in sub-Saharan African countries [31].

The analysis of this study will help reveal areas of investment advice to be given to government parastatals and private organisations operating within the agricultural sector as regarding improvement in gender balance that can aid greater agricultural productivity in the economy. According to [14] records reflects that endowment effect, structural effect and interaction effect influence the level of productivity difference in gender within developing countries like Nigeria, Tanzania, and Uganda. While [30] reveals that the endowment effect has a higher influence, [33] reflects that the use and level of efficiency of labour resources introduced in operations of agricultural production procedures and interrelation level influences the extent of productivity gap resulting from differences that occur from the predictors and the relative coefficients estimated at the same time. This reveals that the level of male to female difference management is highly affected by the output level recorded in the agricultural sector of the economy. The concept of gender can simply be described as relations arrangement in the society that includes its male and female citizens. It is a great yardstick used in the current farming communities across the world and also a major factor in the current restructuring activity in the agricultural sector [13]. Statistics reveals that Agriculture contributes a large proportion of the GDP of a good number of sub-Saharan African countries and it is also the main source of foreign currency from major exchange of the economy [22]. Not only is agriculture considered to be significant to economic growth, but it is also the principal food provider and source of livelihood for a substantial percentage of citizens in the rural areas [18]. Women, most times are discovered to constitute a majority of rural dwellers, hence they form a significant role player in the agricultural production of the economy [23, 24, 7].

2. Some Background Facts
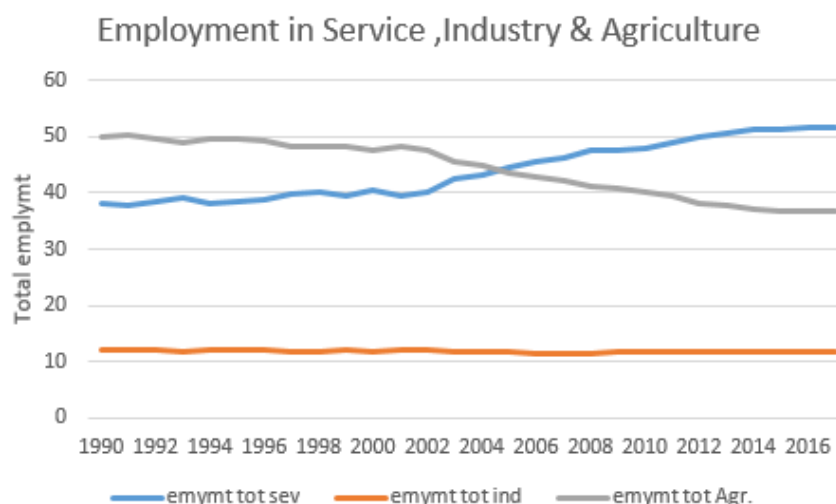
Figure 1: Employment total in the Service, Industry & Agriculture Sector
Source: [25]

This reflects the employment total in the service sector, Industry and Agricultural sector that there is need to pay close attention to the Agricultural sector, which in the past has a good record of high productivity but presently on a consistent trend of decrease in its level of contribution to the total economy's output. Statistics reflects how much of the labour in African agriculture is provided by women, showing the contribution of women in Nigeria as 37 percent, while that of the male will be 63% consequently. This is still quite a large number of differences in the ratio of contribution between male and female in the

agricultural sector of Nigeria. If the existing gender gap can be minimised by introducing more female friendly methods of farming, a better level of productivity will be attained in the sector.
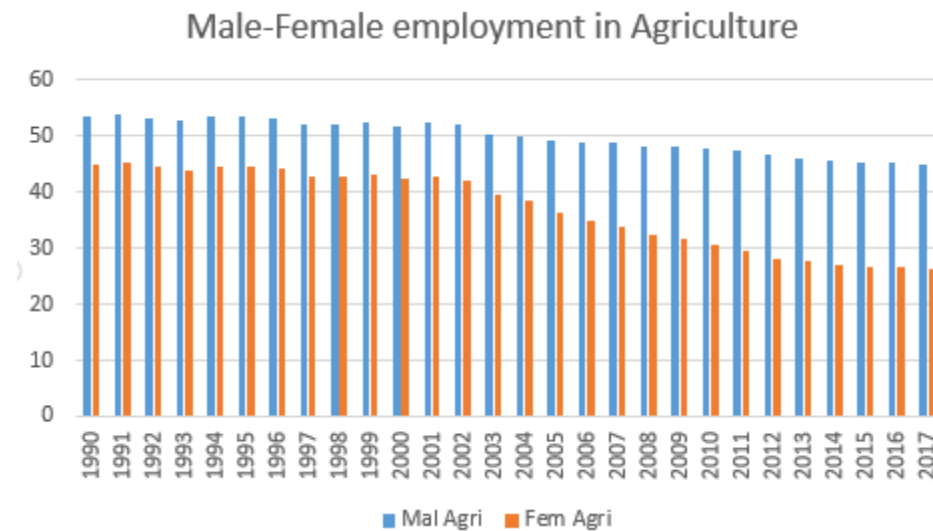
Figure 2: Male- Female Agricultural Employment in Nigeria
Source: [25]

This reveals that there has been a consistent decrease in the employment of females as compared to the males within the Nigerian agricultural sector. For decades, these decrease has been a continual trend, and if nothing is done to put things in their appropriate places, the current experience within the sector will grow worse and worse. Records also reveals some form of possible causes influencing the contribution of farmers farmer in Nigeria and the impacts it has on the total agricultural output. Nigeria has the lowest distribution of agricultural land area for females as compared to other developing countries.

3. Literature Review

[10] stated that Agricultural programs and policies should be adequately planned to help increase the current records of agricultural productivity, rural livelihoods and food security, attention to gender as a cross-cutting dimension is a potential strategy to increased success in accomplishing desired goals. Programmes focused on improving the economy's agricultural level of productivity should pay attention to activities that will enhance the participation of both genders involved in the agricultural contributions at the different levels. In line with the initial, [14] affirms that Structural transformation of Africa's agriculture is a prerequisite for enhancing agricultural productivity, food security and poverty reduction in the continent. However, a critical ingredient of such a transformation is gender equality, given its potential impact on social inclusion and employment generation. Unfortunately, available evidence reveals that Africa's agricultural landscape is characterised by gender inequality disproportionately against women in areas such as access to productive resources, low rates of technology adoption of economic capacities and incentives. Therefore, a good understanding of the extent and source of gender productivity gaps is imperatives for the success of policy interventions among at empowering women. The involvement of gender

equality concept in decision making and programme selection for implementation will help enhance a better level of productivity in the agricultural sector [17].

There exists a huge gap in the level of adoption among male farmers as compared to female farmers of advanced technology in the production of rice due to institutional, motivational, innovational, attitudinal factors which influences each gender decisions on technology adoption. More avenue to educate the female gender on the benefits and influence of technological advancement on their level of productivity will have a good impact on the general level of agricultural productivity [11] The existence of gender gap was also reflected in [27] stating that existence of gender gaps in agricultural output can be said to being quite reduced with regards to quantity harvested and harvest sales of plot size managed by male farmers, which is slightly higher than that managed by female farmers by 0.22% and 6.24% respectively. The research also revealed that the level of disparity in gender productivity differs from various selected crops. These gaps could be stated as a result of longer farming experience of men as against women and labour market imbalance which is partial to women farmers. Necessary adjustments can be put in place to help minimise these existing   gender disparities because as long as they still existed the capacity of such populace will yet be underutilised, leading to a defected production level.

According to [13] which explains that agricultural inputs are quite inadequate among farmers generally causing a major reduction in the turn-over of agricultural output. South-east and South-west zones females' farmers make use of more hired labour as compared with their male counterparts, who might not necessarily have to deal with other related duties. Record also reveals that labour productivity is higher on male cultivated plot than that of female cultivated plots. Methods and mechanisms that will assist female farmers due to the peculiar work load at home that they will need to add to their productivity level on the farm, need to be developed and introduced to them alongside their advantages in order to assist them maximise their farming desires and mental effort. Also [9, 6] stated that the engagement of both gender in several agricultural activities might be quite gender-specific but that will have a complimentary and reciprocal effect. The research reveals that the involvement of women has increase from 32% to 36% while that of the men have experienced a relative decline from 68% to 64%. More encouragement for equitable involvement of both genders will help curb food crises. Yet another emphasis on ensuring equity in gender opportunities that assists the male and female to contribute their best. [21] affirms that if the basic feeding need of Africa will be met, then there will be a need to close the gender gap in the socio-economic status, resource access, productivity and competitiveness with the aim of pooling resources together to tackle food insecurity on an equitable and sustainable basis. The presence of gender gap influences different aspects of any economy either directly or indirectly, thereby leading to overall economic decline.

Onyishi (2016) explains that the relationship between production quantities and land area allotted to the crop considered is significant in some areas and otherwise in other areas. More deliberate agricultural efforts by all concerned stakeholders in the agricultural sector will help reduce the level of food insecurity experienced in the North central zone of Nigeria. With the established connection between production quantity and access to land areas, equity in the opportunity given to each gender in the owner of land needs to be critically looked into and encouraged to improve economic productivity. In line for a considerable increase, [16] states that a larger number of female farmers have a higher level of adoption to cassava production technology than their male counterparts. These results call for policies aimed at increasing the level of adoption of cassava production technologies for both male and female to improve their standard of living and multiply economy's output. Females farmer are likewise technologically compliant as the male farmers so they deserve equal opportunity that will aid their productivity.

[20] reveals that maize productivity of male- headed households was overall 44.3% higher than female-headed household productivity will increase by 42.3%, if they can receive the same return on their resource as do the male-headed households. Female farmers have a higher probability of performing better if given equal privileges as that of their male counterparts. Hence it is important the concerned bodies and the government pay more attention to the more productivity proportion of their populace for developmental opportunities.

Methodology

The aim of the study is to determine the current existence of gender gaps in the agricultural sector and the several implications alongside the positive results of a well-managed and addressed economic situation. This study is to determine the current existence of gender gaps in the agricultural sector and the several implications alongside the positive results of a well-managed and addressed economic situation.

Economic Development = f (economic growth, economic wellbeing)

Economic Growth = f (Productivity of all sectors in the economy)

$$Total\ Agricultural\ productivity\ (TAP) = f\ (MAE, FAE, TRA, INF) \qquad (1)$$

$$TAP_t = \beta_0 + \alpha_1 MAE_t + \mu FAE_t + \partial TRA_t + \emptyset INF_t + \varepsilon_t \qquad (2)$$

$$\Delta TAP_t = \theta_0 + \theta_1 TAP_{t-1} + \theta_2 MAE_t + \theta_3 FAE_t + \theta_4 TRA_t + \theta_5 INF_t + \sum_{i=1}^{J} \beta_i \Delta TAP_{t-i}$$

$$+ \sum_{i=1}^{J} \beta_i \Delta MAE_{t-i} + \sum_{i=1}^{J} \beta_i \Delta FAE_{t-i} + \sum_{i=1}^{J} \beta_i \Delta TRA_{t-i}$$

$$+ \sum_{i=1}^{J} \beta_i \Delta INF_{t-i} + \mu_t \dots\dots\dots\dots\dots(3)$$

MAE= Male agricultural employment

FAE= Female agricultural employment

TRA = Trade

INF = Inflation

The estimation of the model proceeds by carrying out both the Augmented Dicky-Fuller test and the Phillips-Perron test. This helps explain the existing relationship between and among the following variable: employment in agriculture, male, employment in agriculture, female, trade and inflation. The study seeks to use the estimation technique of An Autoregressive Distributed Lag Modelling Approach to analyses the level of gender involvement in agricultural productivity. However, the time series variables in the model will need to be differenced after checking for unit roots. The autoregressive model specifies that the output of variable depends linearly on its own previous values and on a stochastic term (an imperfectly predictable term); thus the model is in the form of a stochastic difference equation.

4. Results and discussion

4.1 Unit Root Test for Stationarity

In order to confirm that the variables of choice are stationary and therefore appropriate for carrying out analysis, all variable used in this study were subjected to the Augmented Dicky-Fuller (ADF) and the Phillips-Perron tests. The null hypothesis is rejected if the test statistic is insignificant. From the Augmented Dicky-Fuller result, all the variables were stationary at first difference except employment in agriculture, male, employment in agriculture, female, trade and inflation which were co-integrated at level. The Phillips-Perron test also showed a similar result with a mix was I (0) and I (1) series.

Table 1: Augmented Dicky fuller and Phillips-Perron Unit root test

	ADF Test	Philp- Perron Test

Variables	Level	First diff.	Decision	Level	First diff.	Decision
Agricultural productivity	-2.47878	-4.79835	*1(1)*	-2.48707	-4.79835	*1(1)*
Agricultural credit guaranteed scheme fund	-2.06732	-5.90423	*1(1)*	-2.09325	-5.99656	*1(1)*
Commercial bank credit to agriculture	0.03143	-7.99472	*1(1)*	-0.10737	-	*1(0)*
Employment in agriculture, total	-1.72832	-	*1(1)*	-3.98879	-	*1(0)*
Employment in agriculture, male	-3.34301	-	*1(0)*	1.00206	-2.74576	*1(1)*
Employment in agriculture, female	-1.74270	-	*1(0)*	-3.50661	-	*1(0)*
Gross fixed capital formation	-2.43907	-8.81168	*1(1)*	-5.27128	-	*1(0)*
TRADE	-3.03236	-	*I (0)*	-3.03236	-	*1(0)*
Inflation	-4.06608	-	*I (0)*	-2.29167	-4.34533	*1(1)*
Agricultural Machinery	-2.31979	-4.16421	*1(1)*	-2.30639	-4.48029	*1(1)*
Arable land	-2.25539	-5.15272	*1(1)*	-2.16297	-6.28560	*1(1)*

Source: Authors.

Lag Length Selection Criteria

The appropriate lag to be used in this study is tested using the VAR lag length selection criteria and the result is presented in table 2. As shown by all the criterion the most appropriate lag to use is one (1)

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-4535.261	NA	1.56e+47	139.8849	140.2529	140.0301
1	-3870.821	1083.548*	8.97e+39*	123.1637*	127.5794*	124.9060*
2	-3799.761	91.83016	5.65e+40	124.7004	133.1637	128.0397
3	-3734.145	62.58771	7.74e+41	126.4045	138.9156	131.3409

Source: Authors. *denotes lag order selected by the various criterion

4.2 ARDL Bounds Test and Error Correction Mechanism

Following a mix of both I (0) and 1(1) variables, the study adopts the ARDL bounds test cointegration method to find the short and long run relationship. The null hypothesis of no cointegration is to be rejected if the F-statistic value is higher than the upper and lower bound critical value at 5% and the same is accepted if the case is otherwise[5,4] (Adeleye et al., 2018). From the ARDL results presented in Table 3, the null hypotheses of no cointegration is rejected at the 1%, 5% and 10% level. This is because the F-statistic value is obviously greater than the upper bound and so the null hypotheses of no cointegration is rejected and the alternative is accepted.

Table 3: Bound test results

F-Bounds Test	Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.268676	10%	1.76	2.77
K	10	5%	1.98	3.04
		2.5%	2.18	3.28
		1%	2.41	3.61

Source: Authors

ARDL and ECM

Since cointegration has been established among the variables, the long run and short run dynamic is estimated and presented below. Commercial bank credit to agriculture, capital formation, Agricultural Machinery and Arable land are positively related to Agricultural productivity in the long run as confirmed by the sings from their respective coefficient.

The result in table 5 shows the value of error correction term to be -0.697159 per cent. The error correction term is statistically significant and negative as expected; this implies an adjustment from the short run to long run equilibrium. About 70% of the error generated in one period is corrected in the next period. So, if there is a disequilibrium in the model the speed of adjustment of the model back to long run equilibrium is approximately 70 per cent.

The first difference of Agricultural credit guaranteed scheme fund, Agricultural Machinery and Employment in agriculture, total is statistically significant and similar result is reported by the Lag period of Agricultural productive and Agricultural Machinery at 5% level of significance.

Table 4: ARDL long run estimates

Variable	Coefficient	Std. Error	Prob.
ACGSF	-4.93E-05	5.08E-05	0.3364
CBCA	2.851985	3.578984	0.4296
EIAF	-16473.10	6098.362	0.0096
EIAM	-20453.67	7220.130	0.0068
EIAT	36171.61	13516.45	0.0103
GFCF	8.62E-09	1.22E-08	0.4829
TRADE	-0.120692	10.00911	0.9904
INF	-0.866423	4.015759	0.8301
AL	0.000335	0.000121	0.0081
AGM	2086.309	877.0658	0.0216
C	23829.08	18768.91	0.2106

Source: Authors

Table5: Error correction results

Variable	Coefficient	Std. Error	Prob.
D(AP(-1))	0.180757	0.057212	0.0028

|			
D(AP(-2))	0.178909	0.057119	0.0030
D(ACGSF)	-0.000151	3.98E-05	0.0004
D(EIAT)	24440.43	3257.224	0.0000
D(AGM)	-349.4911	271.2002	0.2040
D(AGM(-1))	-914.3326	253.6395	0.0008
D(AGM(-2))	-858.2209	250.2826	0.0013
ECT(-1)*	-0.697159	0.087506	0.0000

Source: Authors

4.3 Model Stability

In order to ensure the stability and the robustness of the model, (Adeleye et al., 2018) alongside others recommend the use of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of recursive residuals squares(CUSUMSQ) test. The plots of CUSUM and CUSUMSQ are presented in figure 1 and 2. The rule of thumb state that if the plot remains with the 5% critical bound then the model is stable. As indicated by the blue line plot from figure 3 and 4, Both the CUSUM and CUSUMSQ test lies within the 5% critical bound therefore indicating that the model is stable.
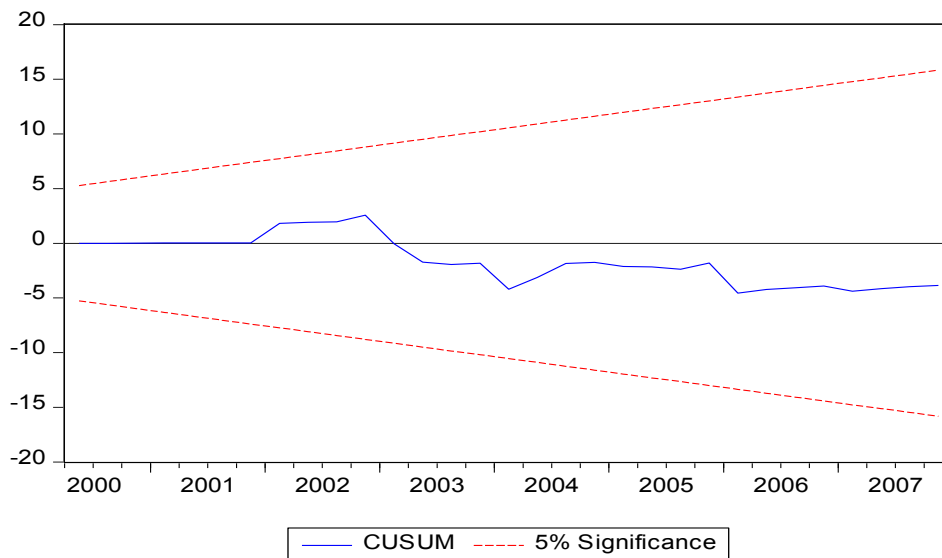
Figure3: CUSUM plot
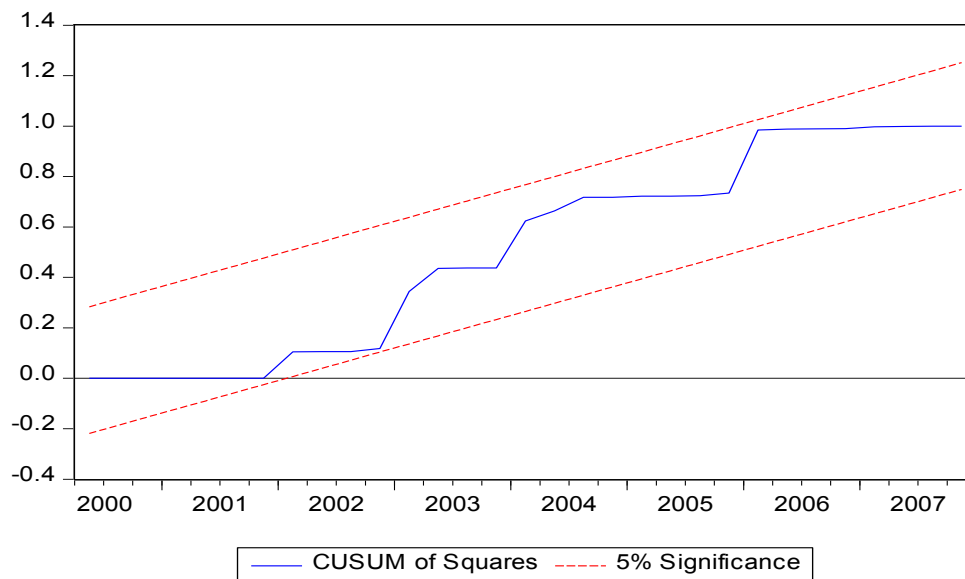
Figure 4: CUMSUMSQ plot

5. Conclusion

With gender participation in agriculture gaining attention from extant literature especially as it related to the contribution of male and female labour force, this study compares the level of male and female employment in agriculture and agricultural productivity. The study focus is to investigate the impact of gender-based employment and productivity in Nigeria. This objective is achieved by employing the Autoregressive Distributed Lag (ARDL) bound technique for co-integration to time series variables spanning a period of 1990Q1 to 2019Q4. The study found co-integrating relationships from the bound test approach, indicating a long run relationship among the variable used in the study. Specifically, gross capital formation and the commercial banks' credit to the agricultural sector had a positive impact on Agricultural productivity. This outcome shows that when credit to the farmer is well utilised, productivity is assured. An increase in Arable land and Agricultural Machinery also positively increase productivity in the agricultural sector. This is also in line with a priori expectation and past literature.

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