

## **SOCIAL PROTECTION POLICIES AND AGRICULTURAL OUTPUT IN NIGERIA: EMPIRICAL INVESTIGATION USING HOUSEHOLD SURVEY DATA**

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### **Abstract**

*Social protection programmes have been recognised and proven to be one of the most effective policies in fighting poverty, hunger and unproductive capacity of rural or poor farmers. Despite the fact that poverty have seen to be declining over the years, the number of people who are still undernourished remains high in Nigeria, and where little effort has been made in improving social interventions. Thus, this study explores the relationship between social protection policies and agricultural output in Nigeria using data from Living Standard Measurement Study-Integrated Survey on Agriculture (LSMS-ISA). The method of analysis engaged is the Propensity Score Matching (PSM). The result from the PSM shows that households who benefit from social protection programmes in form of agricultural credits experienced trice yields more than their counterparts who do not benefit from the programme.*

**Key Words:** *Social Protection, Agriculture, Output, Households, PSM, OLS*

### **INTRODUCTION**

Approximately 1.5 billion people in developing countries live in extreme poverty, about 75 percent of the people live in rural areas of sub-Saharan Africa, where they depend solely on agriculture for survival and agricultural production or output is the main driving force of the rural economy and, in some cases, of the whole economy (Food and Agricultural Organisation- FAO, 2016). For the past two decades, social protection programmes have expanded rapidly in developing countries, reaching out to 2.1 billion people who benefits from the programmes in form of social assistance, social insurance and labour market interventions. Though about 35 percent of the world's population receives some form of social assistance, the majority of households who do not benefit from social protection programmes live in rural areas in Sub-Saharan Africa, especially, Nigeria (FAO, 2016). They are subsistence or peasant farmers who still rely on their own little resources and networks to manage their livelihoods and deal with risks associated with farming (World Bank Report, 2008). Conversely, rural farmers generate limited resources from agricultural output, are frequently insufficient and prone to shocks (such as drought, Pests and diseases outbreak, weather variations, etc). These poor farmers often choose livelihood strategies that forego income to ensure survival (Dercon, 2011).

Social protection and agriculture can be linked in the context of livelihood of rural dwellers, and the rights and privileges of social protection to a certain level will boost productive capacity of farmers (Ehmke, 2016). This is because most rural farmers in Africa depend



**e-Governance Conference**

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predominantly on agriculture as an occupation for their livelihoods (World Bank, 2008). Stronger coherence between agriculture and social protection interventions can help protect the welfare of the poor, small-scale agriculturalists, helping them manage risks more effectively and improve agricultural productivity, leading to a more sustainable livelihoods and find their out of poverty and hunger (Holmes *et al.*, 2011)

Social protection policies generally include programmes or policies that are geared towards reducing socio-economic risks, vulnerability, extreme poverty and deprivation, while smallholder agricultural policies focus on improving productivity in crops, fisheries, forestry and livestock and improving access to markets (World Bank, 2008). Both areas of policy are important in poverty reduction strategies, but little attention has been paid to the interaction between them and how that influences their design and implementation. Social Protections have, however, been largely neglected, or addressed only with inappropriate tools, in the majority of developing countries, especially in Sub-Saharan Africa where emphasis has been placed instead upon the primacy of economic growth (UNCTAD, 2016). Several factors can be seen to explain the increased attention to social protection within development debates in recent years (World Bank, 2007).

Conceptually, there could be a two-way relationship between social protection and agriculture production or output. In one hand, poor rural households that mostly rely on agriculture for their livelihoods are often affected by limited access to resources, low agricultural productivity, poorly functioning markets and repeated exposure to covariate and idiosyncratic risks (Devereux *et al.*, 2008). Social protection can help to alleviate credit, savings and liquidity constraints by providing cash and in-kind support, especially vulnerable farmers. In addition, the regularity and predictability of social protection instruments help farmers to better manage risks and engage in more profitable livelihood and agricultural activities. On the other hand, agricultural policies and programmes can help small-scale farmers manage risk by stimulating farm output, income and overall household welfare (Devereux, 2009).

## **REVIEW OF LITERATURE**

### **The Multiplier Impact induced by Growth in Agricultural Output and social Protection Programmes**

As has been pointed out in this study, agricultural policies and social protection policies are used almost together but, with different meaning. The former can be referred to as policies which are intended to raise production of agricultural sector, while the latter is referred to as welfare incentives (Levy, 2015). In broad economic perception, it can be said to be the different phase of constraints in relation to the production function, and to infer if it means to the variation in productive capacity of labour or variation in technology and the effect of labour income will definitely change. It is therefore necessary to show the distinction existing among those factors which may exert a major impact on the level of income of households from labour (increase in output capacity of labour); comparatively greater effect on capital income (increase in production level of capital); or the same impact on both factors (the adoption of technology). Given for example, financial support can enhance the level of

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technology used by households during farming, while government spending (investment) on irrigation and others will definitely enhance the productive capacity of labour (Aschauer, 2000).

The existing literature which examines how output can be increased through the effective implementation of social protection programmes in the agricultural sector is somewhat slim, specifically when it has to do with rural farmers. Whether private or public expenditure, the degree of influence it exerts on the production function may vary. Anderson *et al* (2006) reviewed the empirical works which aimed to examine the effect government expenditure on agricultural productivity and technical progress. Whether the effect is been looked at the macroeconomic or at the microeconomic level, most of the existing literature assume that government expenditure enhances variations in technology, consequently impart equally all the production features. The extent of the variation differs from one literature or study to the other, with a greater effect on average in the less developed countries.

The aspect of social protection programmes, policies and schemes is highly broad and relates to the welfare of the people, as a weapon to condense vulnerability of farmers to both stress and shocks associated with farming (Duflo, 2000). Therefore, it assumes a great variety of processes, each adjusted to the kind of families they attempt to target, based on the sources of their income (Levy, 2015). For the farmers who are not able to be involved in production exercise, for example, elderly people, those who are deformed, health challenge (ill), widows with children, social protection scheme can take the method of transfers, in kind (like food, clothing, etc.) or in cash. For farmers, it is suggested that set of monetary instruments, such as crop insurance and access to micro-credit, which will avert their vulnerability to risks. These monetary instruments could especially have a substantial impact on investment behaviour at the household level by promoting productive asset accumulation and allowing the farmer to take better advantage of market opportunities even though it implies more risky choices as shown in table 1 below:

UNCTAD (2016), Social protection as a development priority in the post-2015 UN development agenda deduced that 80% of the global agriculturalist (farmers, majorly in Africa), has no access to comprehensive social protection. Social protection programmes tackle multiple dimensions of poverty, employment and deprivation (decent work, education, health care, food security, income security) and can therefore be a powerful tool in the battle against poverty and inequality. Following the study conducted by Osabuohien *et al.*, (2014), examining the Agents and implication of Foreign Land Deals using Uganda as a case study, finds that the availability of land and corruptible officials and leaders at the local levels are some of the factors that attract foreign investors. The presence of land deals can lead to weakening of social amenities like education, road, and health and hence not so beneficial to the locals relative to the communities without the deals. In line with that, social protection on the agricultural sector can ameliorate the issue of land grabbing. Social protection can also play a fundamental role in creating more inclusive and sustainable development pathways. If social protection is not geared toward agriculture, people, especially the most vulnerable farmers, are subjected to increased risks of sinking below the poverty line or remaining



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Table 1: Effect of Agricultural growth and social protection policies

Social protection impact		Schematic characterization of rural Households	Poverty link/ characteristics	Agriculture growth impact
Through demand increase	→	Large-scale farmers	As above, but to minimized degree, moderately vulnerable to shocks and stress	Direct effect on production process: direct effect in supply, costs and factor demand, profits, and investment
Through demand increase	→	Small/medium-scale farmers	The poor as the entrepreneurs, highly vulnerable to stress and shocks	Direct effect on production process: direct effect in supply, costs and factor demand, profits, and investment
Mostly through impact on labour demand as is result from product demand	→	Marginal farmers	Rely on agriculture for job creation and cheap food	Indirect effect via: labour demand, price change and increased food supply
Direct impact on income and vulnerability if beneficiaries from social protection policies	→	Farm labourers	Relate to agriculture majorly as consumers- increased income will be spent	Indirect effect as producers (production increase, profit, autonomous consumption), plus impact through as consumer through market change: supply and price
Direct impact on income and vulnerability if beneficiaries from social protection policies	→	Those who are unable to participate fully or frequently in economic activities. Those like; the sick, handicapped, aged and very young individuals		Through market effect: lower prices, higher distribution from local manufacturers; potentially higher transfers from other groups with increased income

Source: Adapted from Levy (2015, P.7)

trapped in poverty for generations. Social protection is an important instrument for the pursuit of at least five of the seventeen sustainable Development Goals (SDGs) by ensuring universal access to staple and sufficient food (food security) through agricultural productivity. In addendum to the above assertion, UNDP (2016), infers that Social protection programmes are among the most successful development experiences the world has seen in recent years. They have proven to be key weapons in developing countries' efforts to fight poverty and hunger, as demonstrated by the substantial progress countries such as Brazil, Tanzania, Ethiopia, Senegal, and Kenya have made in poverty reduction through the adoption and expansion of social protection schemes. Social protection when directed towards agriculture has the potential to contribute significantly to employment generation, poverty reduction and long-term sustainable output, especially when built under a broader, more integrated framework. Articulating the above truism, UNRISD (2016), in paper released: Social Policy and Development Programme: 2030 Agenda for sustainable Development examines how social protection policies can be instrumental to agriculture development, and financed in a sustainable and progressive way, while maintaining their fundamental goals of protection, equity and social inclusion. In line with that, by 2030, the envisaged sustainable development may not be feasible if any sector of the economy is neglected (agriculture per say). Nyasha *et al.* (2013), examines the interaction between Social protection policies and agricultural policies and finds that little attention has been paid to the interaction between them and how that influences their design and implementation in order to achieving sustainable output. In line with that, controlling for seed type, Mistian (2006), compares actual maize yields from trial station in Kenyan using different fertilizer combinations with yields obtained by farmers



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on site with characteristics similar to trial stations. He estimated technical inefficiency of the farmers at 60 percent, suggesting that revised or effective social protection policies towards agriculture can lead to substantial improvements. Randrianarisoa and Minten (2006), offer supporting evidence of the potential efficacy of such policy improvement in Madagascar. Despite these positive developments, adoption of effective policy for output remains limited in Nigeria. At one level, this situation reflects a lack of funding devoted to agricultural research and its dissemination, especially in the area of crop production. Minten (2006) reports the current spending on agricultural research to improve the output of crop production in Madagascar is about 2.5 percent of the total annual value of crop production. Jalan and Ravaillion (2003), conducted a study on impact of social protection on pipe water for rural children's health in rural India using the method of Propensity Score Matching (PSM) using cross-sectional data 1993/1994 nationally representative survey on 33,000 rural households from 1765 villages across India. To evaluate PSM, Jalan and Ravaillion used village level traits which include; the size of the village, land area that is irrigated and local infrastructure and household variables like culture and beliefs, religion and ownership of assets (assets like irrigation can, radio) and households' educational background. Their study concludes that going by behavioural element, poor families or households tends to benefit less from pipe water because of the fact that they properly do not store water for irrigation and household consumption.

Enoma (2010), examined the impact of agriculture credit on agriculture output in Nigeria and highlighted some of the problems of agricultural production in Nigeria and Strategies for agricultural transformation for sustainable agriculture output in Nigeria and concludes that social protection to farmers in form of agricultural credits enhance households production capacity similarly, Iganiga and Unemhilin (2011), investigated the impact of Federal government agriculture on the value of agricultural output in Nigeria, and finds out that commercial credits is positively related to agricultural output using the Cobb Douglas production function engaged econometric method in their analysis.

### **Theoretical Framework**

There are different theories coined by different scholars that old sway about poverty (pro-poor growth), social protection and productivity capacity with regard to farmers. This study presents the views of the Classicalist, the Neoclassicalist, the Keynesians, the Neoliberalists, the Marxists, the Ricardians, the Social Exclusion and the Capital Exclusion.

### **Classical View**

The Classical school of thought (such as Adam Smith, J.B Say, Alfred Marshall, Robert Malthus among others) who is regarded as the first school of economic thought holds the view that poverty is individualist. To them, individuals are highly responsible for their own destiny, decide on in effect to become poor (e.g. by forming lone-parent families). They are of the opinion that individuals can work their way out of poverty whether protection, support from the government, sundries or not, individuals are better able to escape poverty trap through their own effort labour. The concept of 'sub-cultures of poverty' implies that deficiencies may continue over time, owing for example to lack of appropriate role models,

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and that state aid should be limited to changing individual capabilities and attitudes (i.e. the laissez-faire tradition).

### **Neoclassical View**

Unlike the classicalists, the Neoclassicalists are of the opinion that poverty is more of economic and social deprivation rather than individualist. Neoclassical theories are more wide ranging and recognise reasons for poverty beyond individuals' control. These include lack of social as well as private supports; market failures that exclude the poor from credit markets and cause certain adverse choices to be rational; barriers to education; immigrant status; poor health and advanced age; barriers to employment for lone-parent families; and lack of support for rural farmers and dwellers which daunt output. Looking at the classical and neoclassical approaches together, their main advantages reside in the use of (quantifiable) monetary units to measure poverty and the readiness with which policy prescriptions can be put into practice. They also highlighted the influence of incentives on individual behaviour as well as the relationship between production and income. Criticism of these approaches highlights their overemphasis on the individual (without, for instance, taking into account links with the community) and the focus on purely material means to eradicate poverty.

### **Keynesian View**

The Keynesian view which was led by John Maynard Keynes, are of the opinion that poverty is as a result of deficiency of public goods wide range of inequality in a certain economy. Even though the neoliberal school led by the new-Keynesians also adopts a money-centered, individual stance towards poverty, the importance assigned to the functions of the government allows for a greater focus on public goods and inequality. For instance, a more equal income distribution can facilitate the participation of disadvantaged groups of society in the type of activities that are deemed essential under broader notions of poverty. On the other hand, new-Keynesians are in line with neoclassical economists in their belief that overall growth in income is ultimately the most effective element in poverty removal. Publicly provided capital (including education) has an important role to play, with physical and human capital believed to be the foundation for economic prosperity. Unlike the classical approach, unemployment, viewed as a major cause of poverty, is largely seen as involuntary and in need of government intervention to fight it. Excessive inflation, high sovereign debt and asset bubbles are other macroeconomic factors, besides weak aggregate demand, believed to cause poverty.

### **Marxian /Radical View**

By suggesting radical changes in the socio-economic system, Marxian economists and other radical theorists highlighted the possibility that economic growth alone may be insufficient to lift poor people especially farmers out of poverty, because those who belong to certain classes may not reap any of the benefits of overall income growth. Similarly, by emphasising the concept of class, it provides a shift in perspective, focusing on group (rather than individual) characteristics, with individuals' status considered dependent on the socio-economic environment in which they live. Nevertheless, adequacy of income remains a key factor. Within a capitalist system, alleviation of poverty may require minimum wage laws,

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action to eliminate dual labour markets, and antidiscrimination laws (seen as one of the most effective anti-poverty strategies). The exploitation of the poor farmers by the rich groups in society may also occur via the quality of the environment; for example, the poor tend to suffer most from air pollution which damage crops and livestock (normally generated by the wealthier groups) given their residential location. A further contribution of Marxian/radical economists is the sense that poverty is a moral as well as a technical issue. This is often lacking in more mainstream economic frameworks, except when they integrate political theories of justice in their analytical framework.

### **Social exclusion and social capital**

Another component of the literature stresses the interrelation between social exclusion, social capital and the occurrence of poverty and recognizes the importance of the structural characteristics of society and the situation of certain groups. Social exclusion and social capital theories are, among all the reviewed approaches, arguably the ones that focus most on understanding the inherent processes that allow deprivation to arise and persist. Nevertheless, the wide definition of poverty and exclusion considered under these theories comes at the cost of being less precisely defined and more challenging to quantify and address by policy. Townsend claimed that excessive attention has been paid to the wage system/labour market outcomes and those other resource systems, such as the political and welfare institutional framework, should be taken into account. Progress is underway in that economics has shifted from focusing on materialistic assessments of poverty to considering other factors. Sub-disciplines such as behavioural economics, for example, attempt to disentangle the effects of bounded rationality on poor people's choices.

Institutional definitions of poverty highlight areas that have been neglected in economic approaches:

1. Inadequate physical security, lack of political voice (World Bank);
2. exclusion from social and cultural activities (European Commission);
3. Lack of participation in decision making and in civil, social and cultural life (United Nations).

This points to a broader range of motivations for human behaviour than just maximizing one's own consumption less utility of labour. People also seek autonomy, freedom, status, political influence, fairness, justice, dignity and community, for example, which are often excluded from the economic calculus. These elements can be part of the circumstances that qualify people as poor in broader delineations of poverty. In this context, political, sociological, socioeconomically and qualitative analyses can strongly complement insights from quantitative economic analyses. Discussions at the theoretical level can also inform applied research and policy.

Conclusively, each approach has an essential role in enhancing and broadening the knowledge of poverty and social protection (pro-poor growth) as relates to this study, but no theory is sufficient in itself. Furthermore, economics by its nature leaves out important aspects of the nature and causes of poverty. In terms of informing policy, this review should first help to identify the theoretical foundations of particular policy viewpoints (e.g. 'the poor

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have only themselves to blame’ or ‘there are market failures involved’). Second, it provides ideas for intervention, based on the following policy points: the key role of capital formation (including human capital through education; physical capital through investment) in the alleviation of poverty, which will require substantial government expenditure on social protection programmes that is geared towards agriculture to enhance farmers productive capacity and which must be appropriately designed for each locality (following the Keynesian tradition); the role of discrimination in poverty, via society’s class stratification and the need for legal action and deep market regulation to offset it (as emphasized by Marxian economists)

**METHODOLOGY**

This sub-section would also adumbrate the means through which the objective of the study will be achieved. *Inter alia*, it comprises of model specification, estimation technique, presentation and analysis of data.

$$Q=f(L, K) \text{ -----(1)}$$

$$Q=f(L^\beta, K^\alpha) \text{ ----- (2)}$$

Where:

Q - the quantity of output produced

L - the quantity of labour required to produce a given level of output (Q), for example, the number of hours worked per day, week or months as the case may be.

K- Units of capital applied in producing a given level of output (Q). As considered in this study, capital measures the number hours machines are been put to use to produce a given level of output (Q). Following the Cobb-Douglas production function, this study added other variable inputs apart from labour and capital in producing a given level of output

$\beta$  - Share of labour in production process, and  $\alpha$  - Share of capital in production process

**Model Specification**

The method engaged for this study is the Propensity Score Matching (PSM) model study is built on Jalan and Ravallion (2003) who worked Impact of piped water for children’s health in rural India using the method of propensity score matching and Osabuohien, Herrmann, Efobi and Gitau, (2016) who also used the PSM method.

Computing the change in the outcome of interest mathematically is depicted as  $Y_i^{T=1}$  for the outcome of the households with agricultural credit (social protection) and  $Y_i^{T=0}$  for the counterfactual (those without agricultural credits or who do not receive agricultural credit). Therefore, the change in the outcome that is attributed to participating in the program is computed as:

$$\Delta Y = Y_i^{T=1} - Y_i^{T=0} \text{ ----- (3)}$$

The average treatment effect therefore will be:

$$agrout = E(\Delta Y | T = 1) = E(Y_i^{T=1} | T = 1) - E(Y_i^{T=0} | T = 0) \text{ -----(4)}$$



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

The household's or farmer's characteristics which was taken into consideration are: age of the household, location of the household, occupation of the household, income of the household, household size (number of individuals in the household or family), household head (if the household is been led by a male or a female) education of the household (agriculture education per say), household access to credit, household 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 in 1983 by proposing the use of Propensity Score Matching (PSM) as a suitable technique to develop the unequal non-participant data.

The PSM method of analysis has the following assumptions guiding it, which are: (i) the conditional independence assumption and (ii) the common support condition. 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".

$$i.e Y_i^0 \perp P_i | X$$

- (5)

Thus, after adjustment has been made for noticeable variations, it can be inferred that the mean of the outcome variable is the same for both households with and households without agricultural credit. This condition helped in matching the households without agricultural credit as a control group when measuring the effect agricultural credit on household output. Thus, equation (6) above may be depicted as follow:

$$((Y^1_i / P = 1, X) = (Y^0_i / p = 0, X))$$

Another assumption which is the assumption of similar support condition centres on the prospect that for each value of "X"; there is a direct chance of each household being with or without agricultural credit. Recently, this method or techniques has been used as tin he case of the study carried out by Nkhata, Jumbe and Mwabumba (2014).

There exist various matching algorithms that are applicable when using the PSM technique. This study uses the Nearest Neighbour Matching (NNM) and Kernel Matching (KM) algorithm, as they are found to be suitable for this study. The NNM algorithm compares the output of households' agricultural credit and similar households without agricultural credit, using propensity scores. Therefore, this can be depicted as:

$$\text{That is } \min || P_i - P_j ||$$



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The Kernel Matching Algorithm (KMA) observed to give more effectual outcome, and is well appropriate for handling large, asymmetrically distributed dataset (Baser, 2006). The KMA is designed in a way that each household with agriculture with “i” are matched with other control observations that have weights that are inversely proportional to the households without. The weight is computed as

$$W_{ij} = \frac{H(P_i - P_j)/h}{\sum_{j=1}^n (P_i - P_j)/h} \dots \dots \dots (8)$$

Where: h represents the bandwidth. Households in community with (and without) agricultural credit are indicated as ‘i’ (and j’).

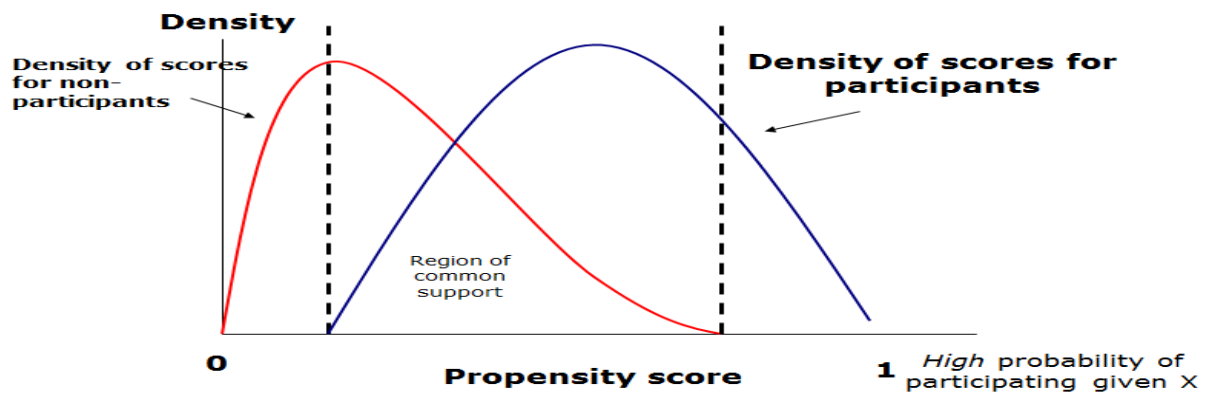


Figure 1: Graphical representation of PSM (Author’s Plot)

Figure 1 present’s graphical representation of the propensity score matching (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 benefit the programme (social protection policies), while the non-participant are those households that do not benefit from the programme (Dehjia & Wahba, 2002)

**Data Source**

This study makes use of cross-sectional data sourced from the Living Standard Measurement Study Integrated Surveys on Agriculture (LSMS-ISA). The LSMA\_ISA was conducted by the World Bank in collaboration with National Bureau of Statistics-NBS (Osabuohien, 2014). The dataset from LSMS-ISA covers the 36 states in Nigeria including Abuja. The data are 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 utilized involving the merging of both the post planting and post-harvest data as the variable of interest are either of the periods. The post-planting interview was carried in August-October, 2012. While the post-harvest data was conducted February-April 2013. . The data for the study was integrated at households’ level where the information needed by the researcher is available which covered 4210 household members

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**PRESENTATION AND DISCUSSION OF RESULTS**

**Result from Kernel Density Plot**

The kernel density plots are presented for the household’s agricultural credit as a control variable which captures social protection in this study. The goal of the Kernel Density Plot is to approximate the density function of the outcome (agricultural output) variable and compare its trends, which are shown below

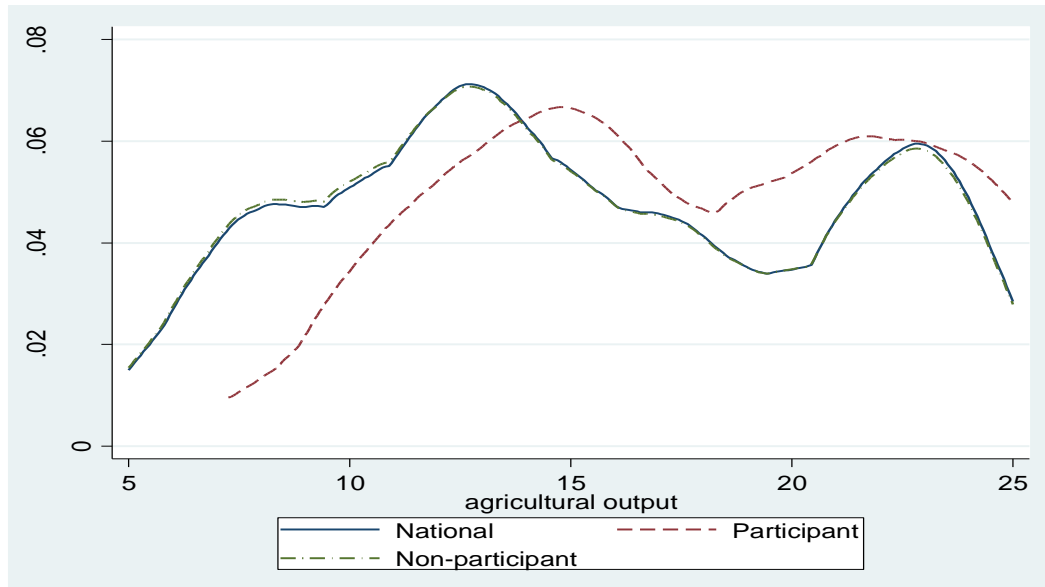


Figure 2: Kernel Density Plot of Agricultural Credit (Researcher’s computation using stata software version 13)

The kernel density plot of households’ agricultural labour allocation is shown in Figure 2. The results depict that households in with agricultural credit (participant) are more productive than households without agricultural credit (non-participant).

**Descriptive Statistics: Overall Sample Characteristic of Propensity Score Matching**

The household characteristics of interest as mentioned above include household size, average age and educational attainment of household, number of household members, and households’ 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

**Table 2: Household Characteristics (outcome variable agricultural output)**

	Households with agricultural credit		Households without agricultural credit		t-stat
	Mean	SD	Mean	SD	
agricultural credit(with=1, without = 0)					



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Health status	1.807 5	0.614	1.7892	0.4310	-43**
Information	0.547 2	0.2944	0.5574	0.21806	48**
Capital	1.987 2	0.0734	1.9765	0.1221	-0.99
Land	0.010 0	0.0672	0.0046	0.0370	-1.82*
Labour	1.821 2		1.175	1.9819	-3.62**
		2.2317			

Notes: \*, \*\* and \*\*\* indicate significant at 10, 5 and 1%, respectively  
Source: Researchers' computation using Stata 13

The rationale for the selection of variables is due to the role they play while in explaining household ability to produce (Osabuohien et al, 2016)

**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 intention 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 with agricultural credit and those without agricultural credit)

**Table 3: Probit Model for Computing the Propensity Score**

Household characteristic	Outcome
Information	0.0917** (0.046)
Household capital	0.74170 (0.153)
Health status	-0.40053 (0.131)
Household land	0.6040 (0.565)
Household labour	0.04462** (0.018)
Constant	-2.7876** (0.010)
Pseudo R2	0.014
Pro value	0.002
Log. Likelihood	-437.1680

Probability values are in parentheses\*\* $p < 0.05$ .  
Source: Author's Computation using stata 13





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Table 3 shows the result from the probit model, which was used to derive the propensity matching scores. For all households, household information, household health status, household property and household labour whether or not a household is cultivating land or owning and cultivating farm plots are found to be significantly associated agricultural credit Herrmann (2016).

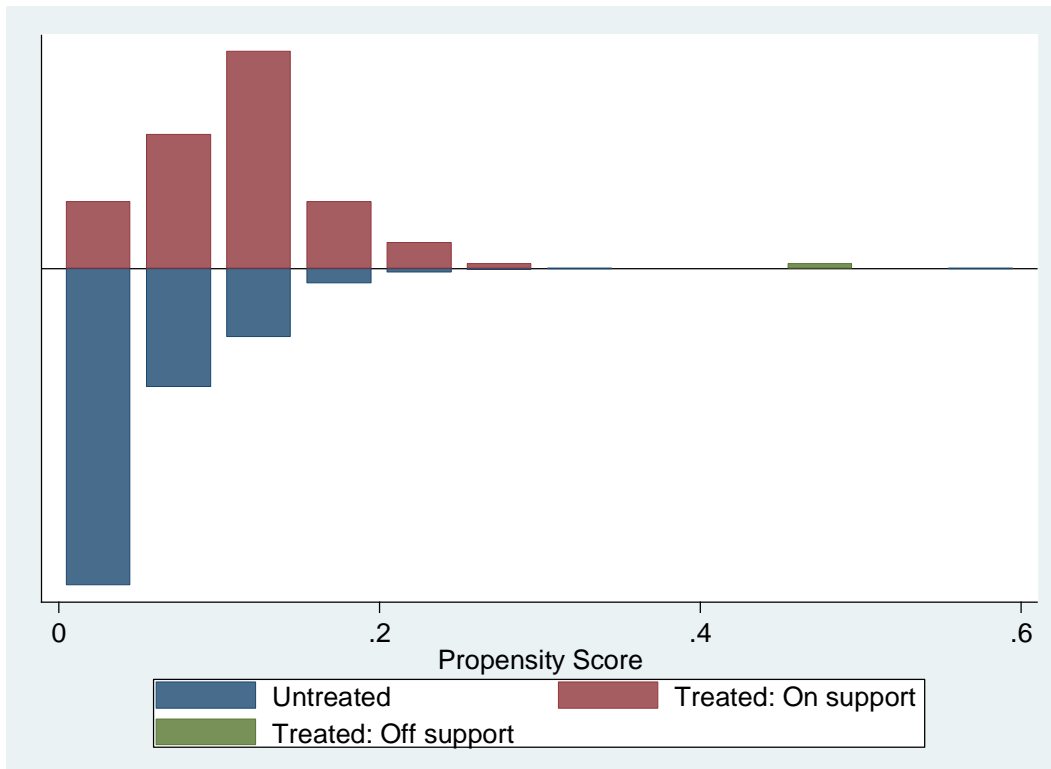


Figure 3: Propensity Score Distribution (Authors' Computation using stata 13)

Figure 3 above presents the result of the balancing quality checks and the histograms of the predicted propensity scores for both the treated and the control groups are presented in the figure. From the figure, it could be inferred that the propensity score relatively is of equal distribution, suggesting comparability of the treatment and control groups.

### SUMMARY OF STUDY

The summary of the study is mainly hinged on the nexus between social protection programmes and agricultural output in Nigeria which would be summarized according to the existing chapters. In chapter one, the background of the study revealed how social protection programmes has been implemented and its performance. The study engages household's survey data which was sourced from the Living Standard Measurement Study – Integrated Surveys on Agriculture conducted by the World Bank and the Nigerian National Bureau of Statistics, about four-thousand two hundred and ten (4210) households were interviewed for two seasons: post planting and post-harvest season, and data were sorted and collapsed at

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households level. Research question was obtained from the statement of research problem and have been answered in literature review. Both the objectives of the study and research hypotheses were achieved and tested respectively through empirical findings; relevant theories relating to the study were reviewed. The essence of literature review is to draw out people's contribution related to the study, have a better understanding of what they say and be able to contributing to the frontiers of knowledge. The Cobb-Douglas theory was considered essential for this study, and the model for this was built in line the Cobb-Douglas output model to explain the relationship between the dependent variable and the independent variables for the Ordinary Least Squares model. The main technique for this study is the Propensity Score Matching which was completed by the Ordinary Least Squares among other post estimation techniques that were engaged to make sure that the results are not spurious. The trend of variables was revealed in the stylised facts, and econometric descriptive analysis of data was made and which shows the empirical relationship existing between variables under study. Variance inflation factor and Pairwise correlation were engaged to check for the presence of multicollinearity and it was revealed that there was no incidence of multicollinearity and the Ramsey Regression Equation Specification Error Test (RESET) was used to check for the omitted variable bias and it was found that the model was correctly specified. The LM test (Breusch-Godfrey Serial Correlation) was engaged in for serial correlation and the Breusch-Pagan Godfrey was used for homoscedasticity. It was observed in literature that heteroscedasticity is more prominence in cross-sectional data than any other data set, due to this, the robust standard error was used to control for heteroskedasticity and the propensity score matching was used to determine the difference between households with social protection and those households without in terms of production.

### **SUMMARY OF FINDINGS**

The study shows that social protection is positively related to agricultural output. The relationship between these shows that a unit change in social protection programmes will lead to a more than a unit change in agricultural output similarly, health status and agricultural output has a positive relationship showing that an increase in health status leads to an increase in output by a greater unit.

Labour and agricultural also has a positive relationship showing that an increase in agriculture labour has the capacity of increase output. Conversely, why other variables are showing a positive relationship, capital is showing a negative relationship meaning that a unit change in capital brings about a decrease in agricultural output. This defiles the "a priori" expectation as it was expect of capital to show a positive relationship with agricultural output. Reason for defilement could be that households members (peasant farmers) engages labour intensive that is uses more of labour than capital in this case, an increase in capital stock will reduce output on the long run.

From the Propensity Score Matching and the Kernel Density plot, it shows that households with agricultural credit (social protection) are likely to experience three times more agricultural yields (output in terms of bags) than their fellow counterparts who do not receive



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agricultural credit, this calls for the need of social protection among farmers to increase their output.

### **Policy Recommendation**

It widely believed that agriculture holds the future of Nigerian economy, as major generator of employment and income for rural dwellers the sector cannot stand on its but will perform more efficiently when appropriate programmes are geared towards the it. In line with above, based on finds, the following are recommended:

- i. Agricultural products like rubber, cocoa and others constitute the major items of exports of Nigeria. If there is smooth development practice of agriculture, imports are reduced while export increases considerably. This helps to reduce countries unfavourable balance of payments as well as saving foreign exchange. This amount may be well used to import other essential inputs, machinery, raw-materials, and other infrastructure that is helpful for the support of country's agricultural sector. This is achievable if the sector is coordinated through the effectiveness of social protection programmes
- ii. Activities in the agricultural sector are important as it provides larger employment opportunities for the citizens. Agriculture sector provides more employment opportunities to the labour force that reduce the high rate of unemployment in the economy. The results obtained in this study confirmed that labour is needed in producing a given level of output and this can be easily achieved when effective programs are geared towards thee sector
- iii. Food security: A stable agricultural sector ensures a nation of food security. The main requirement of any country is food security. Food security prevents malnourishment that has traditionally been believed to be one of the major problems faced by the developing countries. Low income farmers depend predominantly on agricultural outputs as a means of livelihoods and the capacity of farmer to produce enough food depends on how the sector is coordinated through effective programmes. It is therefore recommended that the agricultural sector should be built by enhancing the coherence between social protection programmes and the sector. This can be done, by insuring that social protection schemes are geared towards the sector. This is because increase in agricultural production will raise the per-capita income of the rural community.
- iv. Agricultural sector should be made more attractive through the implementation and execution of programmes that can help pull labour out from other sectors as this will enhance the productive capacity of the sector.
- v. As revealed in the study by the PSM method, households who received agricultural credits were found to be three time more productive than the ones who do not receive agricultural credit, this calls for government and donor agencies to effectively direct credits to the agricultural sector

### **CONCLUSION**

The study examined the relationship between social protection policies and agricultural out in Nigeria. The study was intended in finding out how effective social protection programmes

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will contribute to boosting agricultural output in Nigeria. The study selected variables such as quantity of crops produced by household members (farmers in rural communities where survey were carried out) measured in percentiles as depended variable which captures agricultural output. Social protection was proxied by agricultural credit and agricultural insurance, variable inputs were captured by Labour and capital as part of the independent variables. Labour measures the number of hours farmers work on the plot or farmlands, while capital measures the number of hours machines were put to work on the farmer-land per week. Labour and capital were considered very essential this is because the role both variables play in production cannot be undermined as Cobb-Douglas theory of output was engaged. Similarly, land and farmers health status, as revealed by literature that healthy farmers are no doubt more productive than the ill farmers and production depends on the availability of land

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