Family Access to Agricultural Credit and Agricultural Creation In Nigeria: A Penchant Score Coordinating Model

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Abstract

Purpose: Agricultural production is low in Nigeria because of low use of homestead inputs encouraged by farmers' powerlessness to spare and contribute. In this manner, credit is required by farmers to upgrade their gainful limit and effectiveness in agriculture. Given the significance of credit to farmers, this study analyzed the nexus between households' entrance to credit and agricultural production in Nigeria.

Design/methodology/approch: The study utilized information from the Living Standard Measurement Study-Integrated Survey on Agriculture (LSMS-ISA) comprising of 4210 households over the 36 states in Nigeria, just as the Federal Capital Territory, Abuja. The study utilizes the affinity score coordinating (PSM) procedure.

Finding/Results: The fundamental outcome from the study proposes that households who approached agricultural credit offices had yields that are threefold those of their partners who didn't profit by such offices. In case of a stun, the farmers who didn't have a wellspring of credit are regularly compelled to receive measures, for example, bringing down utilization and selling resources, which over the long haul intensify their neediness levels.

Originality/value: The study suggests that policymakers should address hidden components that forestall access to credit for agricultural production, which is equipped for raising the profitable limits of farmers.

Keywords: access to credit; agriculture; household; production; propensity score matching.

Introduction

The Nigerian government has perceived the significance of agribusiness in the economy, which has prompted the execution of different agricultural credit approaches to improve the production limit of the segment (Mallum 2016). The major agricultural credit strategies in Nigeria incorporate the Agricultural Credit Guarantee Scheme Fund (ACGSF), the Agricultural Credit Support Scheme (ACSS) and the Commercial Agriculture Credit Scheme. In the credit conspire, the administration holds 60% and the Central Bank of Nigeria (CBN) holds the staying 40% of the offers. The capital base of the plan was expanded to 3 billion naira in March 2001 with the end goal of expanding households' entrance to credit. The ACGSF was reached out to the farmers by banks up to 75% of the sum in default, net any security figured it out. Somewhere in the range of 1978 and 1989, when the legislature specified loaning quantities for banks under the plan, there was a steady increment in the loaning arrangement of banks to horticulture, yet after the deregulation of the monetary framework, business banks in Nigeria neglected to satisfy the understanding by diminishing bank credits to the agricultural division because of the apparent hazard.

The usage of credit strategies in Nigeria is frequently not the significant limitation to credit, rather the disappointment of contributor organizations to guarantee convenient arrangement of credit to farmers. Convenient access and credit accessibility are basic to farmers for gaining the necessary sources of info and apparatus important to do cultivate activities. The serious issue looked by farmers is restricted access to credit offices, which prevents the reception of progressively effective and current innovations in the homestead activity. This absence of assets constrains the potential outcomes of expanded profitability, however it additionally obstructs the limit with respect to smooth utilization (Saqib et al. 2018). Farmers buy the vast majority of their contributions to money or from vendors on a credit-in-kind premise, prompting expanded reliance of homestead households on credit markets. A proficient credit showcase gives farmers the chance to meet utilization necessities and legitimate info use, in this way improving the government assistance of the farmers, little scope agriculturalists, helping them to oversee hazards all the more successfully and improve agricultural production, prompting increasingly supportable occupations and progress out of neediness and craving (Holmes et al. 2011; Matthew et al. 2018; Saqib et al. 2018; Afolayan et al. 2019).

Be that as it may, farmers have been to a great extent dismissed in regards to access to credit offices in most of developing countries, particularly in Nigeria where the accentuation has been set rather upon the power of monetary development, as opposed to the agricultural segment which utilizes over 75% of the complete work power in the nation (United Nations Conference on Trade and Development [UNCTAD] 2016; World Bank 2007). By and large, agricultural credit offices can be as an advance or overdraft, among others, that is made accessible for farmers to help support their gainful limit, which will expand their income. These study depicted the agricultural mediation as giving salary through direct seed and money moves so as to lessen appetite and destitution, yet whether the credit approaches were fruitful or not stays an issue for talk. In any case, on account of Nigeria, there is a deficiency of writing that tends to the issues of access to agricultural credit for the rural rancher, which shapes the inspiration for this examination. The consistency and confirmation of credit instruments help farmers to more readily oversee hazards and take part in progressively beneficial work and agricultural exercises.

Literature and Theoretical background

Credit approaches help households to create salary from cultivating activity that empowers them to deal with the various parts of neediness, business and hardship (not too bad work, training, human services, food security, pay security) and can, subsequently, be a useful asset in handling destitution and disparity (Adjognon et al. 2017; Chandio et al. 2017; Rehman et al. 2017; Matthew et al. 2019). Notwithstanding the above statement, United Nations Development Program (UNDP 2016) set that credit strategies are among the best advancement encounters the world has seen from the 1990s to date. Croppenstedt et al. (2017) inspected the effect of agricultural credit offices on agribusiness and called attention to that proof has indicated that financial development is a significant component of destitution decrease. Be that as it may, in Nigeria and other developing countries with an enormous extent of the workforce occupied with agricultural exercises, development created from farming is a progressively strong component of neediness decrease.

Christiaensen, Demery and Kuhl (2011) affirmed the legitimacy of Croppenstedt et al. (2017) by calling attention to that monetary development may not be comprehensive and neediness decrease following financial development will in general be moderate and doesn't generally profit farmers in rural networks; they infer that development produced from horticulture is more comprehensive than development created from some other division of the economy. Chandio et al. (2017), in their study, analyzed the effect of agricultural credit on production in Pakistan utilizing a cross-sectional irregular testing procedure of 180 rice makers in the Sindh region of Pakistan. The study utilized the most extreme probability gauge and the outcome demonstrated that households' entrance to credit empowers them to build their ranch size that fundamentally impacts on the gainful limit of farmers in the Sindh territory of Pakistan. The investigation reasoned that households' entrance to credit and ranch size are the two primary variables in improving the degree of agricultural production in, just as the specialized proficiency of little scope farmers in Pakistan. To put forth a defense for open financing towards agricultural credit, the legislature is encouraged to utilize agricultural credit to urge the farmers to have the option to increment agricultural yield.

In the light of the previous issues investigated in the writing, it becomes clear that households' entrance to credit will perpetually improve agricultural production, in this manner diminishing the pace of neediness among rural occupants who exclusively take part in horticulture. This study is adding to the group of writing, is in the territory of credit help and agricultural production of farmers in rural networks in Nigeria.

Theoretical framework

A few speculations have developed on the examination of neediness and government intercession as credit offices, however scarcely any hypotheses have been bound to the comprehension of households' entrance to credit and agricultural production; particularly when it has to do with rural farmers. In any case, this examination has analyzed in rundown: the credit channel hypothesis, the old style and the neoclassical perspectives, the Keynesian and Marxian sees, including the social prohibition hypothesis

prompting the vocation portfolio hypothesis proposed by De Neubourg (2009), and the Cobb-Douglas production work.

A progressively extreme measurement was taken by the Marxian financial analysts upholding that monetary development alone may not in any way, shape or form lift poor people, particularly laborer farmers, out of destitution, as a result of class battle in the entrepreneur framework where the components of production are constrained by the rich (Shildrick and Rucell 2015). They would prefer to favor standard financial solidness, which incorporates both monetary and ecological enhancements, in light of the fact that the poor are generally helpless against natural debacles, particularly in cultivating. Also, Sen and Dreze (1989) proposed that more consideration ought to be coordinated to wage and work advertise results in the circulation of financial assets, and political contemplations ought to be directed into an institutional structure for the arrangement of government assistance. Thus, meanings of destitution jumped up from multilateral organizations, for example, the World Bank (2008) – the deficient physical security and absence of political voice – and the United Nation Program (2016): absence of interest in dynamic and in common, social and social life. This expansive idea of destitution exemplifies all the social and monetary components of hardship, for both individual and gathering essentialness.

In any case, the improvement of the social avoidance hypothesis prompts what De Neubourg (2009) alluded to as the business portfolio hypothesis, where foundations – family, markets, interpersonal organizations, part establishments and open specialists – are accepted to be the center main impetus of credit strategy for the household. Under the job portfolio hypothesis, De Neubourg, utilizing the government assistance pentagon, communicated the connection between credit specialists in the assurance of household government assistance, given certain essential suspicions of utility augmentation and pay imperatives, occasioned by utilization dangers. These utilization dangers are moderated by open specialists through government disability benefits and agricultural sponsorships for cultivating networks or people depending on family or public help to make up for a stun.

Research Methodology
Data

This study used cross-sectional data sourced from the LSMS-ISA wave 2 (2012/2013). The LSMA-ISA was conducted by the World Bank in collaboration with the National Bureau of Statistics and applied in Osabohien (2018) and Osabuohien (2014). The dataset from LSMS-ISA covers the 36 states in Nigeria including Abuja the Federal Capital Territory.

The data is classified into three groups: agriculture, households and community for the two periods of the survey (post-planting and post-harvest, Devarajan [2013]). For the purpose of this study, the community-level data is utilised, involving the merging of both the post-planting and post-harvest data, as the variable of interest is either of the periods. The post-planting interview was carried out in August 2012
– October 2012, while the post-harvest data was conducted February 2013 – April 2013. The data for the study was integrated at household level where the information needed is available, which covered 4210 households. Description of the variables engaged is presented in Table 1.

Outcome variable

To determine the outcome variable, households were interviewed about their farm harvest in wave 2 (2012/2013) post-harvest agriculture season in the LSMS-ISA data. Questions regarded the land area of crop harvested, name of crops planted, unit of crops harvested and how many units of crops were sold since the last interview. Households who harvested crops are represented by 1, while households who did not harvest were represented by 0. Reasons for not harvesting were ascertained in the survey; such reasons include: lost crop due to drought, lost crop due to flood, lost crop due to pest, lost crop due to violence, lost crop due to theft, disagreement on land ownership, unable to work due

TABLE 1: Description of variables.

Variable	Description
Outcome variable:	
Agricultural Production	= 1 if household harvested crop in the 12 months preceding the LSMS-ISA post-harvest interview, = 0 otherwise
Control variable/Household characteristics:	
Access to credit	= 1 if a household has access to credit, = 0 otherwise
Education	= 1 if a household is able to read and write, = 0 otherwise
Household head	= 1 if household head is male, = 0 otherwise
Capital	= 1 if household owns farming equipment, = 0 otherwise
Labour	= 1 if household hires labourers, = 0 otherwise
Land	= 1 if household owns land, = 0 otherwise
Health	= 1 if household has consulted health practitioners since the last survey, = 0 otherwise
Information	= 1 if household has access to information, e.g. radio or television, = 0 otherwise

to sickness, no available labour and delayed or deferred harvest. Other control variables were considered as important factors that affect production, including the key variable (access to credit), health, education, labour, capital, land and information, which are presented in the next subsection.

Model specification

This study employs the PSM, which is a non-parametric technique used in the estimation of the effect of a treatment on a group of persons or subjects, in this case agricultural credit given to rural farmers, based on a control group or those who did not receive such agricultural credit. The effect of the treatment on the treated group is matched with the control group and the difference in behaviour or outcome of interest is calculated using a binary logit or probit model. The method of PSM has been applied by Jalan and Ravallion (2003) on the impact of piped-borne water for children's health in rural India. Also, by Osabuohien et al. (2019) on female labour outcomes and large-scale investments in Tanzania, and by Hermann et al. (2018) on the assessment of the impact of household participation in biofuel feedstock production on agricultural input expenditures in order to show that participation in a sugarcane out-grower scheme is associated with a larger amount of land under staple food crops and higher purchase of farm inputs compared to a control group in Malawi.

Computing the change in the outcome of interest mathematically is depicted as $Y_i^{T=1}$ for the outcome of the households who had access to credit and $Y_i^{T=0}$ for the control (households who did not have access to credit). Therefore, the change in the outcome that is attributed to participating in social protection policies is computed as:

$$Y = Y_i^{T=1} - Y_i^{T=0} \qquad \text{[Eqn 1]}$$

The average treatment effect therefore will be:

$$agrout = E\,(\,Y\,|T=1) = E(Y_i^{T=1}|T=1) - E\,(Y_i^{T=0}|T=0) \qquad \text{[Eqn 2]}$$

E is the mean (or the expected value). This equation attempts to capture the outcome of agricultural production of the households or farmers with agricultural credit, compared to what the households would have experienced without agricultural credit (that is, what their production would have been without agricultural credit).

The household characteristics taken into consideration are: age, location, occupation, income, size (number of individuals in the household or family), household head (if the household is led by a male or a female), education, access to credit, health status, number of assets owned by the household, whether the household owns a plot of land, and whether the household cultivates that land. This method was coined by Rosenbaum and Rubin (1983) by proposing the use of PSM as a suitable technique to develop the unequal non-participant data.

The PSM method of analysis is based on the assumptions of conditional independence and common support. The conditional independence assumption assumes that the potential outcomes for households without agricultural credit are independent of their status of being in this category, given a set of observable covariates 'X':

i.e $\gamma^o_i \ p_i | X$ [Eqn 3]

After an adjustment has been made for noticeable variations, it can be inferred that the mean of the outcome variable is the same for households both with and without agricultural credit. This condition helped in matching the households without agricultural credit as a control group when measuring the effect of agricultural credit on household production. Thus, equation (3) above may be depicted as follows:

$([Y^1_i | P= 1, X] = [Y^0_i p= 0, X])$ [Eqn 4]

Another assumption is the similar support condition, which considered the prospect that for each value of 'X', there is a direct chance of each household being with or without agricultural credit. A recent application of this method is by Nkhata, Jumbe and Mwabumba (2014). Various matching algorithms are applicable when using the PSM technique. This study used the kernel matching algorithm (KMA), as it is found to be suitable for this study mainly because it avoids random pruning.

The KMA was found to give a more effectual outcome and is more appropriate for handling large, asymmetrically distributed datasets (Baser 2006). The KMA is designed in a way that each household with agriculture credit with '*i*' is matched with other control observations that have weights that are inversely proportional to the households without. The weight is computed as:

$$W_{ij} = \frac{H \left(Pi - Pj \right) / h}{\sum^n_{j=1} \left(Pi - Pj \right) / h}$$ [Eqn 5]

h represents the bandwidth. Households in the communitywith (and without) agricultural credit are indicated as *i* and *j*.

Figure 1 is a graphical representation of the PSM. The right-hand side is the participant or the treatment side, while the left-hand side is the non-treatment or non-participant side. The participants are the households who benefited from the programmes (social protection policies), while the non-participants are households that did not benefit from social protection policies.

geopolitical zones in Nigeria: the north-central, North-East, North-West, South-East, North-West, South-South and South-West. Each of the six geopolitical zones has six states, excluding Abuja, the Federal Capital Territory, making Nigeria a 37-state nation. In line with the findings of Osabohien et al. (2018), Adjognon et al. (2017), Chandio et al. (2017) and Rehman et al. (2017), farmers' low production can be attributed to inaccessibility of credit facilities.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

Results and discussion

This section of the study presented the result obtained from the analysis. Figure 2 presents the frequency of households' access to credit across zones in Nigeria. There are six
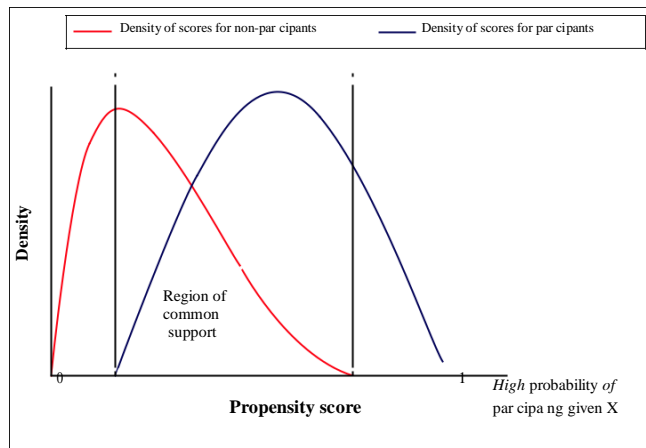
Source: Adapted from CEGA n.d., *Matching methods*, viewed n.d., from cega.berkeley.edu/assets/cega_events/31/Matching_Methods.ppt

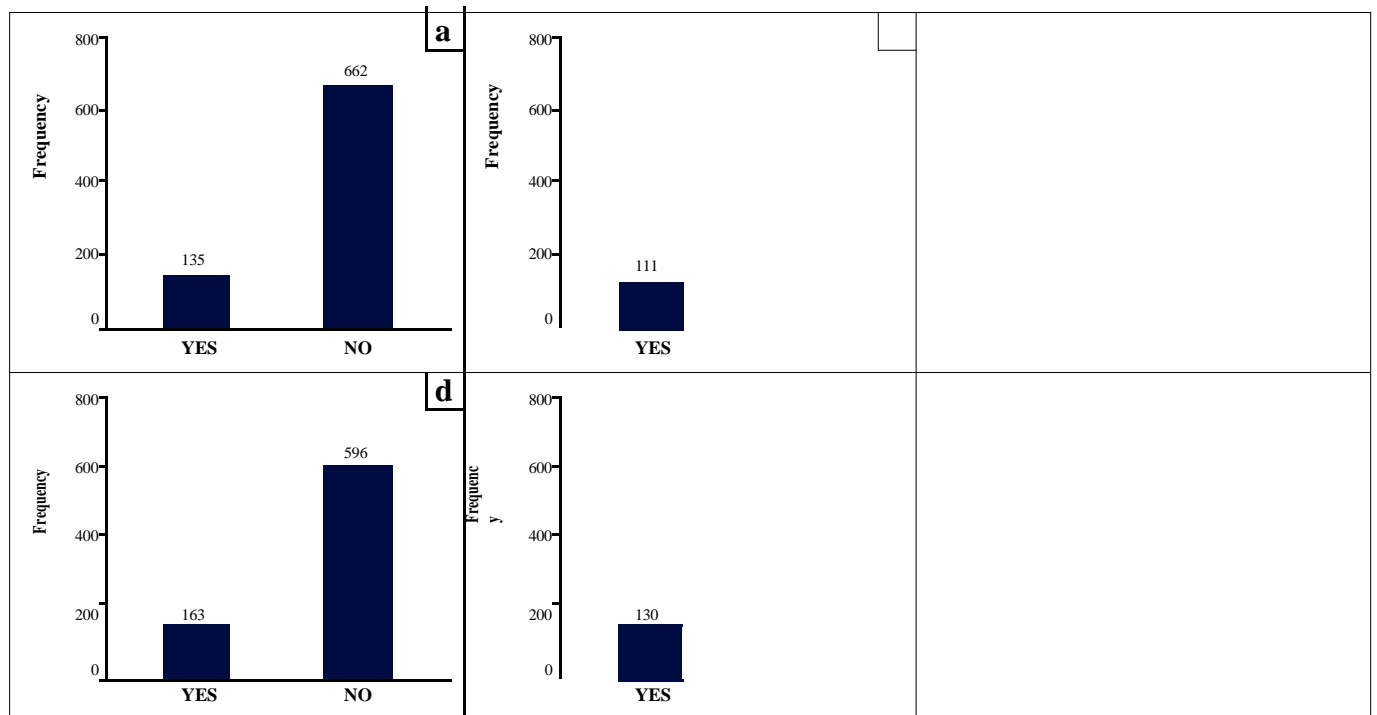**FIGURE 1:** Graphical representation of propensity score matching.

Figure 2 shows that across the six zones in Nigeria, there are far more households who lack access to credit than households who have access to credit. The 'Yes' columns in the figure represent households who have access to credit and 'No' represents those who have no access to credit. In North-Central (Yes = 135, *No* = 662), out of the 979 farming households, 135 households had access to credit (13.79%), while a larger number of households (662, representing 67.62%) had no access to credit, thus affirming the reason behind low yields.

In the north-central, 111 households had access to credit (17.50%), while 523 had no access to credit (82.49%). north-east is not different as 88 (10.10%) households had access to credit, as compared to 783 (89.90%) households who had no access to credit. Similarly, in the south-east geopolitical zone, 163 (27.35%) households had access to credit while 579 (72.65%) lack access to credit. In south-south and south-west, 130 (24.06%) and 187 (23.97%) households

had access to credit while 618(82.62%) and 187 (76.03%) households lack access to credit. This result signals the importance of credit to farming households to enhance production.

Result from kernel density plot

The kernel density plot approximated the density function of the outcome (agricultural production) variable and
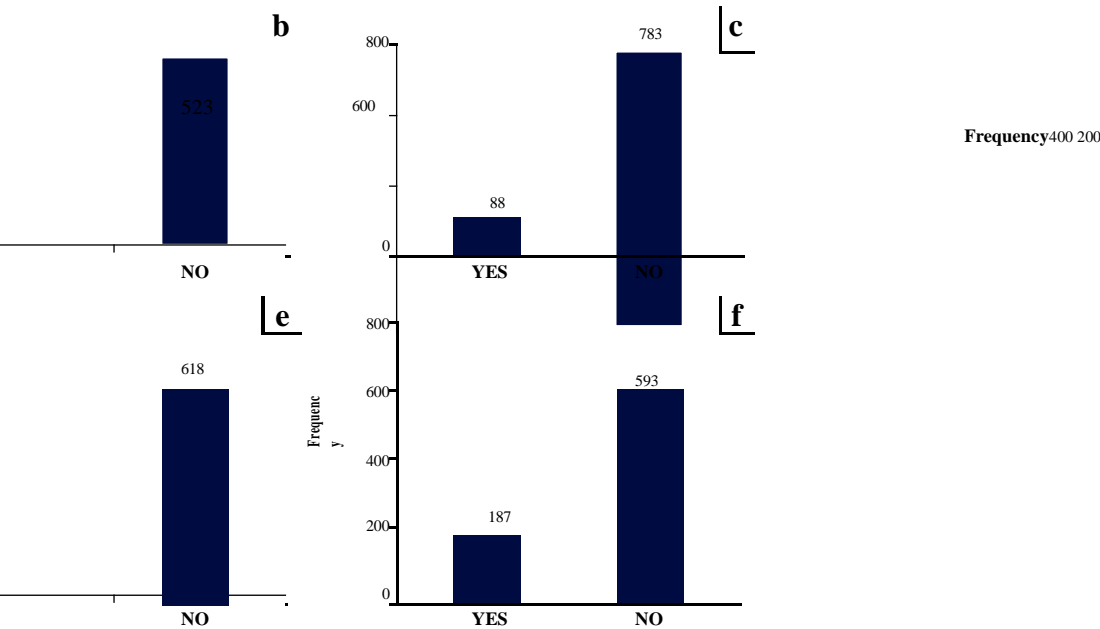

FIGURE 2: Households access to credit by zones in Nigeria: (a) north-central; (b) north-east; (c) north-west; (d) south-east; (e) south-south; (f) south-west.

Household characteristics of propensity score matching

The household characteristics of interest as mentioned above include size, average age, educational attainment, credit access and land ownership. The descriptive statistics are presented in Table 2, which compares the sample characteristics of households with and without agricultural credit. The aforementioned household characteristics are important as they determine how effective households become in terms of productivity.

The probit model for propensity score matching

To design a set of variables that can match household characteristics in communities with and without agricultural credit, the probit regression model was applied. The main goal for estimating the probit regression model is to balance the differences in the observable characteristics that may be occurring between the groups (that is, those households who had access to agricultural credit and those households who had no access to agricultural credit). Table 2 shows the result from the probit model, which was used to derive the propensity matching scores. For all households, information, health status, property and labour, whether or not a household is cultivating land or owns and cultivates farm plots are found to be significantly associated with agricultural credit (Herrmann et al. 2018).
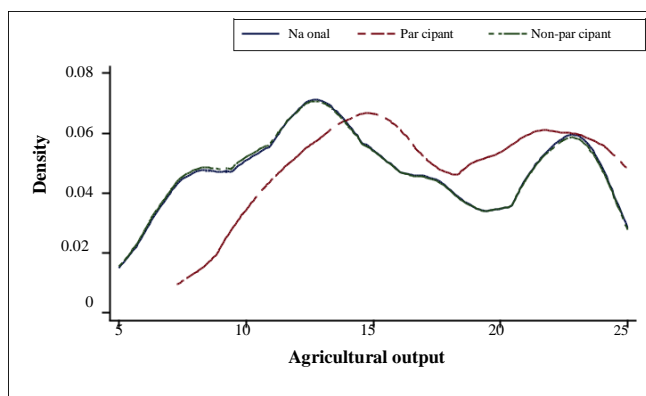

FIGURE 3: Kernel density plot of agricultural credit.

Discussion and implication of findings

The study found that households' access to credit had a positive impact on agricultural production; this indicates that a unit increase in the effectiveness of access to credit facilities will lead to more than a unit increase in agricultural production. Similarly, health status and agricultural production showed a positive relationship that implies that an increase in health status leads to an increase in agricultural production. Labour and agricultural production also showed a positive relationship, which means an increased supply of labour, increased the level of agricultural production. The PSM and the kernel density plot indicated that households who had access to agricultural credit had yields thrice those of their counterparts who did not benefit from such credit. This validated the need for households' effective access to credit in order to increase agricultural production. On the other hand, households who did not benefit from credit facilities are compelled to meet the shortfall in their production and living standard by selling their assets.

From the results in Table 2, we observed that health status, quality of information obtained, availability of land and labour are factors that significantly account for the differences between households with agricultural credit and households without agricultural credit. However, this distinction only drew from the sample characteristics, with less emphasis on
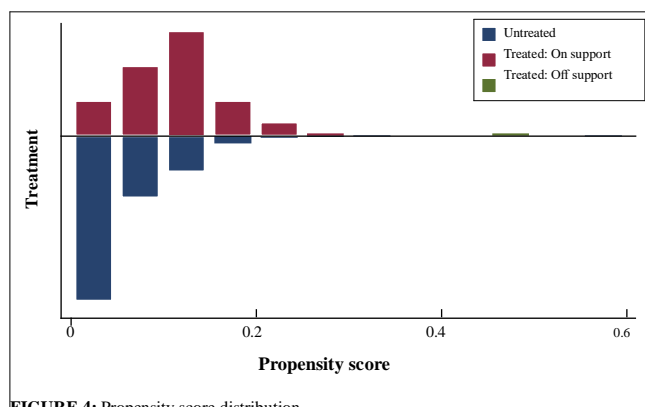

FIGURE 4: Propensity score distribution.

TABLE 2: Comparing household characteristics of propensity score match (Outcome variable: agricultural production).

Agricultural credit	Households with agricultural credit		Households without agricultural credit		*t*-stat
(with = 1, without = 0)	Mean	SD	Mean	SD	
Health status	1.8075	0.6140	1.7892	0.4310	-4.31†
Information	0.5472	0.2944	0.5574	0.2180	4.80†
Capital	1.9872	0.0734	1.9765	0.1221	-0.99
Land	0.0100	0.0672	0.0046	0.0370	-1.82§
Labour	1.8212	2.2317	1.1750	1.9819	-3.62‡

SD, standard deviation.

†, and ‡, § indicate levels of significance at 1%, 5% and 10%, respectively.

the outcome of the experiment. However, the results in Table 3 revealed that information and household labour significantly determined whether the household received any form of agricultural credit or not.

Information asymmetry is an issue of concern, because of the lack of database; information flow is inadequate, so only the privileged in the society would have access to government credit policies. On the other hand, more labour will be put to work if there is a significant incentive for return on labour productivity. In a similar study for Tanzania, Hermann et al. (2018) found that for all households' information, health status, property, labour and whether or not a household owned and cultivated farm plots, are found to be significantly associated with agricultural credit. It is obvious that agricultural credit will improve household health and labour productivity because with extra funds they can purchase better farming tools and good nutrition for an improved standard of living.

The findings of this study are in tandem with the results of Adjognon et al. (2017) on the impact of credit on agricultural production in SSA. The study of Adjognon et al. examined the impact of agricultural input credit on agricultural production in SSA. The study engaged four SSA countries (Mali, Nigeria and Tanzania and Uganda) with 3219 (Mali), 3000 (Nigeria), 3047 (Tanzania) and 2910 (Uganda) farm households using the LSMS-ISA using a two-sample technique. The study found that in Mali 60% of households has access to a fertiliser subsidy, unlike Nigeria where only 5% of the fertiliser used by households was subsidised, thus limiting farm yields. However, findings in this study disagreed with Ewetan et al. (2017) who pointed out that agricultural production is the major driver of economic growth using the co-integration approach to examine the long-run relationship between agricultural production and economic growth in Nigeria. Nevertheless, the non-conformity with Ewetan et al. relates to the relationship between agricultural production, economic growth and development.

In the case of Ewetan et al. (2017), the study was taken at the aggregate level without considering how the production capacity of rural farmers could be enhanced. To this end, the aggregate agricultural production that is a requisite in spurring economic growth and development without the inclusion of farmers in rural communities tends to be increasingly ineffectual. This study also agreed with Osabuohien et al. (2019) on the female-labour outcome and

TABLE 3: Probit model for computing the propensity score.

Household characteristic	Outcome	Probability values
Information	0.0917*	0.046
Household capital	0.74170	0.153
Health status	-0.4005	0.131
Household land	0.6040	0.565
Household labour	0.0446*	0.018
Constant	-2.7876*	0.010
Pseudo $R2$	0.014	-
Pro value	0.002	-
Log Likelihood	-437.1680	-

*, $p < 0.05$.

large-scale agricultural investment in Tanzania, using PSM. The findings revealed that women with investment credit tend to be more productive than women without investment credit. The PSM technique tends to be a more realistic measure of the changes in the behaviour of subjects in a treatment design, where pre-treatment and post-treatment analysis is of the essence.

Conclusion /Direction for future research

This study examined the relationship between households' entrance to agricultural credit and agricultural production in Nigeria with the end goal of giving new bits of knowledge on how the arrangement of agricultural credit can add to expanding agricultural production. The factors incorporate the quantity of yields delivered by

family unit individuals (ranchers in rustic networks in which the study was led) estimated in percentiles as the result variable which catches agricultural production; the significant ward variable is agricultural credit, while other control factors included are agricultural contributions as caught by work and capital. Work gauges the quantity of hours ranchers chip away at their farmlands, while capital estimates the quantity of hours or weeks machines were given something to do on the farmlands. Correspondingly, comparable to health as uncovered by writing, healthy ranchers are no uncertainty more beneficial than ranchers who are health tested. Along these lines, households' entrance to agricultural credit or appropriation improves the profitable limit of ranchers and the individuals who have no entrance to credit facilities depend on the transformation of existing resources for money to improve their job in this manner developing their destitution.

All in all, it is broadly accepted that farming holds the eventual fate of the Nigerian economy since it produces work and salary for country occupants. The agricultural part can't work in disconnection yet will perform all the more effectively when proper credit approaches are outfitted towards enabling the individuals who participate in it. In the light of the abovementioned, the investigation suggested that the agricultural area ought to be made increasingly appealing through the usage and execution of powerful credit strategies that can assist pull with working out from different areas (work poaching), as this will upgrade the beneficial limit of the part.

As uncovered in the examination by PSM, households who profited by agricultural credit had yields threefold those of households who didn't approach credit; this situation calls for government and contributor offices to successfully execute credit arrangements in the agricultural division which will improve the expectations for everyday comforts of ranchers in country networks. Thusly, this investigation has added to information by assessing the effect of households' entrance to credit facilities on agricultural production in Nigeria utilizing PSM, which to the creators' best information has not been examined in the Nigerian setting.

Further studies around there could be directed to learn the exhibition of the agricultural segment as for human capital advancement in light of the fact that as households start to get improved health care facilities and education in new cultivating procedures and appropriations from the administration, there is an inclination for agricultural production to increment. Be that as it may, a disadvantage for the execution of credit strategies in a creating nation like Nigeria is the absence of a sufficient database (distinguishing proof) with the end goal of dispensing of credit motivating forces.

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