

# DETERMINANTS OF DEMAND AND SUPPLY OF MICROCREDIT AMONG FISH FARMERS IN OSUN STATE

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**Abstract.** With the help of microcredit, a farmer's way of life could be transformed from one of utter destitution to one of greater dignity. For the poor and disadvantaged, especially rural farmers, it unlocks potential and increases productivity and well-being. This study investigated the determinants of demand and supply of microcredit among fish farmers in Osun State. A multi-stage sampling procedure was used to select 150 fish farmers and 50 microcredit providers for the study. Data were analyzed using descriptive statistics and a simultaneous equation model. The result revealed that many fish farmers are males (86.5%), married (77%), and educated (95%). Simultaneous equation estimates revealed that farmers' income, age, interest rate, and educational level determine microcredit demand among fish farmers whereas liquidity, experience in lending, and interest rate determine the microcredit supply in the study area. The findings of the study revealed that microcredit suppliers consider several factors before supplying credit to fish farmers.

**Keywords:** economic principles, loan, Nigeria, pisciculture, simultaneous equation

## INTRODUCTION

Millions of people worldwide rely on the fishing sector for their means of subsistence. Nigerians' well-being is also significantly impacted by fish farming. When compared to other sources like beef, mutton, and chicken in

Nigeria, fish is a less expensive form of animal protein (Omowa, 2016; Sogbesan and Kwaji, 2018; Olaleye et al., 2019). It is a significant food source that is priceless for the protein it offers and the industrial items it generates. As a component of the global diet that contributes to sustained food security, fish has economic, social, and cultural significance.

Compared to beef, chicken, mutton, and turkey, it is generally less expensive (Omoare et al., 2013; Kehinde, 2022). Fish is the cheapest source of animal protein, making up around 40% of a typical Nigerian's daily intake (FDF, 2007; 2010). According to studies, consuming fish can help prevent the spread of malnutrition-related illnesses like anemia and kwashiorkor as well as other illnesses (Olagunju et al., 2007; Oke and Kehinde, 2019). It is impossible to overstate Nigeria's economic dependence on fish farming. About one-third of Nigeria's GDP comes from the fish farming industry (Olaoye et al., 2013; Baruwa and Omodara, 2019). The industry makes up around 373 billion naira of Nigeria's GDP (CBN, 2012; Omodara et al., 2021). Fish farming provides job and wealth-creation chances to many people who make their livings from fisheries-related activities, helping to improve the socioeconomic standing of the populace (Olagunju et al., 2007; Kehinde, 2022). Given the widespread adoption of fish farming in Osun State, there is potential for job development, youth empowerment, and poverty alleviation in the Nigerian fish farming

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industry (Oyedele and Akinola, 2012). Fish could provide raw materials for the agro-industry, particularly feed mills (Esu et al., 2009; Oke and Kehinde, 2019).

Despite the fact that fish has health, economic, and consumer benefits, there is a significant supply and demand imbalance (Baruwa and Omodara, 2019; Omodara et al., 2021). Nigeria's ever-increasing demand for fish, which is now satisfied by importation, calls for a supply of 2.04 million metric tons (Kudi et al., 2008; Fisheries in Nigeria, 2013; Omowa, 2016; Baruwa and Omodara, 2019). To make up the difference, Nigeria imports fish worth \$500 million annually, or around 0.7 million metric tonnes (Baruwa and Omodara, 2019). Nigeria imports fish on a yearly basis for a cost of over 288 billion naira (CBN, 2017; Omodara et al., 2022). The enormous disparity between Nigeria's demand and supply for fish is caused by a number of factors. These problems, among others, include the difficulty in obtaining financing and the absence of credit availability for fish farmers. Due to a variety of constraints, many fish farmers do not have sufficient access to official sources of funding (Oke and Kehinde, 2019; Kehinde, 2022). These restrictions include high-interest rates, bureaucratic roadblocks, delayed approval, collateral requirements, guarantors, lack of nearby banks, payment defaults, lack of information, attitudes, and insufficient credit (Nwaru et al., 2011; Oke et al., 2019; Omodara et al., 2021). According to Olanunmi (2012) and Kehinde and Ogundeji (2022), an insignificant number of farmers had access to bank loans. Alternatively, attention has shifted to microcredit (Kolapo et al., 2021). According to Frank et al. (2013), microcredit is a small loan given to smallholders, particularly those in the agriculture sector. The loans are often unsecured and awarded based on the applicant's moral character and the business's cash flow (CBN, 2012). The basis for the demand for credit in Nigerian agriculture is the reality that agricultural investment expenditures exceed anticipated returns (Kehinde, 2020).

Microcredit is the provision of extremely tiny loans that are not bankable to unemployed people, underprivileged business owners, and other people in poverty (Orimogunje et al., 2020; Kolapo et al., 2021). These people do not meet even the minimal requirements for formal credit since they lack collateral, stable employment, and verifiable credit histories (Tata and Prasad, 2005).

Microcredit services have historically been offered in Nigeria, mostly to low-income rural and urban people. Low-wage workers organize themselves into

self-help clubs, where members trade funds and credit cards. Other unofficial sources of microfinance include cooperative societies and money collectors known as "Baba Alajo" (Kolapo et al., 2022). The goal of microcredit institutions is to aid those who are unable to obtain credit in overcoming poverty and funding self-employment activities. It is underlined that offering microcredit to small and medium-sized businesses has been a key tool in promoting the growth of industrialization, enhancing the effectiveness of the business, and increasing their production. For a business to expand, microcredit is necessary. Investment and the increase of merchants' revenue are hampered by loan availability. Because of the perceived risky nature of small firms and the lack of government guarantee programs to cover the loan, commercial banks are hesitant to provide loans to the private sector, especially SMEs. One cannot overstate how crucial microcredit is to fish farmers, especially those who are less privileged (Nosiru, 2010; Oke and Kehinde, 2019). Microcredit enables fish farmers to buy the inputs required for production and increases the value of fish (Nosiru, 2010). As a result, successive Nigerian governments have introduced a variety of microcredit sources, including the Bank of Agriculture (BOA), Bank of Industry (BOI), commercial banks, microfinance or community banks, and cooperative organizations in an effort to spread the use of microfinance in Nigeria (Kolapo et al., 2022). The new policies also promote borrowing from family, friends, and private lenders. Any of these local providers of microcredit could offer loans to fish producers. The mechanism used by the majority of microfinance institutions to distribute credit to farmers is a group approach (Kehinde et al., 2021). This is explained by the fact that they give loans to farmers using social collateral instead of conventional, physical, or financial collateral, i.e., the borrowers' reputation (Kehinde et al., 2021). Following this, BOA and/or BOI urge fish producers to form fish cooperatives so they can apply for microcredit.

Although microcredit is of great importance to the sustenance of fish farming, many fish farmers find it extremely difficult to access the credit (Oladele, 2006; Omodara et al., 2021). This implies the existence of a gap between the demand and supply of microcredit among fish farmers (Adebayo and Adeola, 2008; Olanunmi, 2012). This was often ascribed to the fact that only crop producers were able to secure loans from the microcredit scheme among other reasons (Olaoye et al.,

2011; Olasunkanmi, 2012). Furthermore, the demand and supply of microcredit are influenced by several factors such as personal attributes of the individual, area-specific attributes, and credit source attributes (Udoh, 2005; Olasunkanmi, 2012; Sarma and Borbora, 2015; Samphantharak and Townsend, 2018; Aligbe et al., 2018). These attributes influence individuals differently irrespective of their gender such that what might determine the demand for credit by a particular female farmer might be different from what determines credit demand by another farmer. For instance, Aligbe et al. (2018) indicated that age, educational level, household size, annual income, farming experience, and farm size are determinants of demand for credit while the household size of farmers, annual income of farmers, gender, and farm size have a significant influence on credit supplied to the farmers. In line with this, Nwaru et al. (2011) revealed that farm income, profit, education, and interest amount determined demand whereas liquidity, experience in lending, and interest amount determined the supply of microcredit. Several other studies also show contradictory results with either negative, insignificant, or positive effects of the determinants. The literature on the determinants of credit demand and constraints is varied. Some studies focus on the demand for credit generally among households, irrespective of the purpose of the credit (Akpanjar et al., 2013). Other studies focus on the determinants of demand for credit among smallholder farmers in rural areas (Ssonko and Nakayaga, 2014; Tura et al., 2016; Umanath et al., 2018). Some studies focus solely on the determinants of credit constraints (Ali et al., 2014; Chandio and Jiang, 2018).

However, accessing microcredit is pertinent to transforming the well-being of fish farmers (Norton et al., 2010; Tijani, 2011). But the amount accessed for fish production is one of the major factors critical to lifting small-scale farmers above the subsistence level and enabling cushioning of the fish business against risks (Weber and Musshoff, 2012). Despite this, studies (Tijani, 2011; Nwaru et al., 2011; Oyedele and Akintola, 2012; Frank et al., 2013) have concentrated on the determinants of credit demand and supply among crop farmers. Not many studies have been carried out regard to fish farmers (Olaoye et al., 2017). To the best of our knowledge, no research has been carried out to investigate determinants of credit demand and supply among fish farmers, especially in the southwestern region of Nigeria. In addition, the few available studies on

microcredit (Ajani and Tijani, 2009; Balogun and Yusuf, 2011; Olaoye et al., 2017) focused on the demand side of microcredit, neglecting the supply side. Other studies such as Mohamed (2003), Guiso et al. (2004), Okurut (2006), and Mpuga (2008) addressed the issue of access to micro-credit without referring to effective size. Whereas access to microcredit and the amount accessed is more of a supply-side issue related to the potential lender's choice of the maximum credit limit (Nwaru et al., 2008; Aligbe et al., 2018). Therefore, the need for urgent attention to reviving fish enterprises necessitates researching the supply of credit among fish farmers. This fact initiated the need for this research. This paper focuses on the factors affecting the demand and supply of microcredit among fish farmers in Osun State. Specifically, it describes the socio-economic characteristics of fish farmers; it analyses factors affecting microcredit supply and demand among fish farmers. Analyzing the factors influencing the demand and supply of credit would have significant policy implications which would be helpful in redressing the relative decline from low patronage of credit facilities. The paper is structured as follows: section two contains the literature review, and section three introduces the empirical models and provides a brief description of our estimation procedure of the simultaneous equation model. Section four presents the results and discussion. The conclusion and policy implication of the study is provided in section five.

## LITERATURE REVIEW

Nigeria has inland water surface areas of about 14 million hectares, of which 1.75 million are available and suitable for aquaculture (Olaoye et al., 2013). Aquaculture is primarily a vast land-based industry in Nigeria, where it is carried out in freshwater at subsistence levels (Olaoye et al., 2013). Commercial farming is still not very common (Fagbenro, 2005). Currently, the majority of fish farmers run small-scale operations with ponds that range from 25 to 40 meters in length to small clay ponds (0.02–0.2 hectares). More than 85,000 tons of fish were produced by the sector (FDF, 2008; Olaoye et al., 2013). Despite Nigeria's rich fishery resources and relatively high fish consumption (FDF, 2005; 2008), the country's 0.62 million metric tons of fish supply is insufficient to meet the 2.66 million metric tons of demand (FDF, 2008). To increase the amount of fish farming production now being done in Nigeria, new fish farms

must be built. Despite the interest that the government and the commercial sector have so far shown in fish production in general, fish farming currently has a relatively low growth rate. This may be caused by a lack of access to microcredit among other things. For fish firms to become more commercialized and intensive, credit is a crucial tool. However, the expansion of fish farms has been hampered by insufficient financing access. Both Hanson and Menezes (1971) and Orimogunje et al. (2020) pointed out that people only borrow money because it offers them control over products and services rather than because they want it for their own sake. As a result, smallholders' access to loans could boost family income and assist the impoverished in building up their savings to engage in job-generating ventures (Germidis et al., 1991; Oke et al., 2019).

Rural farmers in Nigeria can obtain finance from formal and informal sources, respectively (Badiru, 2010). Commercial banks like the Nigerian Agricultural Bank (NAB) and Micro Finance Institutions are two formal credit providers. NGOs, cooperative societies, support groups, farmers' associations, rotating savings and credit associations (ROSCAs), businesses, traders, loan sharks, rural shopkeepers, clubs, and saving societies like "Esusu" and "Ajo", as well as friends, family, and spouses are among the informal sources of credit (Badiru, 2010; Okojie et al., 2010). The informal credit sources provide loans to farmers in exchange for agricultural produce, generally in exchange for repayment in cash or kind. Most of the time, these sources don't demand a deposit relationship and there's no need for collateral (Badiru, 2010). Due to this, informal sector financing continues to be Nigeria's principal source of credit for the rural economy, making credit facilities more accessible to small rural holders. Both the supply and demand of credit are greatly influenced by numerous factors. Individual characteristics of the person, regional characteristics, and credit source characteristics could be split into variables (Udoh, 2005). These characteristics have distinct effects on people regardless of their gender, therefore what influences one farmer's demand for credit may not necessarily influence another farmer's demand for credit.

Several scholars have made an effort to explain the variables influencing farmers' access to finance (Izeakor and Alufohai, 2010; Alufohai, 2006; Alufohai and Ahmadu, 2005). According to Asekome and Ogbechie (2011), financing is difficult to obtain and, when it is obtained, moneylenders charge rates that are too high

for micro-enterprises to afford. The high rates increase the cost of capital and have a detrimental influence on the farm enterprise's yearly turnover. According to Asekome and Ogbechie (2011), farmers purchase inputs at inflated prices since they are unable to do so in wholesale marketplaces, which lowers their profit margins. The aforementioned highlights the necessity of making sufficient loanable funds accessible to farmers on time, at low-interest rates, and to the amount necessary to make returns on investment more alluring, according to Ikhelowa (2011). However, it's unclear how much financing farmers actually received in comparison to how much they requested. In addition to the borrower's age, farm size, educational background, distance to technical services (in kilometers), household size, socioeconomic associations like age grade, co-operative societies, farmer and women's associations, the total amount of money a borrower would have requested will also depend on favorable borrowing and investment conditions (Ewuola and Williams, 1995). Considering the rate of interest and profitability as one of the borrowing and investment conditions, a farmer would borrow funds when the expected rate of return from the project is greater than the cost of the borrowed funds.

Government regulatory controls, interest rate ceilings, loan limitations, collateral requirements, expensive administrative and procedural costs, and subsidized discounts further hinder the ability of formal credit institutions to perform their duties (Srinivas, 1993). Due to this reduction in market share, there is a big imbalance between the supply and demand of credit (Hoff and Stiglitz, 1998). The advantages of the unregulated money supply, quick accessibility, cheap liquidity, minimal administrative and procedural expenses, little to no collateral, flexibility in interest rates, and payback schedules are where the unregulated credit markets enter the picture (Srinivas, 1993). Fouillet and Augsburg (2007) looked into the program's many regional reaches and have suggested solutions to India's supply and demand imbalance. They have discovered that one of the key elements influencing the availability of microcredit is the cost of credit. By charging borrowers high-interest rates, Swain (2002) has discovered that the credit markets are characterized by high borrowing costs and high demand for credit. Allathia (2008) asserts that transaction costs, such as those associated with information, supervision, monitoring, and hazards, have an impact on the availability of MFIs. These cost elements cannot simply be



selection of 50 micro-credit agencies from the LGAs using a snowballing technique. Also, in the second stage, 30 fish farmers were randomly selected from LGAs. A total number of 150 fish farmers and 50 microfinance agencies were selected for the study.

### Analytical technique and model

Descriptive statistics and a simultaneous equation model were used to analyze the data collected.

### Simultaneous equation model

Following Nwaru et al. (2011), the study employed two equations in a schematic fashion of simultaneous modeling to determine factors affecting the demand and supply of microcredit. The model contains two equations explaining the variables with interrelationships. The model assumes that demand and supply of credit inter-dependently determine the viability of the fish enterprise and consequently, the welfare of fish farmers. Therefore, the models contain the demand for microcredit equation and the supply of microcredit equation. The model contains 2 equations in 2 endogenous variables that influence each other. The model adopts a two-stage estimation procedure to reduce the incidence of multicollinearity and eliminate the effect of simultaneous equation bias through the reduced form equations.

Employing 2SLS estimation techniques, the equations of the model are therefore specified as follows:

Demand function:

$$Y_1 = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + \mu_1 \dots \quad (1)$$

Supply function:

$$Y_2 = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \mu_2 \dots \quad (2)$$

In the demand equation:

$Y_1$  – amount of microcredit demanded (₦)

The explanatory variables are:  $X_1$  – years of education (years);  $X_2$  – pond size (square meters);  $X_3$  – gender (1 = male; 0 = female);  $X_4$  – farmer’s income (₦);  $X_5$  – interest rate (%);  $X_6$  – household size (number);  $X_7$  – age of farmers (years) and  $\mu_1$  – error terms.

The inclusion of these independent variables in the model was based on a previous expectation of the variable used and a review of the literature. These independent variables are expected to influence the amount of microcredit demanded (Table 1). The farmer requested the whole amount of microcredit, regardless of whether it was granted. The farmer’s total number of years spent in formal education is referred to as years of education. The income that farmers received from farming the prior year is known as farm income. The number of individuals that share the farmer’s home and are subject to his care is referred to as the household size. The entire sum that the farmer paid in interest charges on borrowed funds is known as the interest rate. For male farmers, the gender was specified as one, while for female farmers, it was zero. The total pond area that is being used is the pond size. Age refers to how long the fish farmer has been alive.

In the supply equation:

$Y_2$  – amount of microcredit supplied (₦)

**Table 1.** Description of variables

Variables	Unit	Expected sign	Description
Age	Year	±	Measured in years
Gender	Dummy	±	1 = male, 0 = female
Income	Naira	+	Measured in Naira
Household size	Number of persons	±	Measured in the number of household members
Pond size	Square meter	±	Measured in square meters
Education	Years spent in school	±	Measured in years spent in school
Interest rate	The percentage charged on credit	–	Measured in percentage charged on credit

Source: own elaboration.

**Table 2.** Description of variables

Variables	Unit	Expected sign	Description
Liquidity of the lender	₦	±	Measured in Naira
Business leverage of credit institution	₦	±	Measured in Naira
Experience in leading	Years	±	Measured in years
Interest rate	The percentage charged on credit	±	Measured in percentage charged on credit

Source: own elaboration.

The explanatory variables are:  $X_1$  – liquidity of the lender (₦),  $X_2$  – business leverage of the credit institution (₦),  $X_3$  – experience in lending (years),  $X_4$  – interest rate (%),  $X_5$  – type of credit (0 = credit with no collateral; 1 = credit with minimum savings),  $\mu_2$  – error terms.

The inclusion of these independent variables in the model was based on a previous expectation of the variable used and a review of the literature. These independent variables are expected to influence the amount of microcredit supplied (Table 2). The total amount of money the lender was willing to make available for borrowing is used to calculate credit supply, and the lender’s liquidity is represented by the current asset/current liabilities ratio of his farm business. Current debt and owner equity make up the lender’s business leverage. The length of time a lender has been in the lending business is considered their lending experience. The entire sum that the lender got as interest fees on money lent is the interest rate. The microcredit typology is the kind of credit.  $U_i$  is the error term that is thought to satisfy every requirement of the traditional linear regression model.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics of fish farmers

The socioeconomic characteristics of fish farmers are presented in Table 3. The average age of fish farmers is approximately 42 years. This shows that fish farmers are young and more energetic to carry out rigorous activities involved in fish farming. This is a prolific age range. Additionally, this result shows that very many young individuals work in fish farming, which bodes well for the future of fish production (Olowosegun et al., 2004). This is due to the fact that fish farming demands a lot of responsibility and proper attention. About 86.5% of

fish farmers are male. This indicates that fish farming is dominated by male farmers. The claim made by Brummett et al. (2010) that men predominately participate in fishery activities can be used to support this outcome. Ekong (2003) agreed that marriage is highly regarded in our society. The reports of Fakoya (2000) and Oladoja et al. (2008), which argue that marriage puts some level of responsibility and commitment on those who are married, further supported this conclusion. The majority (77%) of the farmers are married. This shows that the farmers will be committed to the business because of the responsibility of the family. In Nigeria, marriage is sacred and confers some levels of responsibility on the individuals involved (Fakoya, 2000; Ekong, 2003). This finding indicated that responsibility/commitment which is in line with Adeoye et al. (2012) who reported 93.7% of the fish farmers in Ogun State are married. The average household size is 5 persons. This implies that the farmers have family labour that can assist with farming activities. This further implied a moderate household. There is the likelihood that the size of the household may influence the number of hired laborers, thereby

**Table 3.** Socioeconomic characteristics of fish farmers

Variable	Fish farmers
Age (yrs)	41.64 (12.12)
Male (%)	86.5
Married (%)	77
Household size (#)	4.55 (2.23)
Formal education (%)	95.8
Years of farming experience	7.44 (5.14)

Figures in parentheses are standard deviations.  
Source: own calculation.

reducing cost (William et al., 2012; Amachree et al., 2019). The majority (95.8%) of fish farmers have formal education. This shows that literate farmers dominate fish farming in Osun State. This indicates that the educated class, particularly those with a high level of education, dominate fish farming. This is true because fish farming requires extensive technological and scientific expertise to be carried out successfully. The average number of years of farming experience is 7. This suggests that the fish farmers have a substantial amount of experience. The conclusion implies that respondents are not new to the industry and may have acquired abilities to mitigate risk. Experience improves efficiency because, as is often said, “experience is a good teacher”. Respondents with experience greater than 5 years in the fish farming industry will have better skills and business strategies and be better able to predict market conditions that will allow them to sell their products for higher prices (Olaoye et al., 2013). The idea is also in line with the Schumpeterian theory of economic development, which suggested that technical efficiency was influenced by technical knowledge and understanding in addition to other socio-economic environments with which the farmers must take decisions (Amachree et al., 2019).

#### Determinants of microcredit supply among fish farmers

The F-value was significant ( $P = 0.000$ ), suggesting strong explanatory power. This shows that the entire model is of best fit and significant at 1 percent. The determinants of microcredit supply among fish farmers are presented in Table 4. The coefficient of liquidity was positive and significant. This implies that an additional unit increase in the liquidity of the lender increases the supply of credit by ₦0.084. The relationship between the liquidity ratio and money supply is positive, indicating that the liquidity ratio is moving in the same direction as the money supply and higher levels of liquidity ratio are associated with higher levels of the money supply. According to Nwaru et al. (2011), who found that microcredit lenders readily release credit to potential borrowers based on the level of liquidity, this conclusion is consistent with their findings. The liquidity ratio is the percentage of total deposits that must be retained in designated liquid assets in order for the financial institution to be able to service depositors’ cash withdrawal requests and maintain system credibility (Olweny and Chiluwe, 2012). Although it is widely acknowledged that the

**Table 4.** Determinants of microcredit supply among fish farmers

Variable	Coefficient	Z-value	P-value
Constant	-1.635**	-2.26	0.026
Liquidity	0.084**	2.39	0.016
Experience in lending	2.243**	2.19	0.023
Interest rate	1.924**	2.48	0.013
Type of credit	2.983	1.56	0.210
Business leverage	-0.224	-1.10	0.270
R <sup>2</sup>	0.65		
Adjusted R <sup>2</sup>	0.52		
F value	24.98***		

Significance level: \*10%, \*\*5%, \*\*\*1%.

Source: own calculation.

liquidity ratio is used to increase or decrease cash availability, researchers have argued that the primary purpose of the statutory reserve ratio is to allow for the floating of government securities (Otalú, 2014). In other words, informal lenders will adjust their credit supply upward in response to a higher level of liquidity. This result is in line with Tra and Lensink (2004) and Essien (2009) who indicated that informal lenders readily disburse credit to prospective borrowers based on the level of their liquidity. The coefficient of years of experience in lending was positive and significant. This suggests that an additional unit increase in years of experience in lending increases the supply of credit by ₦2.243. This implies that years of experience in lending have a direct relationship with credit supply. This is in line with studies from Essien (2009) and Nwaru et al. (2011), who found that the length of time a lender has been active in lending may help the lender avoid or minimize problems that arise from lending. The length of time a lender has been actively involved in lending may be a sign of the practical experience he has amassed on how to efficiently resolve lending-related issues. Such hands-on experience would enable him to handle loan applicants more effectively, carefully evaluating them for sincerity and sincerity. According to Nwaru et al. (2004; 2011), this would lower the risk associated with his loan portfolio and enhance the amount of credit available. The coefficient of interest rate was positive and significant. This is in line with the *a priori* expectations of the study. This suggests that



an additional unit increase in interest rate increases the supply of credit by ₦1.924. This is consistent with Ug-bomeh et al. (2008)'s report that the amount of credit offered rises with the rate of interest, which is the cost of money given. This conclusion supports the discovery by Nwaru et al. (2011) that the interest rate significantly influences the amount of credit extended.

### The determinants of microcredit demand among fish farmers

The F-value was significant ( $P = 0.000$ ), suggesting strong explanatory power. This shows that the entire model is the best fit and is significant at 1 percent. The determinants of microcredit demand among fish farmers are presented in Table 5. The coefficient of farmers' income is positive and statistically significant. This is in conformity with the findings of Cheng (2010) and Nwaru et al. (2011) who reported a positive and significant relationship between credit demand and farm income. This implies that a unit increase in farmer's income will increase credit demand by ₦2.972. This may be explained by the possibility of reinvesting farm profits in commercial ventures, which raises credit demand. Farmers with high incomes are also more likely to receive credit facilities from lenders since they have a better likelihood of repaying the loan. This result is in

**Table 5.** The determinants of microcredit demand among fish farmers

Variable	Coefficient	Z-value	P-value
Constant	-4.851**	-2.36	0.017
Farmers income	2.972*	1.88	0.059
Age of farmers	0.336**	2.19	0.028
Pond size	6.240***	3.95	0.000
Gender	-4.262	-0.85	0.394
Interest rate	-2.886***	-3.41	0.000
Family size	-1.257	-1.50	0.133
Education	3.002*	1.67	0.094
R <sup>2</sup>	0.61		
Adjusted R <sup>2</sup>	0.43		
F value	15.24***		

Significance level: \*10%, \*\*5%, \*\*\*1%.  
Source: own calculation.

agreement with Nto (2006), Nwaru et al. (2008), and Essien (2009) who reported a positive and significant relationship between credit demand and farm income. The coefficient of the age of farmers was positive and statistically significant. This indicates that a unit increase in the age of the farmer increases credit demand by ₦3.336 (Ajagbe, 2012b). This suggests that as the respondents' ages increase, smallholder farmers are more likely to request agricultural credit, suggesting that older farmers are presumed to have amassed knowledge, experience, and a thorough understanding of lending institutions. As a result, the demand for agricultural credit will rise (Mignouna et al., 2011; Kariyasa and Dewi, 2013). This result is consistent with studies that have looked at similar topics, including Crook (2001), Diagne and Zeller (2001), Akram et al. (2008), Chen and Chivaku (2008), Akudugu et al. (2009), Akudugu (2012), Akpan et al. (2013), Mohammed et al. (2013), Hananu et al. (2015), and Mwonge and Naho (2022), which found that age is a significant factor in determining smallholder farmers' demand for credit. Therefore, the study concludes that age plays a pivotal role in influencing smallholder farmers' decisions for microcredit. The pond size was positive and statistically significant. This could indicate that a unit increase in pond sizes increases demand for credit by ₦6.240. This finding is consistent with the findings of various related studies (Uaiene et al., 2009; Simtowe et al., 2009; Oboh and Ekpebu, 2011; Mignouna et al., 2011; Akudugu, 2012; Abraham, 2014; Hananu et al., 2015; Mwonge and Naho, 2022). This implies that pond size plays a vital role as collateral security for granting credit. It also gives the farmers freedom to consider risk options in adopting new agricultural technologies which demand additional capital which might be obtained through credit. The coefficient of interest rate was negative and significant. This shows that a unit increase in the interest rate reduces credit demand by ₦2.886. The negative effect of interest rate indicates that a credit scheme with a higher interest rate lowers the probability of farmers' demand for microcredit and vice versa. This is in agreement with the finding of Nwaru (2004), Essien (2009) and Nwaru et al. (2011), Ibrahim and Al-iero (2012), Ololade and Olagunju (2013), Assogba et al. (2017), and Mwonge and Naho (2022). Also, from the law of demand, the higher the price of a loan charged (that is, high-interest rate), the lower the credit demand. Therefore, the study concludes that farmers who perceived the interest rate charged by MFIs to be high are

less likely to demand agricultural credit from them. The coefficient of years of education was positive and statistically significant. This shows that a unit increase in years of education increases credit demand by ₦3.002. This is consistent with the findings of Oladeebo and Oladeebo (2008) that highly educated household heads are more likely to have stable incomes and are better able to obtain finance from both formal and informal institutions, making them more prone to take risks than less educated farmers. Additionally, they are more likely to develop relationships with affluent people in their social networks who can provide unsecured loans. This is explained by the fact that people with literacy are able to read and submit better bank applications than people without literacy. In this sense, people with higher levels of education are more receptive to novel ideas and enhanced management techniques. These results are consistent with the findings of Barslund and Tarp (2008), Chen and Chivaku (2008), Ibrahim and Aliero (2012), Akpandjar et al. (2013), Ali et al. (2014), Duniya and Adinah (2015), Tang and Guo (2017), and Chandio et al. (2020). Their studies concluded that the formal schooling years of farmers enable them to cope with the procedure to gain formal credit.

## CONCLUSION AND POLICY IMPLICATIONS

This study investigated the determinants of demand and supply of microcredit among fish farmers in Osun State. Data were analyzed using descriptive statistics and a simultaneous equation model. This study concluded that fish farmers were male, experienced, educated, and at an economically active age. Liquidity, experience in lending, and interest rate are determinants of microcredit supply among fish farmers while determinants of microcredit demand among fish farmers are farm income, age of farmers, pond size, and years of education. In implementing microcredit policy interventions for fish farmers, these significant variables should be taken into consideration. It could be concluded from this study that informal credit suppliers consider several factors before supplying credit to rural farmers. In accordance with the findings of the study, it is advised that measures be developed by the government and other organizations to help farmers overcome their financial hardships in order to lessen the negative effects of high-interest rates on demand for microcredit.

Action should be taken to lower the excessive interest rates that microcredit providers charge.

The financial policy should encourage financial institutions to create solutions that meet the needs of low-income farmers while still being profitable and incorporating low-interest rates into their portfolios. Additionally, suitable educational programs should be developed for fish farmers to improve their capacity to decide on the sum required to carry out a specific project with knowledge. It would be beneficial to create relevant educational programs for farmers, both formally and informally, such as evening classes and adult education initiatives. Finally, it should be highlighted that simply providing credit is insufficient to eradicate poverty and boost income and productivity.

In order to complement microfinance, another intervention needs to be put into place. Therefore, the operators of rural credit markets require suitable educational services, training, and skill development in order to manage productive and efficient businesses, as well as to secure an appropriate operational environment for informal credit operators and marketplaces for their products. The Central Bank of Nigeria (CBN) should provide an appropriate solution to deal with the issue of the inadequate capital base of informal micro-credit institutions.

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