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AN ANALYSIS OF THE FARMERS CHOICE OF CREDIT SOURCE IN KANO STATE: A MICRO LEVEL ANALYSIS

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Abstract

Access to agricultural credit remains a significant barrier to productivity and rural development in Nigeria. This study investigates the determinants of farmers' choice of credit sources in Kano State using a microeconometric framework. A stratified-cluster sample of 1,000 farmers across urban, semi-urban, and rural areas was surveyed. A multinomial logit model was employed to examine the influence of demographic, socioeconomic, and institutional variables on farmers' choice among self-financing, informal credit, microfinance, commercial banks, and government sources. Results reveal that urban residence, profitability, political affiliation, and occupation strongly influence access to formal credit. Subsistence farmers and those with lower education are more likely to rely on informal or personal financing. The study provides evidence-based recommendations for inclusive agricultural credit policy and financial infrastructure development targeting smallholder farmers

Keywords: Agricultural credit, Microfinance, Multinomial logit, Nigeria, Rural finance, Credit constraints.

1 Introduction

Agriculture is the primary livelihood for a majority of Nigeria's population, contributing about 25% to the GDP and employing over 60% of the workforce. Despite its critical role, agricultural productivity remains low due to limited access to key inputs—especially credit. In fact, the average cereal crop yield per hectare in Nigeria was three times lower than that of Malaysia (3889.23 kg per hectare) and South Africa (3724.86kg per hectare), and almost five times lower than U.S [1]. Among the reason behind the low productivity and poor performance of agriculture and in Nigeria is lack of access to credit [2]. Agricultural economists over the years maintain that rural poverty and agricultural stagnation are the repercussions of the lack of access to capital among others [3]. Perhaps, in order to improve farming production and increase the welfare of rural dwellers, farmers have to use improved techniques of production ([4]; [5]). However, the adoption of these modern agricultural inputs and machineries are somehow expensive, and most farmers cannot afford to self-finance. As a result of these problems, the adoption of modern agricultural inputs and new machineries are very stumpy in Nigeria ([6]; [7]).

The fact that almost 70 percent of Nigerians do not have access to credit and also not covered by the formal financial and banking services of whatever forms [8], suggests that government finance programs do not cover many farmers. This is due to the fact that most of the Nigerian farmers do not only resides in the sparsely rural areas, but also unbanked, and the loans under Agricultural Credit Guaranty Scheme are distributed through commercial banks, which are mostly restricted to few urban centres.
In support of this, evidence from the World Bank report indicates that only five percent in Nigeria have access to formal loans, and 44 percent have formal bank account, while about two percent obtained loans

from the informal source [9]. Besides, empirical evidence from Nigeria reveals that 79.2 percent of farmers were constraints in the agricultural credit market [10].

Evidently, lack of credit increases the level of farmers' poverty, deteriorates farm performance, and further worsens the welfare condition of rural farmers. It is, therefore, agreed to some extent among researchers that farm credit enhance farm performance and productivity which leads to significant improvement in rural welfare and farmers' income [11]. Therefore, farm credit is one of the crucial inputs considered fundamental in agricultural production. Lack of access to credit is among the significant obstacles confronting farmers across Nigeria, which deteriorate the modernization and expansion of many farms. This study analyses the determinants of farmers' choice among the different source of agricultural finance in Kano State, Nigeria using micro-level data of Kano State, Nigeria.

2 Literature Review

Several studies have reveal that households are rationed in the credit market, due to its owned attributes and institutional factors. At the household level, the total income, accumulated wealth, residential location, business enterprises and other attributes were found to be important determinants of credit source and constraints ([12]; [5]). In an empirical survey in Nigeria and China, [13] found that old farmers are more likely to be credit constraints than younger ones. This is in line with the intuitions of [10] that younger farmers are more amenable to new technologies and aggressive to income generating activities, and, therefore, more likely to save or invest. However, this contradict the findings of [14] in Uganda and 15 Euro area countries that credit constraints decreases with being old. Likewise, being female-headed household increases constraints in the formal sector in Poland [15]; and decreases in the informal sector in Malawi [16]. [17] observed that majority of the constrained farmers are more attributed with small holdings, and lenders favour large holding farmers because they have higher repayment capacity. This is in line with finding of [18] which confirmed the evidence of lending bias in favour of large farms on one side. On the other side, [13] found that an increase in land endowment will increase the probability of being credit constraints. Similarly, married individuals were found to be more likely to face credit exclusion than non-married ones ([17]) in Nigeria. Though it is yet to be conclusive, as some studies reveal that lending agencies might view married individuals as stable and more reliable; hence, they are less likely to be credit constraints in both Nigeria and Rwanda ([19]; [20]). Moreover, wealth and total income were hypothesized to affect liquidity constraints of the households [21]. In view of this, several studies revealed that wealthier individuals among farmers are less likely to be credit constraints ([22]; [14]). These findings were supported by [23] and [24] in Uganda, Paraguay, China and Mexico, that the probability of being credit rationed increases with being poor. While in an empirical survey in Pakistan, [25] and [26] found that households with more income are less likely to demand credit, and therefore, more likely to become unconstrained non-borrowers. This class of households seem to achieve economic independence, which decreases their preference to borrow credit.

3. Methodology

This segment provides information on the methodology adopted in the study such as; population of the study, sampling technique, process of data collection, type and sources of data used in the analysis

3.1 Sampling Technique and Sample Size

This study used probability sampling technique as employed by some previous studies ([27]; [28]). From the beginning, respondents were stratified between those participate in credit market and non-participants, in

addition to microfinance banks. The second stratification follows the agricultural zones strata for the selection of the respondents. For the first population, respondents were selected from six local governments namely, Minjibir, Ungoggo, Dambatta, Gezawa, Wudil and Kura was selected from three different agricultural zones. The selection of these agricultural zones is justified by the intention of the research to include different zones in the analysis. This is also augmented by the desire of the study to have different responses from urban, semi-urban and rural dwellers.

On the part of the sample size, the sample size of the study was determined based on the [29], a population of 271,233 demand a sample size of 384 using the formula in Equation (1)

$$n = \frac{NP(1-P)}{(B/C)^2\,(N-1) + P(1-P)} \qquad (1)$$

Where: n is the sample size of the study. N is the size of the population, B is acceptable sampling error or precision, P is the ratio of population expected to choose, C is the Z statistic associated with a confidence level (1.96) corresponds to the 95 percent level. Thus, $N = 271{,}233, P = 0.5, B = 0.05\ and\ C = 1.96$. This formula has been widely applied in household level studies ([30]; [31]; [32]). Following the formula in Equation (1), a sample size of 383.62 was calculated. However, in line with [33], the sample was increased by 50 percent and become 576 to avoid the problem of sample error and size distortion. For the second category, all the 411 credit beneficiaries were taken in to consideration. It is interesting to note that all the beneficiaries were within the selected study areas. Same goes to the third category where all the 45 microfinance banks in the state were considered to be part of the study samples. Therefore, the total samples targeted by the study were 1032 respondents though finally 1000 samples utilised.

3.2 Data Collection

The data was collected through December, 2015 and February, 2016 after the pilot survey for reliability and validity test of instruments. A total of 1000 questionnaires were distributed with the help of extension workers and credit officers across the study areas as approved by the KNARDA. At the end, 905 questionnaires were retrieved out of 1000 questionnaires that are administered by the team of the research assistants across the various local government areas. Subsequently, this makes the response rate of 90.5 percent.

3.3 Multinomial Logit Regression Model

In order to achieve the objective of this research, Multinomial Logit Regression Model (MNLM) was employed to determine the factors affecting the choice of agricultural finance among farmers in Nigeria. The choice among the different types of agricultural finance in Nigeria depends on the probabilistic response or dependent variable; which is typically a discrete choice, and it has a general structure of a multinomial variable (unordered polytomous response).

The multinomial logit model for choice of agricultural finance will be written in Equation (2).

$$Prob(Y_i = j) = \frac{e(X_i\beta_j)}{\sum_{j=i}^{J} e(X_i\beta_j)} \qquad j = 1,2,3,\ldots\ldots\ldots,m \qquad (2)$$

Where: j is the different source of agricultural finance in Nigeria such as self-finance, commercial banks, government loans, microfinance banks and loans from friends and relatives (informal source).

Following normalization, the probabilities in Equation (2) is presented in Equation (3) and Equation (4) as:

$$P(Y = 0|x) = \frac{1}{\left[1+\sum_{k}^{j}\exp(\beta_k x_i)\right]} \qquad (3)$$

$$P\left(Y = j \mid x\right) = \frac{exp\left(\beta_j x_i\right)}{\left[1 + \sum_k^j \exp\left(\beta_k x_i\right)\right]} \text{for } j = 1, \ldots k \quad (4)$$

Where: $Prob\left(y_i = j \mid X_i\right)$ is the probability that farmer *i* chooses alternative *j* given X, X_i is a vector of attributes of farmer i, J is the number of nominal alternatives, β_j measures the contribution of farmer's characteristic to the likelihood of choosing alternative *j*.

In general, the model has been used in multiple-choice studies such as occupational choice, urban travelling mode and choice of corporate bonds [34]. Following [35], the estimable model is written in Equation (5).

$$ln\frac{pr(CAF = j)}{pr(CAF = m)} = \alpha_{oi} + \alpha_1 AGE_i + \alpha_2 MAS_i + \alpha_3 QLF_i + \alpha_4 OCC_i + \alpha_5 SUB_i + \alpha_6 EXP_i + \alpha_7 FSZ_i + \alpha_8 POL_i + \alpha_9 PRF_i + \alpha_{10} REG_i + \varepsilon_i \quad (5)$$

Where: *CAF* is a source of finance associated with agriculture in *j* categories (self-finance, commercial banks, government loans, microfinance banks and loans from friends and relatives) and *m* is the base outcome (self-finance), *AGE* is the age of the farmers, *MAS* is the marital status; *QLF* is education in years; *OCC* is the farmers' occupation (full time farmer, trade, civil service); *SUB* is the subsistence farming; *EXP* is the years of farming business, *FSZ* is the farm size, *POL* is the dummy for political party affiliation; *PRF* is the profit from farming; *REG* is the regional dummy representing urban areas and ε_i is the random variable assuming logistic distribution.

4. Result and Discussion

This section presents the results of multinomial Logit regression model (MNLM) of the determinants of the credit choice.

The coefficients indicate the influence of each explanatory variable on the different choice of agricultural finance relative to the base category (self-finance). Thus, the coefficient estimates compare the likelihood of different agricultural finance options; self-finance (1); relatives and friends (2); microfinance (3); commercial banks (4); and government finance (5). The Outcome level 1 (self-finance) is chosen as the base category, not only because it is the group with the highest outcomes which the software (Stata 13) chooses automatically, but also it is regarded as a unique way by which farmers can resort to finance their farming activities. Because apart from the self-finance, all other choice like relatives and friends, microfinance, banks and government are different forms of loan. The odd ratios are the numbers which multiply the odds of choosing a particular alternative among different alternatives of agricultural finance relative to other alternatives. However, these odd ratios were converted in to percentages in Table 1 for analysis as suggested by [36].

Of notable importance in Table 1, are the statistical significance of occupational dummies; *FAM, TRD* and *CVS,* with respect to different choice of agricultural finance at various significant degrees. To start with households who have no any other engagement except farming, the coefficient of *FAM* was found to be statistically significant at one percent with respect to government source. On one side, *TRD* which represents the entrepreneurial engagement of a farmer is positively and statistically significant at one percent in connections to all sources of loans except for commercial bank loans. On the other side, *CVS* which indicates farmer being in civil service or engaged in administration was also found to be positive and significance with respect to microfinance loan and government borrowing.

The positive significant coefficient of *FAM* with regard to government source predicts that the odds of obtaining loan for households with no any other engagement except farming is 29.6 percent higher for government loan with reference to self-finance than farmer with an additional commitment apart from farming. This is to say that a decrease in off-farming commitment increases the odds of farmer being confined only to cheap and subsidized government loan by 29.6 percent. This indicates the effect of lack of other means, as most of these households are subsistence farmers; that is why most of them were crowded out from the credit market making them only to wait for government intervention.

In contrast, the positive and significant coefficient of *TRD* at one percent infers that the odds of obtaining credit from governments, microfinance banks and relatives increases by 36.5 percent, 424.3 percent and 661 percent with an increase in non-farming business relative to self-finance. It follows that as off-farming business increases households tends to consult associates to finance some profitable ventures. The fact that this type of farmers was encouraged for more diversification, government tends to gives them loans. On the other hand, the high level of their non-farming businesses gives them an opportunity to acquire more assets that could enable them to access financial services including credit.

Moreover, the variable *CVS* is positive and statistically different from zero with respect to microfinance and government loans at conventional level, but statistically unimportant in connections to commercial banks and relatives borrowing, respectively. This implies that to every additional promotion in the civil service is accompanied with an increase of 204.9 percent odds of sourcing agricultural loans from government source than otherwise. But the preference for the civil servant to borrow from microfinance banks has double as the odds increases to 536.8 percent than non-civil servant. The fact that government is the major employer of civil servants and more upon channel their salary to microfinance banks as a strategy for these banks to survive; highlight its importance to civil servant as the major source of financial services. Generally, findings with respect to households' occupational choice are imperative with regards to choice of agricultural finance and has concurs with many studies. [35] found that those in trade and administration among households are more probable to demand loan from government, commercial banks and money lenders. The result also corresponds with the findings of [37].

Similar findings was also reported by [38] that there is significant and positive relationship between formal loan demand and engagement outside agriculture. But this finding is contradicts that of different from [39] that the preference for household to demand credit falls with an increase in off-farming commitment.

The variable *SUB* was found to be significant for the microfinance banks at five percent. The coefficient of this variable was found to be negative implying that the preference of the microfinance banks to release credit to farmers goes down by 81.6 percent for subsistence farmers than otherwise. This is plausible as this type of farmers virtually consume all what they produce, leaving no resource for future productive investment, making lenders to view them as potential risk borrowers with no repayment capability. It appears that the probability of being crowded out from the loan contract by microfinance banks increases for subsistence farmers relative to self-finance than commercial farmers.

Furthermore, the results in Table 1 show that the coefficient of *EXP* appears negatively significant at 10 percent with respect to borrowing from microfinance banks, albeit insignificant in connections with other borrowing alternatives. It appears that for every additional year in farming business, farmer's preferences to borrow credit from microfinance banks falls by 2.9 percent than an inexperience farmer. This suggests that a farmer who stay longer in the agricultural business has acquired skills and manoeuvres which make him economically independence, and therefore less likely to demand credit from the microfinance banks.

It is plausible that the experience a household has gained in farming practice would give him a practical knowledge on how to overcome the obstacles associated with loan. Such experience would help him to address his financial demand in better ways and less risky means. Thus, would probably reduce the risk of

loan portfolio. However, the result contradict the findings of [40] that the characteristics of firm's owner such as professional experience influence his desire to seek institutional loan. Additionally, the finding in Table 4 corresponds with the findings of [18] that the longer a household stayed in farming business the likely that his elasticity of credit demand will fall.

Of notable importance in Table 1 is the negative statistical appearance of *FSZ* with respect to borrowing from relatives at five percent and microfinance banks at 10 percent respectively. This implies that an increase in one hectare will decrease the odds of borrowing from the relatives and microfinance banks by 74.5 percent and 18.6 percent, relative to self-finance (the base category). These results suggest that landholding seems to play unimportant role on borrowing and choice of credit market; which may be partly associated with fact that the loan granted is too small for farmers with large holdings. The results are in line with most of the government policy that favoured cheap credit instead of guaranteed credit [41]. However this finding contradicts that of [35]. Nevertheless, the findings that an increase in landholdings decreases farmers' borrowing preference goes with the intuitions of [12] that a wealthier household stand a chance to participate in credit market, but they are very unlikely to demand it. In fact, these categories of farmers are likely to become source of informal finances in their communities, and the consequential effect will increase the supply of credit.

Table 1. Odd Ratios of Choice of Agricultural Finance in Percentage

	(2)	(3)	(4)	(5)
Variables	**Relatives**	**Microfinance**	**Banks**	**Government**
AGE	7.9	3.1	14.**	-5
MAS	2.3	-24.3	823.8***	11
QLF	-11.3***	-12.8***	2.3	0.2
FAM	-53.6	70.5	-82.4	29.6***
TRD	661***	424.3***	139.1	36.5***
CVS	-4	536.8***	-25	204.9***
SUB	127.9	-81.6**	73.5	-30.6
EXP	-3.4	-2.9*	-4.1	-1.6
FSZ	-74.5**	-18.6*	-44	-49.5
POL	-62.5*	42.0	126.9	-56.8
PRF	59.5***	168.7	62.4***	7.6
RE2	15.5	326***	862.3***	521.6***

Note: Robust standard errors in parentheses. ***, ** and * donate statistical significance at 1%, 5% and 10%, respectively. Outcome (1) which is self-finance was omitted because it is a reference group, while (2) to (5) are the estimates of the remaining outcomes (relatives and friends, microfinance banks, commercial banks and government subsidized loan). *AGE* is the age of the farmers, *MAS* is the marital status (1=married), *QLF* is education in years, *FAM* is the primary occupation (1=farmer), *TRD* is the entrepreneurial ability (1=if engage in trading), *CVS* is the dummy of administrative involvement (1=ifcivil servant), *SUB* is the farming system (1=if subsistence farmer), *EXP* is the years of farming business, *FSZ* is the farm size, POL is the dummy for political affiliation (1=if member of ruling party), *PRF* is the profit from farming (1=if farming is profitable), *RE2* is the regional dummy (1=iflocated in urban areas)

This suggests that land holdings increases supply more than credit demand, and the benefits of landholdings with respect to credit supply might be sturdier than the extent to which it raise the investment desire.

At 10 percent level of significance, result in Table 4 indicates that the coefficient of *POL* is statistically significant in relations to borrowing from relatives and friends. The systematic negative appearance of this variable infers that in comparison to self-finance being member of ruling political party decreases the odds of borrowing from relatives and friends by 62.5 percent. This means that the preferences to borrow falls by 62.5 percent as farmer increases his political commitment. This is unexpected from the study's prediction, but the result shows that political party members are intermediate links between government and its sympathizers making them to become source of finance for their political alliance. Though they stand for a better chance to be granted loan, indeed they are less likely to demand it, which may probably lead to more supply. However, this finding contradicts that of [42] and [40].

However, the finding that political connections is a criterion for credit access has adverse consequences on the credit repayment, due to the notion that this type of household may likely regard credit as political gifts from the political mentors.

The positive significant coefficient of *PRF* at one percent with respect to borrowing from the informal and formal lenders validates the importance of profit in farming business with the greatest impact being found for banks' borrowing. In comparison to non-profit farming, a one percent increase in farming profit increases the odds of borrowing from relatives and commercial banks by 59.5 and 62.4 percent, respectively, compared to self-finance. In this case, borrowing preference for the household is little higher for the bank's loan due to the low interest rate charge by the formal lenders than to invites friends and relatives to invest in the business, where they may likely demand substantial amount in the profit-sharing formula. It may also be explained by the fact that either with usury or otherwise, loans from relatives and friends are usually small, whereas bank's loan may be substantial enough to finance big project which promised more returns. Besides, this finding is consistent with some previous empirical studies in different economic sectors ([43]; [40]). Moreover, the finding implies that a household who make profit from farming activities seems to wisely solve his financial obstacles by combining both informal and formal loans. Due to the bottleneck of formal credit and the borrowing limit of informal source, farmers are unlikely to satisfy their financial need through solely prone to commercial banks' loan, informal loan or owner's capital.

More interestingly, farmers' location infers another story with respect to choice of credit market. *RE2* dummy is found to be significant with respect to all different alternatives of agricultural finance except borrowing from relatives and friends at conventional level with the strongest impact being found for bank's borrowings. The positive statistical evidence of this variable implies that urban farmers had a greater opportunity to borrow from microfinance banks, commercial banks and government as well, compared to farmers living elsewhere. Indeed, farmers living in urban province (Dambatta Zone) are closer to microfinance banks and other formal financial lenders which may facilitate loan applications quickly. Whereas, farmers living far away from the city are unlikely to have greater access to variety of formal lenders. That is why the odds of borrowing preferences from microfinance banks, commercial banks and government for households living in urban areas (DambattaZone) increases by 326 percent, 862.3 percent and 521.6 percent as well, than farmers elsewhere. Besides, due to the long queue associate with commercial banks' loan and high level protocol related to governments' loans, this type of farmers seem to supplement their extra credit demand with microfinance borrowings.

Notably, this result tallies to the findings of other previous studies ([35]; [40]). This finding implies that informal sources are very important source of finance for the rural households where interpersonal relationship plays a major role in deciding who to get loan. While, urban residence relies more on formal and subsidized-government loans.

5. Policy Recommendations

From the policy implication assessment with respect to subsistence farming and tenureship, pro-poor credit policies are required for the establishment of new agencies and financial institutions devoted to agricultural sector. Similarly, an integrated system of forward-looking policies based on tax and subsidy-regimes to augment desired incentives for private financial sector and NGOs to lend money to the farmers are needed. These may not only raise the productive capacity of the rural households through better and efficient utilisation of farm resource, but will also discourage labor-mobility, hence an increase in rural productivity that may lead to rural welfare. Noting that, even in the laissez-fair financial settings, the idea of getting the right institutions is required as a compliment that could address the microeconomic intricacies facing small and poor farmers in the rural areas. Besides, some subsidized formal credit agencies should be implemented and devoted to these types of farmers so that it will cushion the inequality and financial gaps.

However, since ownership of asset plays an important role in the credit market, improving property protection rights and strengthening the enforcement laws would bestow and restore trusts and confidence among economic agents, hence better access to credit in large quantity. Similarly, the establishment of registry for fixed and non-fixed assets is something worth noting. These policies would be complemented by relaxing the obstacles associated with long queue and tedious bureaucratic bottleneck in the property titles formalisation. But the process of registration should be decentralised to registries at the local government levels at relative affordable cost.

Moreover, the significance of off-farm commitment is clear. As a result, uplifting and investing in human capital in Nigeria may produce some benefits in the financial arena. Specifically, polices should focus on rural development through the activities that could generate off-seasonal employment. Similarly, the provision of rural infrastructure and local markets would be useful in pro-famers transformation process in the financial reform.

Lastly, with the increasing influence of neighborhood participation and traditional title highpoint some imperfections in the working of credit market in Nigeria. While in the presence of well-functioning credit market, social network may not properly work. Therefore, government policies should be targeted towards reducing the effects of social relations and be forward-looking to more well-functioning credit market. This can be achieved through measures that can quickly spread information on the credit availability, application procedure and the source of that particular credit. Apart from increasing credit information through electronics and non-electronics medium, incorporating local heads through community re-orientation programs will be worth noting.

6. Limitations

Similar to most of preceding researches, this study has acknowledged the existence of some constraints. Even though the scope of the present study is limited to only Kano State, Nigeria, but one of the major limitations of this study is concentration of the study within the vicinity of Kano State. Field studies with a larger number of respondents across Nigeria are needed to address issues such as modeling dynamic productivity and investment in relation to credit source and participation. Secondly, this study failed to account the influence of time dimension over credit source. Thus, future researches should employ longitudinal data or time-series data covering several years to confirm the findings of this study. This might allow for comparison and could pave way for the inclusion of more variables in the analysis such as: households risk attitudes; household resettlement (migration); experience in credit use and the effect on time variation in the analysis.

REFERENCES

[1]Danlami, A.H., Islam, R., Applanaidu, S.D., &Tsauni A.M. (2016). An empirical analysis of fertiliser use intensity in rural Sub-saharan Africa: evidence from Tofa local government area Kano state, Nigeria. *International Journal of Social Economics, 43*(12), 1400 – 1419.

[2]Kofarmata, Y. I. & Danlami, A.H. (2019). Determinants of credit rationing among rural farmers in developing areas: empirical evidence based on micro level data. *Agricultural Finance Review, 79*(2), 158 – 173.

[3]Barry, P., & Robison, L. J. (2001). Agricultural finance: Credit, credit constraints and Consequences. In Gardner, B. & Rausser, G. (Eds.), *Hand Book of Agricultural Economics, 1A*, (pp. 513–571).

[4]Danlami, A.H.(2014a). Determinants of demand for fertilizer: A conceptual review. *Journal of Economics and Finance, 4*(4) 45-48.

[5]Nuryartono, N., Zeller, M., & Schwarze, S. (2005). Credit rationing of farm households and agricultural production: Empirical evidence in the rural areas of central Sulawesi, Indonesia. In *International Agricultural Research for Development. Stuttgart-Hohenheim*, (11-13), 1–8

[6]Kofarmata, Y. I. & Danlami, A.H. (2021). A micro level analysis of the intensity of agricultural finance supply in Nigeria: empirical evidence. *SN Business & Economics, 1*(12), 1 – 17

[7]Danlami, A.H., Applanaidu, S.D., & Islam, R.(2019). A micro level analysis of the adoption and efficiency of modern farm input use in rural areas of Kano State, Nigeria. Journal of *Agricultural Research, 8*(3), 392 – 402.

[8]CBN. (2005). Microfinance policy, regulatory and supervisory framework for Nigeria. *Publications of Central Bank of Nigeria*, 1–27.

[9]World Bank. (2015a). Financial inclusion in Nigeria: World bank. *http://datatopics.worldbank.org*

[10] Omonona, B., Lawal, J., & Oyinlana, A. (2010). Determinants of credit constraint conditions and production efficiency among farming households in Southwestern Nigeria. *The Social Sciences*, *5*(4), 326–331.

[11]Chisasa, J., & Makina, D. (2013). Bank credit and agricultural output in South Africa: *International Business and Economics Research Journal*, *12*(4), 387–399.

[12]Foltz, J. D. (2004). Credit market access and profitability in Tunisian agriculture. *Agricultural Economics*, *30*, 229–40.

[13]Oyedele, G. A., Akintola, J. O., Rahji, Y. M. A., & Omonona, T. B. (2009). Credit constrained condition of farm households and profitability of agricultural production in Nigerian agriculture. *Agricultural Journal, 4(*4), 192–201.

[14]Teppa, F., Ziegelmeier, M., Blanc, J. Le, & Zhu, J. (2013). Household saving behaviour and credit constraints in the Euro area. *Decument De Travail*, 1–62.

[15]Petrick, M. (2002). Credit Rationing in the Polish Farm Sector: A Microeconometric Analysis Based on Survey Data. *Zaragoza (Spain)*, *28*, 31.

[16]Diagne, A., & Zeller, M. (2001). Access to credit and its impact on welfare in Malawi. *International Food Policy Research Institute Washington, D.C*, *116*, 1–168.

[17]]Omonona, B., Jimoh, A., & Awoyinka, Y. (2008). Credit constraints condition and welfare among farmers in Egbeda Local Government Area of Oyo State, Nigeria Egbeda Local Government Area of Oyo State, Nigeria. *European Journal of Social Sciences*, *6*(3), 422–432

[18]Turvey, C. G., He, G., Ma, J., Kong, R., & Meagher, P. (2012). Farm credit and credit demand elasticities in Shaanxi and Gansu. *China Economic Review*, *23*(4), 1020–1035.

[19]Nwosu, F., Okorji, E. C., Nweze, N. J., Orebiyi, J. S., Nwachukwu, M. O., & Ibekwe, U. C. (2014). Loan accessibility and repayment performance of livestock farmers under the agricultural credit guarantee scheme fund in Southeast, Nigeria. *Developing Country Studies*, *4*(6), 63–69.

[20]Papias, M. M., & Ganesan, P. (2010). Financial services consumption constraints: Empirical evidence from Rwandan rural households. *Journal of Financial Services Marketing*, *15*(2), 136–159.

[21]Winter-Nelson, A., & Temu, A. A. (2005). Liquidity constraints, access to credit and pro-poor growth in rural Tanzania. *Journal of International Development*, *17*(7), 867–882.

[22]Shoji, M., Aoyagi, K., Kasahara, R., Sawada, Y., & Ueyama, M. (2012). Social capital formation and credit access: Evidence from Sri Lanka. *World Development*, *40*(12), 2522–2536.

[23]Fletschner, D. (2009). Rural women's access to credit: market imperfections and intrahousehold dynamics. *World Development*, *37*(3), 618-631.

[24] Khantachavana, S. V., Chiu, L. J., Turvey, C. G., & Kong, R. (2012). Risk rationing and the demand for agricultural credit. *Available at SSRN 2191297.*, 1–51.

[25]Akram, W., Hussain, Z., Sial, M., & Hussain, I. (2008). Agricultural credit constraints and borrowing behavior of farmers in rural Punjab. *European Journal of Scientific Research*, *23*(2), 294–304.

[26]Fatima, A. (2009). Socio-economic constraints to demand for borrowing among rural females of Pakistan. *International Journal of Social Economics*, *36*(11), 1050–1070.

[27]Bashir, R., & Danlami, A.H. (2022). Gender and loan accessibility among entrepreneurs: empirical evidence from women entrepreneurs in Kano Metropolis. *European Journal of Government and Economics, 11*(1), 97 - 112

[28]Tsauni, A.M., & Danlami, A.H. (2016). Social capital formation and implication for the achievement of Fadama III project development in Kano State, Nigeria. *Hyperion Economic Journal* 1(4), 37 – 48.

[29] Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley and sons.

[30]Danlami, A. H., & Islam, R. (2020). Explorative analysis of household energy consumption in Bauchi State, Nigeria. In Manuel, J., & Alfonso, G. (Eds.), Energy efficiency and sustainable lighting –A bet for the future. London: IntechOpen

[31]Danlami, A. H. (2017). An intensity of household kerosene use in Bauchi State, Nigeria: a Tobit analysis. *Nigerian Journal of Management Technology and Development, 8*(2), 1 – 13.

[32]Danlami, A.H.(2014b). Examination of the determinants of demand for fertiliser in rural areas: a case study of Tofa local government area, Kano state. *Nigerian Journal of Management Technology and Development, 5*(2), 1 – 14.

[33] Salkind, N. J. (1997). *Exploring Research* (3rd ed.). Upper Saddle River, NJ: Prentice Hall

[34]Greene, W. (2012). *Econometric Analysis* (3rd ed.). Macmillan, New York.

[35]Mpuga, P. (2010). Constraints in access to and demand for rural credit: Evidence from Uganda. *African Development Review*, *22*(1), 115–148.

[36]Pampel, F. C. (2000). *Logistic regression: A primer* (Vol. 132). Sage.

[37]Kiplimo, J. C. (2015). Determinants of access to credit by smallholder farmers in eastern and western Kenya. *Journal of Development and Agricultural Economics*, *7*(9), 303–313.

[38]Awunyo-Vitor, D., & Abankwah, V. (2012). Substitutes or complements?: Formal and informal credit demand by maize farmers in Ashanti and Brong Ahafo regions of Ghana. *International Journal of Agriculture and Forestry*, *2*(3), 105–112.

[39]Nagarajan, G., Meyer, R. L., & Hushak, L. J. (1998). Demand for agricultural loans: A theoretical and econometric analysis of the Philippine credit market. *Savings and Development*, *22*(3), 349–363.

[40]Nguyen, N., & Luu, N. T. H. (2013). Determinants of financing pattern and access to formal-informal credit: The case of small and medium sized enterprises in Vietnam. *Journal of Management Research*, *5*(2), 240–259. .

[41]Petrick, M., & Latruffe, L. (2006). Contractual relations in agricultural credit markets: A hedonic pricing approach with application to Poland. *Journal of Agricultural Economics*, *57*(1), 49–63.

. [42] Akudugu, M. (2012). Estimation of the determinants of credit demand by farmers and supply by rural banks in Ghana's Upper East Region. *Asian Economic and Social Society*, *2*(2), 189–200.

[43]Fhima, F., & Bouabidi, M. (2011). Credit rationing in the bank credit market: The case of Tunisian SMEs. *Journal of Small Business and Entrepreneurship*, *24*(4), 583–602.