Non-farm MSMEs performance and gender bias in access to credits in Nigeria. A multinomial logistic regression approach.

[1*]Afamefuna A. EZE, [**]Chinanuife Emmanuel**, ***Muogbo Kingsley Arinze, [***]Nnaji Moses and [****]Atakpa Daniel Akoh

[*]Department of Economics, University of Nigeria, Nsukka.
[**]Department of Management Sciences, Salem University, Lokoja, Kogi State.
[***]Energy Research Centre, UNN.
[****]Department of Economics, Kogi State University.

Abstract- *The study investigates Non-farm MSMEs performance and gender bias in access to credits in Nigeria. A multinomial logistic regression approach. The study used Nigerian Enterprise Survey data (2014) comprising of 2,676 SMEs. Employing Multinomial logit model, the study found that the interaction of female manufacturing (femalemanu~t), female retail (femaleretail) and female other services sector (femaleother~s) significantly reveal the less likelihood of gender bias when application procedures were too complex. The interactive results when interest rates were unfavourable significantly reveal the presence of gender bias in the manufacturing and retail sector at 10% and 5% level of significance but not in other sectors. While the result of the collateral requirements too high played no significant role in all the sectors. The study therefore concludes that gender bias pose a serious hinderance to credit access and recommends that the Central Bank of Nigeria (CBN) should develop policies such as smoothening some lending conditions that are not female friendly. Also, that the government should sustain and expand Micro Finance Policy framework by establishing more MFBs in all the geopolitical zones as well as in the rural areas thereby creating more credits access to both genders for more robust and sustainable growth of MSMEs in Nigeria.*

KEYWORDS*: Non-farm MSMEs, gender bias, access to credits, Multinomial regression, Nigeria.*

I. INTRODUCTION

Gender bias, according to Nikpei and Elmi (2015), indicates that women and men do not have equal access to resources and opportunities due to cultural, societal, and economic issues. In terms of work, wages, education, political influence, and access to economic resources, there can be disparities between men and women. According to statistics from international organizations, women have fewer access to resources and opportunities than males. Women have long fought for equality, respect, and the same rights as men throughout history.

Micro, Small, and Medium Enterprises (MSMEs) play a major role in several developed and developing economies. They are important contributors to job creation and global economic development, representing about 90% of businesses, and more than 50% of employment worldwide. Formal SMEs contribute up to 40% of national income (GDP) in emerging economies. These percentage measurements are significantly higher when informal SMEs are included. According to the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN, 2017), MSMEs contribute a total of 49.8 percent to GDP. These evidences are supported by works of Ariyo (2005), Nguyen and Hu (2015), Schmeimann (2008), and Ebiringa (2011). According to Oyelaran-Oyeyinka (2010), MSMEs comprise 70% to 90% of the business establishment in the manufacturing sector in Nigeria.

Micro Enterprises are those enterprises whose total assets (excluding land and buildings) are less than Five Million Naira with a workforce not exceeding ten employees. Small Enterprises are those enterprises whose total assets (excluding land and building) are above Five Million Naira but not exceeding Fifty Million Naira with a total workforce of above ten, but not exceeding forty-nine employees.Medium Enterprises are those enterprises with total assets excluding land and building) are above Fifty Million Naira, but not exceeding Five Hundred Million Naira with a total workforce of between 50 and 199 employees (SMEDAN, 2017).

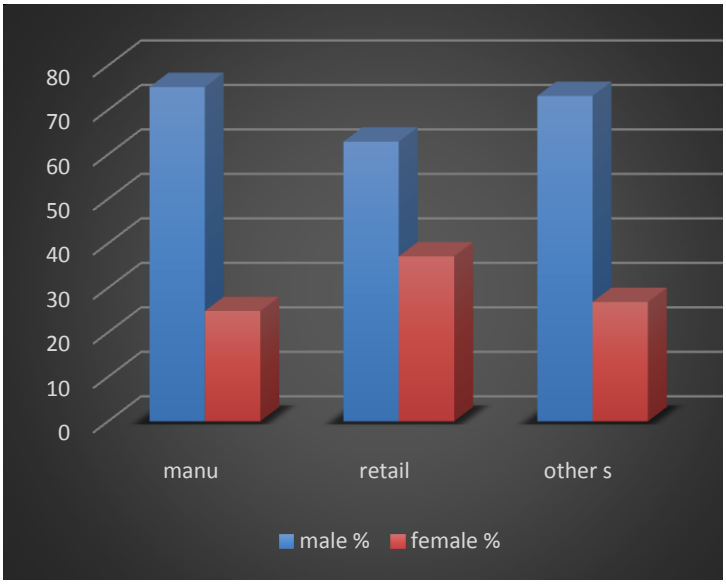
For this work, three firm types/business sectors will be discussed namely; manufacturing, retail and other services. According to the report, the manufacturing sector has a total number of 4,887,395 of micro-enterprises (13.21% of the total number), 20,037,559 micro-enterprises of retail (54.67% of the total) and 2, 927,035 micro-enterprises of other services (7.91% of the total). While for small and medium enterprises, manufacturing is 13,442 and 548, retail is 15,248, and 258 and other services are 2,793 and 64 respectively. According to the report, the number of registered MSMEs includes, manufacturing -- 173,213, retail -- 702,228, and other services -- 109,292. For micro-enterprises, the total employment generation by the manufacturing sector is 4, 796,232 (of which male has 13.61% and the female has 12.70%), retail has a total of 16,122,951 (which has male 45.75% and female 62.66%) and other services have 2,156,202 (which has male 6.12% and female 6.82%). While the distribution of ownership structure for small and medium enterprises is as follows, manufacturing- 8777 (92.16% of male and 7.84% of female), retail- 10925 (88.46% of male and 11.54% of female), and other services- 2796 (78.82% of male and 21.18% of female) (SMEDAN, 2017).

Some of the factors responsible for this anomaly include gender bias, age of the businesses, failure to apply for loan due to fear of rejection, and level of education. In addition, the National Bureau of Statistics (2015), highlighted other constraints to include: poor credit penetration, issues of collateral, complex application

procedures, multiplicity of taxes and asymmetric information, among others.

The Global Gender report of 2017 released by the World Economic Forum, named Nigeria as the 122nd country out of 144countries in closing the gender gap. The rankings are designed to create a global awareness of challenges posed by gender gap and to highlight opportunities in reducing the gap. According to the SMEDAN report (2017), gender biases in access to formal credits can come inform of gender employment gap, disparity in ownership structure, and disparity in employees' qualifications. Panel 1.1 and Table 1.1 show the rate of employment among men and women based on the SMEDAN report (2017). It can be observed from the panel and table that SMEs employ more men entrepreneurs than women entrepreneurs. According to the report, 75 percent of men dominated job creation as against 25 percent of their counterparts.

Figure 1.1: Employment by firm type by gender as of December 2017



Source: Author. Data obtained from the SMEDAN Report (2017)

Table 1.1: Employment by firm type by gender as of December 2017

Firm Type	Male	Female	Total	Percent
Manufacturing	456,690	150,808	607,498	21.0
Wholesale/retail trade	24,755	14,606	39,361	1.4
Other services	112,396	41,228	153,624	5.3

Source: Author. Data from SMEDAN REPORT (2017)

Figure 1.1 and Table 1.1 reveal that the rate of employment for men in Nigeria is higher compared to that of women across all the three sectors.

Studies also show that female entrepreneurs are discriminated against in the ownership structures. This is because firm ownership involves obtaining either formal or informal credits which when made available have stringent procedures. Statistics from the SMEDAN report of 2013 and 2017 show a great disparity in the ownership structures between male and female entrepreneurs as the number of male-headed firms in the three economic sectors under study far outweighed the female headed firms. This was evidenced in the works of Awoniyi and Ayandiji (2008). Also, gender discrepancies in access to formal and informal credits can arise from the level of education of female entrepreneurs as stated in the works of Memba et al. (2014) and Aterido, Beck and Iacovone (2013).

II. EMPIRICAL REVIEW

Nguyen, Gan, and Hu (2015) conducted an empirical study of SMEs' credit access in Vietnam. Using data from a June 2013 survey of 487 SMEs in Hanoi, logistic regression was used to identify the SMEs' capacity to acquire credit, and ordinary least square was used to estimate the interest rate charged on the SMEs' largest loan. The findings suggest that owner characteristics, educational level, and gender are the most critical determinants in determining access to finance for SMEs in Vietnam, followed by networking, favorable relationships, and connections with credit providers. Male-owned SMEs were also 10.6 percent more likely to acquire loans than female-owned SMEs, according to the findings. In addition, the survey found that more women are hesitant to request for bank loans for fear of being turned down. This viewpoint is consistent with the trade-off theory in that rejection may be too painful and emotionally draining to tolerate.

In Kenya, Gichuki, Mulu-Mututu, and Kinuthia (2014) investigated the performance of women-owned businesses that used local credit and savings societies to obtain loans. The study used a sample of 225 women entrepreneurs from Nakuru Town, Kenya, who are members of local saving and credit associations. The results reveal that the selected parameters of respondents' income, credit, and educational level caused favorable improvements in net profits and capital of small and micro enterprises using the Ordinal logit model (SMEs). As a result of the findings, village saving and credit associations have been selected as one of the most effective techniques for enabling more rural and urban women entrepreneurs to obtain inexpensive loans. Business people with a greater degree of education and entrepreneurial skills are more likely to seek formal financing because their enterprises are more likely to perform better, according to studies conducted in Addis Ababa, Ethiopia (Wasihum and Paul 2010). Their greater odds of success are also ascribed to their capacity to make well-informed decisions, take calculated risks, and devise long-term strategies.

Similarly, Asiedu, Kalonda Kanyama, Ndikumana, and NtiAddae (2013) use descriptive statistics and the Extended Nonlinear Decomposition technique to show that there is no gender gap in most developing regions, with the exception of Sub-Saharan Africa, where female-owned businesses are more likely to be financially strained than male-owned businesses. Female business owners in Italy suffer tougher credit limits when

working with a single bank, according to Belluci, Borisov, and Zazzaro (2010), despite not paying higher interest rates. Alesina, Lotti, and Mistrulli (2013) use the Italian Credit Registry to find that, after controlling for entrepreneurial risk, female borrowers pay higher rates, especially when their guarantor is also a woman. Muravyev, Schäfer, and Talavera (2012) use a large cross-country sample to find that female business owners are more likely to be denied bank credit and to pay higher interest rates on bank loans, whereas Aterido, Beck, and Iacovone (2013) find no evidence of gender discrimination in some Sub-Saharan African countries. According to Beck et al. (2012), Albanians have 28 basis points higher interest rates when paired with a loan officer of the opposite sex after testing for own-gender bias in the loan officer-borrower match. The findings also revealed the prevalence of taste-based prejudice, as the chance of borrowers falling behind on their payments is unaffected by the gender of the loan officer.

In addition, Cozarenco and Szafarz (2015) investigated gender biases in microfinance lending in France. The results of the study, which used a double partial-least square (2PLS) estimation and a Heckman selection model, reveal that banks, through co-financing, generated a shift in microfinance institutions' gender-related attitudes toward SMEs borrowers. G. Calcagnini, G. Giombini, and E. Lenti (2012) investigated gender inequalities in bank loan access in Italy from 2005 to 2008. Using a probit model, the data show that female-owned businesses had a higher likelihood of needing to commit guarantees than male-owned businesses. This also reveals that male-owned businesses have a better chance of getting loans than female-owned businesses. Further research, such as Brana (2011), looked into the relationship between microcredit and the gender gap in funding in France. The findings demonstrate that the gender disparity identified among company founders is also maintained among MFI clienteles, according to the study, which examined 3,640 applications throughout the period 2000-2006 and performed a multivariate analysis. When compared to other criteria in the borrower and company profile, the results show that gender is the most important element in determining the amount of credit offered to borrowers.

Hansen and Rand (2012) used firm-level data from eight Sub-Saharan African nations to investigate gender-specific access to credit in Africa. In comparison to their male counterparts, female-owned businesses are less likely to be credit constrained, according to the findings. The gender gap changes, according to the study, are due to unexplained components or traits. Similarly, Hansen and Rand (2014) experimentally evaluated the estimates of gender inequalities in manufacturing firms' access to credit using three distinct measures of credit limitations, extending their analysis to sixteen chosen Sub-Saharan African nations. Female-owned enterprises appear to be more confined than male-owned firms in the perception-based approach, according to the findings. Furthermore, using a formal financial access-based method, there was no gender effect, however using a direct information measure, male-owned small businesses appeared to be disadvantaged. The findings also revealed the gender gap for the two metrics where substantial gender disparities were discovered.

According to Onyena and Popov (2015), who conducted an empirical study on the causal influence of gender prejudice on bank lending access in Europe. The study, which used data from 6,000 small businesses in 17 European nations, discovered that in countries with higher gender prejudice, female-owned businesses are more likely to be discouraged from seeking for bank loans and to rely on informal financing. The study's findings also reveal that loan rejection rates and loan terms do not differ between male and female business owners. Galli and Rossi (2012) investigated bank credit and gender discrimination in seven European nations following the global financial crisis (2009-2013). The results demonstrate that, after controlling for company characteristics and socioeconomic factors, female-owned businesses apply for bank loans less than male-owned businesses due to fear of rejection. On the supply side, the findings suggest that female-owned businesses suffer a higher incidence of rejection than male-owned businesses.

In Ghana, Nyanzu and Quaidoo (2017) investigated the relationship between access to credit and the operation of SMEs. The study reveals that access to financing is a major restriction for SMEs in Ghana, using data from World Bank Enterprise Surveys for Ghana in 2013 and chi-square, logit, and ordered logit analysis. In Sub-Saharan African MSEs, Hewa-wellalage and Locke (2016) investigated informality and credit limitations. The results of the study, which used data from the World Bank Enterprise Surveys for five low-income countries (LICs) and the instrumental variable probit model, reveal that more access to external or formal finance is linked to the likelihood of a firm participating in the formal sector. The paper also claims that causality provides a solid foundation for the formalization of initiatives aimed at reducing the informality of the MSE sector.

Furthermore, Kira & He (2012) investigated the impact of business characteristics on access to funding by Tanzanian Small and Medium-sized Enterprises. The researchers used Pearson Correlation and Logistic Regression to analyze data from 163 small and medium-sized businesses in Dar es Salaam, Arusha, Ungula, and Mbeya, Tanzania. The findings reveal that a company's location, industry size, business information, age, incorporation, and collateral all have an impact on its ability to obtain debt financing. This indicates that the larger a company is, the more likely it is to be able to obtain bank credit. Lenders frequently use financial information supplied by businesses to evaluate and predict future performance, according to the findings of the study. This suggests that businesses who keep business records, as observed by Kitili (2012), have a higher possibility of obtaining bank credit than businesses that do not preserve business records. While race is a significant predictor of both access to credit and the cost of credit (see also Bayer, Ferreira, and Ross, 2014), gender is not. Asiedu, Freeman, and NtiAddae (2013) use US data on small businesses and employ probit and bivariate regression analysis to find that while race is a significant predictor of both access to credit and the cost of credit (see also Bayer, Ferreira, and Ross, 2014), gender is not.

However, several studies have discovered that women are given preferential treatment when it comes to credit. For example, Hansen and Rand (2014) and Hewa-Wellalage and Stuart Locke

(2016), concluded that the credit constraint gap is caused by partiality towards smaller, female-owned businesses in Sub-Saharan Africa. Similarly, de Mel et al. (2009) show that the returns to capital shocks are much greater for men than for women, implying that microenterprises run by males are more credit constrained than those run by women. In Ghana, a study conducted by Baafi (2015) found that small businesses controlled by women are less affected by financial limits than their male counterparts.

Aside from gender discrimination and company characteristics studies, other researchers discovered that additional factors, not just gender and firm characteristics, play a role in SMEs' delayed growth. Berg and Fuchs (2013), for example, looked at the influence of competition, innovation, and the government in bank funding of SMEs in five Sub-Saharan African countries. Between 2010 and 2012, data was collected from five Sub-Saharan African nations (Kenya, Nigeria, Rwanda, South Africa, and Tanzania). According to the findings, SME lending accounts for between 5% and 20% of a bank's total loan portfolio. The results also show that the structure and size of the economy, as well as the amount of government borrowing, the degree of innovation, particularly as introduced by foreign entrants to financial sectors, and the state of the financial sector infrastructure and enabling environment, are all important contributing factors.

Nwosu et al. (2014) investigated whether women entrepreneurs in Nigeria's informal loan markets face prejudice. The study applied a probit constraint model and used a direct measure of credit limitations as well as data from Nigerian Enterprise Surveys (2010). The findings suggest that there is no major discrimination against women in Nigeria's informal loan markets. As a robust check for the gender gap, the researchers used a nonlinear decomposition method, and the results demonstrate that the differences are not statistically different from zero, implying that there is no gender gap. In addition, the study used propensity score matching estimation to determine the performance of the entrepreneurs, and the results demonstrate that credit constraint has a considerable negative impact on most of the performance measures examined.

Eniola and Ektebang (2014) investigated the performance of SMEs in Nigeria. The study used resource-based view analysis and discovered that a lack of financial resources, insufficient management, a lack of initiative, and a lack of managerial education are all barriers to the growth and expansion of small and medium-sized businesses in Nigeria, as well as their competitive performance. Eniola (2014) used a general analysis to investigate the role of SME performance in Nigeria. Administrative bottlenecks have remained a major threat to SME growth and highperformance in Nigeria, according to the study.

Eze, Ibekwe, and Korie (2009) investigated women's access to credit from selected commercial banks in order to reduce poverty. The study used logit regression analysis to discover that socioeconomic factors have a significant impact on women's credit access. The results further show that the banks considered mostly ownership of account with the bank, the character of the borrower, and experience in the business. The study also showed that women sourced finance from the informal sector such as relatives, friends, cooperatives, and women associations. Abiola (2011) and Orodje (2012) find that the levels of interest rates charged by the MFBs in Nigeria are too high, ranging from 20 percent to over 50 percent and this makes it very difficult for many micro and medium scale business owners to seek for or access loans from the MFBs.

These empirical-finding differences could have occurred for a variety of reasons. First and foremost, they may occur due to the definition of credit constraints used. Second, is the econometric robustness of the method used. However, this study will add to literature by using direct credit constraints measure on the manufacturing, retail and other services sector to analyze the gender bias in accessing credits using interaction effect. This is a novel study.

III. DATA DESCRIPTION

The Nigerian enterprise survey (2014) data was used for this study. The survey is a firm-level survey of a representative sample of the private sector in Nigeria (Enterprise Surveys and the World Bank, 2014). The data is nationally representative because it is drawn from all geopolitical zones and covers nineteen (19) states of the United States. The data includes large, medium, and small businesses, with some of them held by women entrepreneurs as single proprietors or as majority shareholders. The survey instrument includes information on why businesses did not seek for credit, such as the fact that the business has "no need for a loan — the institution has sufficient capital," among other reasons. The instrument also asked about overdraft facilities, the proportion of financing from different sources (formal or informal), whether the establishment has a line of credit or loan from a financial institution, collateral requirements, whether the establishment applied for loans or lines of credit, and other firm characteristics. Instead of limiting our sample to a few manufacturing enterprises like Hansen and Rand (2014) did, the included firms from three different industries (manufacturing, retail, and other services) in this analysis. The benefit of doing so is that the majority of women entrepreneurs in micro/small businesses do not work in the manufacturing sector; instead, they work in the retail and service sectors. As a result, focusing solely on manufacturing companies may not provide us with a clearer understanding of the amount of credit discrimination against women entrepreneurs as a whole. Second, by accounting for organizations in the three largest industries, we have more observations to work with. The data was collected using a stratified sampling strategy. The sample size for the study is 2,676 enterprises in Nigeria, as determined by the survey.

Table 3.1.1:Definition and measurement of variables included in the models.

Variables	Definition	Measurement
Constraints	Thisvariable	0= credits granted,

	captures constraint when a firm: (i) applies for and is denied credit due to (i) application procedures being complex, (ii) collateral requirements too high, (iii) unfavourable interest rate (applicants) or establishment already had enough (non-applicant).	1= complex application, 2= collateral requirement too high 3= unfavorable interest rate.
Female	Firms have female owners	1=yes; 0= otherwise
Lnexper	Log number of years' experience of the firm's manager.	Year(s)
CapCity	Firms from the capital city.	1= yes; 0= otherwise
Firmsize	Small firms have 5 to 19 employees	1= yes; 0= otherwise
	Medium firms have between 20 and 99 employees.	1= yes; 0= otherwise
	Large firms between 99 and above	1= yes; 0= otherwise
Ownershiptyp	The firm legal status is a sole proprietorship.	1= yes; 0= otherwise
Edusec	Education of firm owners/managers	0= no education;1=Primary; 2=Secondary; 3= Technical; and 4=Tertiary
Mstatus	Marital status of firm owners/managers	1= yes; 0= otherwise
Manufacturing	Firms from the manufacturing industry	1= yes; 0= otherwise
Retail	Firms from retail services	1= yes; 0= otherwise
Other services	Firms operating in other services activities sector	1= yes; 0= otherwise
Finstat	Firm owners/managers with up to date financial statement are less likely to be credit constrained	1= yes; 0= otherwise
Informal	Firms that have used informal credit.	1=yes; 0= otherwise.
Femaletm	A firm with the female owner as a top manager	1= yes; 0= otherwise
Lnage	Log number of years since the firm has been established	Year(s)
Outcome indicators		
Output per worker	Output per worker is measured as the logarithm of the total output of the firm in monetary terms divided by the total number of workers employed by the firm over that period. The logarithm of the result was used to rescale the data appropriately.	
Capital per worker	Capital per worker is the logarithm total monetary value of investment of the firm in fixed assets divided by the total number of workers employed by the firm.	
Investment in fixed Assets	This is an indicator variable that takes a value of 1 if the firm invested in fixed assets in the current period, and 0 otherwise.	

Source: Author's computation

IV. METHODOLOGY

4.1 Theoretical Framework: Self-selection based on the perception that loan applications will be denied may reflect a true evaluation because these applicants lack the traits (income, collateral, etc.) required by lenders, according to Baydas et al. (1992). These characteristics are among those that indicate impediments to some potential applicants' access to formal loan markets. Alternatively, some applicants may have decided mistakenly that their petitions would be denied while, in fact, they would be approved. While internal self-selection is difficult to quantify, they suggest that it is more likely to explain the conduct of many women, non-farmers, micro, small, and medium-entrepreneurs, and poor people who rely significantly on the informal sector for financial services. As a result, this paradigm informs our notion of credit constraint.

4.2 Model Specification

The model specification adopted for this study is the multinomial logit regression model following from the works of Mckonnen and Mckonnen (2002).

A linear predictor function ln P(Yi = k) / P(Yi =1) is used in the multinomial logistic regression model to predict the probability that observation I has outcome k. The likelihood of belonging to other categories is compared to the likelihood of belonging to the reference category.

Calculating K-1 equations for each category relative to the reference category is required for a dummy variable with K categories.

As a result, if the first category is the reference, the multinomial logistic regression model can be specified as follows for k = 2,

$$In\frac{P(Y_i-k)}{P(Y_i-1)} = \lambda_k + \sum_{n=1}^{n} \alpha_{kn} X_{in} = Z_{ik} \quad (1)$$

where i is the ith person and k is the kth dependent variable category (in this case, constraints). kn represents a vector of regression coefficients for the kth explanatory variable and the nth outcome. Xin is a vector of explanatory variables, whereas k is the constant term.

There will be K-1 predicted log chances for each example in Equation 1, one for each category relative to the reference category. Because there are more than two types of constraints (complex application, excessive collateral, and unfavorable interest rate), the probabilities for k = 2,..., K, yield:

$$P(Y_i = k) = \frac{\exp(Z_{ik})}{1 + \sum_{j=2}^{k} \exp(Z_{ji})} \quad (2)$$

While the reference category yields

$$P(Y_i = 1) = \frac{1}{1 + \sum_{j=2}^{k} \exp(Z_{ji})} \quad (3)$$

The K-1 log odds are computed and exponentiated in this step, making the probabilities calculation simple. When the model's variables are itemized and respecified in functional form, we get Equation 4:

$$Constraints = f\{\text{age, exper, edusec, ownershiptyp, finstat femaletm, mstatus, capcity, firmsize, informal, female,manuf, retail,otherservices}\}, \quad (4)$$

where the variables are as defined in table 3.1.1 above.

In order to capture the objective one which is to ascertain the impact of credit constraint on non-farm MSMEs sectors, equation (4) will be modified using multinomial logit regression as,

$$Constraints = \beta_0 + \beta_1 lnexper + \beta_2 edusec + \beta_3 finstat + \beta_4 lnage + \beta_5 ownershiptyp + \beta_6 Femaletm + \beta_7 Mstatus + \beta_8 Capcity + \beta_9 Firmsize + \beta_{10} Informal + \beta_{11} female + \beta_{12} manufacturing + \beta_{13}\text{retail} + \beta_{14} Otherservices + \gamma_1(female^{*} manfacturing) + \gamma_2(female^{*} retail) + \gamma_3(female^{*} Otherservices) + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where

$\beta_1, \beta_2, \beta_3, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \beta_{14}$ are coefficient parameters while $\gamma_1, \gamma_2,$ and γ_3 are differential effect coefficient parameters.

V. PRESENTATION AND ANALYSIS OF RESULTS

5.1: Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max.
Constraint	2676	2.241031	1.202728	1	7
Exper	2644	12.89391	8.698691	0	72
Edusec	2652	5.316742	1..786789	1	10
Finstat	2674	1.73822	.4396858	1	2
Age	2676	1997.339	12.46659	1846	2014
Ownershiptyp	2676	2.254484	1.29841	0	4
Femaletm	2676	1.869581	.3368263	1	2
Capacity	2676	1.716741	.4506651	1	2
Firmsize					
Small >=5	2676	.5213004	.4996394	0	1
Medium >=19	2676	.2765321	.4473666	0	1
Large >=100	2676	.0840807	.2775607	0	1
Informal	42	26232.17	83432.38	0	500000
Female	2676	1.793348	.4049791	1	2
manufactur~g	2676	.4678625	.4990594	0	1
Retail	2676	.211136	.408191	0	1
otherservi~s	2676	.2264574	.4186167	0	1
femalemanu~t	2676	.8430493	.9396919	0	2
Femaleretail	2676	.3755605	.750716	0	2
femaleother~s	2676	.396861	.761831	0	2

Source: Author's computation

The output results of the summary statistics shown in table 5.1 indicates that all the variables exhibit sufficient variations with varying mean, standard deviation values and their corresponding minimum and maximum values. The results reveal that the highest observational data in the Nigerian enterprise survey (2014) is 2676. Other variables with a lesser number of observations show that there exists missing data or that the respondents could not respond to all the questions in the survey template.

Table 5.2: Comparing those who said that the application procedures were complex and those who said that they had no need for a loan - establishment

Constraint	Coef.	Std. Err.	z	P>|z|
No need for a loan establishment (base outcome)				
Application procedures were complex				
Lnexper	-.1197	0.3238	-3.69	0.000
Edusec	-.1375	0.0257	-5.35	0.000
Finstat	-.1123	.0772	-1.46	0.149
Lnage	.1169	.0284	4.12	0.000
Ownershiptyp	-.4948	.2238	-2.21	0.016
Femaletm	-.3667	.1069	-3.43	0.000

Capacity	-.0257	.1283	-0.20	0.248
Firmsize				
Small >=5 and < = 19	-.2530	.0381	-6.62	0.000
Medium >=20 and <=99	-.1976	.0842	-2.35	o.014
Large >=100	-.1623	.0173	-9.38	0.000
Informal	.1004	.0383	2.62	0.011
Female	.4566	.1852	2.47	0.013
Manufacturing	.1554	.1069	1.45	0.399
Retail	.3234	.0372	8.70	0.000
Otherservices	-.7299	.1656	-4.41	0.000
Femalemanufacturing	-.2234	.1080	-2.07	0.032
Femaleretail	-.5959	.1577	-3.78	0.000
Femaleotherservices	-.1872	.0264	-7.08	0.000
Cons	-1.6871	1.602	-1.05	0.699

Source: Author's computation

From the interactive dummy results above, the relative log odds of females who are in the manufacturing industry (femalemanu~t) having complex application procedures in accessing credit with respect to those that had no need for a loan significantly decreases the constraint by 0.2234316. This result is not surprising since it is expected that with more females in the manufacturing industry regarding complex application procedures, the fewer constraints to be faced by them in accessing credit compared to those that had no need for a loan. The implication here is that with an increased number of females in the manufacturing industry, the less likelihood of having more constraints of credit access when compared to males due to complex application procedures.

In addition to the above, the relative log odds of females who are in the retail services (femaleretail) having complex application procedures in accessing credit against those that had no need for a loan significantly decreases the constraint by 0.5958755. The implication here is that with more females in the retail services considering complex application procedures, the fewer constraints are to be faced by them in accessing credit against those that had no need for a loan. Therefore, with a rise in the number of females in the retail services, the less likelihood of having more constraints of credit access as a result of complex application procedures.

An increase in females who are in firms operating in other services activities sector (femaleother ~s) is associated with a 0.1872258 significant decrease in the relative log odds of having complex application procedures in accessing credit against those that had no need for a loan. The implication here is that with increased number of females in firms operating in other services activities sector, there would be a reduction in the factors that increase constraints of credit access regarding complex application procedures against those that had no need for a loan.

Table 5.3: Comparing those who said that interest rates were not favourable and those who said that they had no need for a loan - establishment had enough

Constraint	**Coef.**	**Std. Err.**	**z**	**P>|z|**
No need for a loan establishment outcome)				(base
Interest rates were not favourable				
Lnexper	-.6784	.2128	-3.19	0.000
Edusec	-.4273	.1253	-3.41	0.000
Finstat	-.1179	.0165	-7.16	0.000
Lnage	-.6695	.1878	-3.57	0.000
Ownershiptyp	-.1105	.0372	-2.98	0.028
Femaletm	-.9526	.2140	-4.45	0.000
Capacity	-.3309	.1249	-2.65	0.032
Firmsize				
Small >=5 and < = 19	-.5641	.4750	-1.19	0.619
Medium >=20 and <=99	.1289	.0734	1.76	0.523
Large >=100	.5992	.0624	9.61	0.000
Informal	.9001	.3820	2.36	0.039
Female	.4542	.1665	2.73	0.031
Manufacturing	.5346	.2723	1.96	0.053
Retail	-.8073	.1248	-6.47	0.000
Otherservices	-1.055	1.771	-0.60	0.601
Femalemanufacturing	.6427	.3510	1.83	0.018
Femaleretail	.9656	.3817	2.53	0.018
Femaleotherservices	.2107	.4319	0.49	0.630
Cons	.5174	1.481	0.35	0.674

Source: Author's computation

From the interactive dummy results above, the relative log odds of females who are in the manufacturing industry (femalemanu~t) having interest rates not favourable in accessing credit with respect to those that had no need for a loan insignificantly increases the constraint by 0.642655. This result is surprising since it is expected that with more females in the manufacturing industry regarding unfavourable interest rates, the fewer constraints to be faced by them in accessing credit compared to those that had no need for a loan since they are gainfully employed. The implication here is that with an increased number of females in the manufacturing industry, the higher probability of having more constraints of credit access due to unfavourable interest rates. This result suggests the presence of gender discrimination.

Also, the relative log odds of females who are in the retail services (femaleretail) having interest rates not favourable in accessing credit against those that had no need for a loan significantly increases the constraint by 0.9655872. This result is surprising since it is expected that with more females in the firms from retail services considering unfavourable interest rates, the fewer constraints they would face in accessing credit against those that had no need for a loan. However, the implication here is that in Nigeria, a rise in the number of females in firms from retail services brings about an increased likelihood of having more constraints of credit access as a result of interest rates not being favourable.

An increase in females who are in firms operating in other services activities sector (femaleother~s) is associated with a

0.2106923 insignificant increase in the relative log odds of having interest rates not being favourable in accessing credit against those that had no need for a loan. The implication here is that with an increase in the number of females operating in other services activities sector, there would be a rise in the factors that increase constraints of credit access regarding unfavourable interest rates against those that had no need for a loan.

Table 5.4: Comparing those who said that collateral requirements were too high and those who said that they had no need for a loan - establishment had enough

Constraint	Coef.	Std. Err.	z	P>|z|
No need for a loan establishment (base outcome)				
Collateral requirements were too high				
Lnexper	-.5921	.1296	-4.57	0.000
Edusec	-.4820	.0464	-10.39	0.000
Finstat	-.0537	.3252	-0.17	0.617
Lnage	-.4509	.1916	-2.35	0.039
Ownershiptyp	-.9941	.4212	-2.36	0.037
Femaletm	-.9187	.3847	-2.39	0.031
Capacity	-.2367	.1575	-1.50	0.327
Firmsize				
Small >=5 and < = 19	.6319	.2835	2.23	0.040
Medium >=20 and <=99	.7110	.1272	5.59	0.000
Large >=100	.4196	.1413	2.97	0.009
Informal	-.8041	.3611	-2.23	0.040
Female	.7232	.3498	2.07	0.044
Manufacturing	.2212	.1041	2.12	0.042
Retail	.7915	.2584	3.06	0.001
Otherservices	.8213	.2888	2.84	0.019
Femalemanufacturing	.2298	.3805	0.60	0.552
Femaleretail	.5424	.4077	1.38	0.196
Femaleotherservices	.2325	.4535	-0.51	0.613
Cons	.4171	.1471	2.84	0.019

Source: Author's computation

From interactive dummy results, the relative log odds of females who are in firms from the manufacturing industry (femalemanu~t) seeing collateral requirements to be too high in accessing credit with respect to those that had no need for a loan insignificantly increases the constraint by 0.2297752. This result is surprising since it is expected that with more females in the manufacturing industry regarding too high collateral requirements, the fewer constraints to be faced by them in accessing credit compared to those that had no need for a loan since they would be gainfully employed. The implication here is that in Nigeria, with an increased number of females in the manufacturing industry, there would be a higher probability of having more constraints of credit access due to very high collateral requirements.

In addition to the above, the relative of log odds of females who are in firms from retail services (femaleretail) having collateral requirements being too high in accessing credit against those that had no need for a loan insignificantly increases the constraint by 0.5424187. This result is surprising since it is expected that with more females in the firms from retail services considering very high collateral requirements, the fewer constraints they would face in accessing credit against those that had no need for a loan. However, the implication here is that in Nigeria, a rise in the number of females in firms from retail services brings about an increased likelihood of having more constraints of credit access as a result of collateral requirements being too high.

An increase in females who are in firms operating in other services activities sector (femaleother~s) is associated with a 0.2324896 insignificant decrease in the relative log odds of having collateral requirements being too high in accessing credit against those that had no need for a loan. The implication here is that with increased number of females in firms operating in other services activities sector, there would be a fall in the factors that increase constraints of credit access regarding too high collateral requirements against those that had no need for a loan.

VI. CONCLUSION AND RECOMMENDATION

This study adds to literature by interacting gender with the manufacturing, retail and other services sectors to determine the impact of gender bias when factors such as interest rates not favourable, collateral requirements too high and application procedures too complex as against that they had no need for a loan-establishment had enough are compared. The interaction result of the first factor shows a negative and significant impact on credit constraints unlike when the not interacted results. the interactive result of the second factor shows that female manufacturing and female retails are both significant and positive impacting while the interactive result for the third factor shows no significant on credit constraints. This conclusively shows that application too complex and interest rate too high factors are paramount in determining the credit constraints of the entrepreneurs.

The study therefore recommends the following;

- ✓ That the Central Bank of Nigeria (CBN) should develop policies such as smoothening some lending conditions that are not female friendly, provision of free education for females, entrepreneurial training and managerial training etc., which will enable them to compete more favourably with their counterparts in terms of firms' performances specifically in the areas of manufacturing industry, retail and other services activities sector.
- ✓ The study also recommends that the government should sustain Micro Finance Policy framework by establishing more MFBs in all the geopolitical zones as well as in the rural areas. Their credit access provision should be gender sensitive by requesting for small or no collateral, simplifying their application procedures etc., so as to promote the growth of MSME businesses as an alternative to formal employment

REFERENCES

Abiola, B. (2011). Impact Analysis of Microfinance in Nigeria. *International Journal of Economics and Finance*, 4(3):217-25.

Alesina, A., Lotti, F., & Mistrulli, P. (2013). Do women pay more for credit? Evidence from Italy. *Journal of the European Economic Association* 11, 45- 66.

Asiedu, E., Freeman, J., & Nti-Addae, A. (2012). Access to credit by small businesses: How relevant are race, ethnicity, and gender? *American Economic Review*, 102, 532- 537.

Asiedu, E., Kalonda- Kanyama, I., Ndikumana, L. & Nti- Addae, A. (2013). Access to credit by firms in Sub- Saharan Africa: How relevant is gender? American Economic Review, 103: 293- 297.

Aterido, R., Beck, T. & Iacovone, L. (2013). Access to finance in Sub- Saharan Africa: Is there a gender gap? *World Development* 47, 102- 120.

Aterido, R., Beck, T. and Iacovone, L. (2011). Gender and Finance in Sub-Saharan Africa. Are Women Disadvantaged? *World Bank Policy Research Working Paper* 5571. World Bank, Africa Region.

Awoniyi O.A. & Ayandiji, A. (2008). Effect of Gender differentials in access to credit facilities on productivity among rural Households.

Baydas, M.M., Meyer, R.L. & Aguilera-Alfred, N. (1992). Discrimination against Women in Formal Credit Markets: Reality Or Rhetoric? Economics and Sociology Occasional Paper No.1989.

Bayer, P., Ferreira F., & Ross, S.L. (2014). Race, Ethnicity and High Cost Mortgage Lending. Department of Economics University of Connecticut, Storrs CT, Working Paper 36.

Beck, T., Behr, P. & Madestam, A. (2012). Sex and credit: Is there a gender bias in lending? *European Banking Center Discussion Paper* 17.

Bellucci, A., Borisov, A., & Zazzaro A. (2010). Does gender matter in bank- firm relationships? Evidence from small business lending. *Journal of Banking & Finance* 34, 2968- 2984.

Berg, G. & Fuchs, M. (2013). Bank Financing of SMEs in Five Sub-Saharan African Countries: The Role of Competition, Innovation, and the Government, Washinton, DC: *World Bank publications.*

Calcagnini, G., Giombini, G. & Lenti, E. (2012). Gender differences in bank loan access: An empirical analysis. *Italian Economic Journal*, 1(2), 1-25.

Cozarenco, A. & Szafarz, A. (2015). Gender Biases in Bank Lending: Lessons from Microcredit in France, *Journal of Business Ethics*, forthcoming.

Ebiringa, O. T. (2011). Entrepreneurship venturing and Nigeria's economic development: The manufacturing sector in focus. *International. Journal of Business Management & Economic Research*, *2*(6), 376-381.

Eniola, A. A. (2014). The role of SME firm performance in Nigeria. *Arabian Journal of Businessand Management Review*, *3*(12): 33-47. Retrieved March 30, 2014, from www.arabianjbmr.com/pdfs/OM.

Eniola, A. A., & Ektebang, H. (2014). SME firms' performance in Nigeria: Competitive advantage and its impact. *International Journal of Research Studies in Management, 3*(2), 75-86.

Eze, C.C., Ibekwe, U. C., & Korie, O. C. (2009). Women's accessibility to credit from selected commercial banks for poverty reduction in South East Nigeria. *InternationalFarm Management Congress Proceedings*, *1*, 669-689, July 19-24.

Galli, E., & Rossi, P. S. S. (2012). Bank Credit Access and Gender Discrimination: An Empirical Analysis. *Working Paper*.

Gichuki, C., Mulu-Mutuku, M. & Kinuthia, L., (2014). Performance of women owned enterprises accessing credit from village credit and savings associations in Kenya. *Journal of Global Entrepreneurship Research*. Heidelberg: Springer Science & Business Media.

Hansen, H. & Rand, J. (2014b). The Myth of Female Credit Discrimination in African Manufacturing. *The Journal of Development Studies*, 50(1):81-96.

Hansen, H. & Rand, J. (2012). Another Perspective on Gender Specific Access to Credit in Africa. *FOI Working Paper 2011/14*, University of Copenhagen, Institute of Food and Resource Economics.

Hansen, H. & Rand, J. (2014a). Estimates of Gender Differences in Firm's Access to Credit in Sub-Saharan Africa. *Economics Letters*, 123:374-377.

Kitili, E. K. (2012). *Factors influencing access to credit facilities among small and medium entrepreneurs in island division, Mombasa County* (Doctoral dissertation, Kenyatta University).

Kira, A. R., & He, Z. (2012). The impact of firm characteristics in access of financing by small and medium-sized enterprises in Tanzania. *International Journal of Business and management*, *7*(24), 108.

De Mel, S., McKenzie, D., & Woodruff, C. (2009). Are women more credit constrained? Experimental evidence on gender and microenterprise returns. *American Economic Journal: Applied Economics*, *1*(3), 1-32.

Memba S. F., Gakure W. R. & Karanja, K. (2012). Venture Capital (V C): It's Impact on Growthof Small and Medium Enterprises in Kenya. *International Journal of Business and Social Science*, 3(6); [Special Issue - March 2012].

Muravyev, A., Schäfer, D. & Talavera, O. (2012). Entrepreneurs' gender and financial constraints: Evidence from international data. *Journal of Comparative Economics* 37, 270- 286.

NBS. (2015). Nigeria Bureau of Statistics Annual Reports.

NBS. (2017). Nigeria Bureau of Statistics Annual Reports.

Nguyen, N., Gan, C. & Hu, B (2015). An empirical analysis of credit accessibility of small andmedium sized enterprises in Vietnam. *Banks and Bank Systems*, 10(1).

Nwosu, E.O., Orji, A., Nnetu V. & Nwangwu, C. (2014). Is there discrimination against women entrepreneurs in formal credit markets in Nigeria? *working paper*: 2014-08. Retrieved from

file:///C:/Users/nirosha/Downloads/1429900270WP_20 1501_PMMA12384_Nigeria%20(5).pdf.

Nyanzu, F., and Quaidoo, M. (2017). Access to Finance Constraint and SMEs Functioning in Ghana, MPRA Paper No. 83202, December, University Library of Munich, Munich.

Onyena S, and Popov, A, (2015). Gender Bias and Credit Access, ECB Working paper 1822, July.

Orodje, G. (2012). Microfinance in Nigeria Two Years After CBN's Intervention. Published by Microfinance Africa.

Sampath, P. G., & Oyelaran- Oyeyinka, B. (2010). Rough road to the market: Constrained biotechnology innovation and entrepreneurship in Nigeria and Ghana. *Journal of International Development*, *22*(7), 962-977.

Schmiemann, M. (2008). Enterprises by size class-overview of SMEs in the EU. *Statistics in focus*, *31*, 2008.

SMEDAN. (2013).The Small and Medium Enterprises Development Agency of Nigeria (SMEDAN). 2013 Survey Report on Micro, Small and Medium Enterprises (MSMEs).

SMEDAN. (2017). The Small and Medium Enterprises Development Agency of Nigeria (SMEDAN). 2016 Survey Report on Micro, Small and Medium Enterprises (MSMEs).

Wellalage, H.N. & Locke, S. (2016). Informality and credit constraints: evidence from Sub Saharan African MSEs, *Journal of Applied Economics*, 48(29): 2756-2770.

Wellalage, H.N. & Locke, S. (2017). Access to credit by SMEs in South Asia: do women entrepreneurs face discrimination. *Research in International Business and Finance*, 41: 336-346.

World Bank, 2011. World Development Report 2012: Gender Equality and Development. World Bank, Washington, DC.

AUTHORS

First Author – Afamefuna A. EZE, MSc. (University of Nigeria, Nsukka), angus.eze@unn.edu.ng.

Second Author – Chinanuife Emmanuel, MSc.Salem University, Lokoja, Kogi State and chinanuifemma@gmail.com

Third Author – Muogbo Kingsley Arinze, MSc, University ofNigeria, Nsukkaand muokar@yahoo.com

Fourth Author: Nnaji Moses, PhD, Energy Research Centre, UNN, moses.nnaji@unn.edu.ng

Fifth Author: Atakpa Daniel Akoh, MSc, Kogi State University, danielatakpa@gmail.com

Correspondence Author – Afamefuna A. EZE, angus.eze@unn.edu.ng. , famzy97@gmail.com. 07068021915.