Participation in "Planting for Food and Jobs" Programme and Commercialization among Maize Farm Households in Savelugu Municipality, Ghana.

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ABSTRACT

Ghana's "Planting for Food and Job" programme aims to improve farmers' access to farm inputs. The idea is that through improved access to quality seed varieties, fertilisers and good agronomic practices, output would increase leading to an increased market surplus. This study sought to investigate whether engagement in 'Planting for Food and Job' (PFJ) programme influences farm households' maize commercialization level in Savelugu Municipality, in the Northern Region of Ghana.

To correct for selectivity bias, unobserved endogeneity and avoid the problems associated with weak instrumentation, the conditional mixed process (CMP) method was used. The results revealed that participation in the PFJ programme and maize yield positively influenced maize commercialization. However, commercialisation was negatively influenced by gender of the farm household's head, household size and membership of community based organisations (CBOs). Participation in the PFJ programme itself was enhanced by education, marital status, increased farm size, farm ownership, membership of farmer-based organization (FBOs) and non-farm engagement. Government and all relevant stakeholders should step up efforts at promoting the PFJ programme and maize commercialisation through access to formal education, farmland and other productivity enhancing inputs and services.

INTRODUCTION

The Alliance for a Green Revolution in Africa (AGRA), (2017) has observed that even among the countries that have modern and diversified economies, a strong foundation of the agricultural sector has been the panacea to such growth and development. In the case of Africa, the role of agriculture cannot be over-emphasised. The sector employs about 70% of the total workforce of the continent and contributes about 15% to GDP (AGRA, 2017). Furthermore, World Bank (2017) estimates also show that the African food market is growing at a fast rate and that from the 2017 estimate of US$300 billion it is expected to rise to US$1 trillion by 2030. Meanwhile, the continent's food import bill was estimated at US$30–50 billion in 2017 (World Bank, 2017).

Given the above background, AGRA (2017) painted a bright future for the agriculture sector in the near future. Specifically, the organization argued that smallholder farmers in Africa are the entrepreneurs in the continent. However, the fear is that the large numbers of smallholder farmers in the continent may not benefit much from growth of the food market. This is because the agriculture sector has been constrained by challenges such as inadequate access to improved agricultural technologies, poor rural infrastructure, high cost of farm inputs and poor market access (Kurukulasuriya and Rosenthal, 2003; Daum and Birner, 2017). The enumerated challenges have the potential to reduce agricultural productivity and output growth, which has serious implications for farmers' welfare and food security status.

This disturbing situation in the agricultural sector has prompted the government and other non-governmental organizations to adopt several policies, strategies and programmes in most developing countries including Ghana. In an attempt to promote agricultural productivity and commercialization, Ghana adopted the Ghana Commercialization Agricultural Project (GCAP) in 2012. In addition, the Food and Agriculture Sector Development Policy (FASDEP II, 2007), Ghana Shared Growth and Development Agenda (GSGDA 2010-2013) and the Medium Term Agriculture Sector Investment Plan (METASIP 2010-2015) were adopted to improve agricultural productivity by providing farmers access to productivity enhancing resources as well as improve farmers income level via market participation in domestic and international markets. It is envisaged that the adoption of these policies and programmes will increase access and promote the adoption of productivity-enhancing farm inputs such as improved seeds and fertilizers. The adoption of these farm inputs is expected to enhance farm productivity and thus marketed surplus ratio.

In spite of the various efforts by government and its developmental partners to improve the welfare of smallholder farmers, by increasing access to modern technology and promotion of agricultural commercialization, still agricultural productivity and commercialization is low (Dagunga et al., 2021). Thus, these policies and programmes adopted have not achieved their intended objectives. According to Banful (2011) and Jayne et al. (2018) some of the reasons for the failure of previous government agricultural programmes include inadequate financial support, poor policy formulation and implementation, corruption and poor target mechanism.

Despite these challenges the government of Ghana is still committed to improving agricultural growth and development. The government of Ghana as part of the mechanisms to support farmers has provided farm inputs and technologies to smallholder farmers aimed at creating jobs for the youth along the agricultural value chain. It was against this backdrop that the "Planting for Food and Jobs" (PFJ) programme was introduced in 2017 and operated till date. The purpose of the PFJ programme is to improve upon farmers' access to input and output markets, supply improved seeds and fertilizers to farmers at subsidized prices and provide free extension services to farmers (MoFA 2017). Increased access to farm inputs such as quality/improved seed varieties, fertilisers and good agronomic practices would go a long way to increase productivity and ensure food security. Also increased market access also implies that the increased output is sold out for increased income (MoFA, 2017). The net effect is that more employment opportunities are generated for increased GDP.

Maize, rice, soybeans, sorghum and vegetables (tomato, onion, chili pepper) were the targeted crops of which maize is a major crop of focus embedded in this policy. Maize is considered as the most important staple food in Ghana (Olwande et al. 2012). The Statistics, Research and Information Directorate (SRID) of Ministry of Food and Agriculture (MoFA) (2016) also postulated that land area for maize production reduced from 1,025,000ha in 2014 to 880,000ha in 2015 with a corresponding yield reduction of 1,769,000Mt and 1,692,000Mt respectively. It is against this background that maize is one of the crops chosen for the implementation of the PFJ programme with the hope that when farmers are supported with improved seeds and complementary inputs they would be able to intensify the production of the crop.

The reasoning is that, participation in the PFJ programme by farmers may increase access to modern technology. Adoption of modern technology is expected to enhance output growth and productivity, which may increase the marketed surplus ratio thereby promoting agricultural commercialization. Gains in agricultural commercialization create a virtuous cycle that enhances household income, thus increasing consumption, food and nutrition security among rural farm households. At the macro-level agricultural commercialisation promotes trade and efficiency, resulting in economic development and enhanced welfare in a country. Indeed agricultural commercialization is the surest way to enhance farm households' welfare, food and nutrition status (Ogutu & Qaim, 2019).

It was against these backdrops that this study examines the determinants of participation in 'Planting for Food and Job' programme and maize commercialization level. It also investigates whether engagement in 'Planting for Food and Job' (PFJ) programme influences farm households' maize commercialization level in Savelugu Municipality, in the Northern Region of Ghana. The findings from this study have policy implications for Ghana and other developing countries. Empirical evidence of the determinant of participation in PFJ programme and maize commercialization as well as the effect of participation in PFJ programme on maize commercialization is critical microeconomic policy ingredient that can inform sound, evidence-based policy on agricultural programmes and commercialization.

The current study makes two main contributions to the literature. First, the study examines the effect of participation in PFJ programme on commercialization level in the Savelugu Municipality in northern Ghana. To the best of our knowledge, not many studies have explored the effects of the PFJ programme on agricultural commercialisation. Notable empirical studies on the effect of

agricultural programme on farm households welfare include   Cavatassi et al. (2011), Biggeri et al. (2018) and Adenegan et al. (2018) who examined the effect of government programme on farm productivity, cereal production and farm income respectively. In contrast, the current study examined the effect of government agricultural programme (i.e. PFJ) on maize commercialization. The reasoning is that, participation in the PFJ programme by farmers may increase access to modern technology. Adoption of modern technology is expected to enhance output growth and productivity, which may increase the marketed surplus ratio thereby promoting agricultural commercialization. Gains in agricultural commercialization create a virtuous cycle that enhances household income, thus increasing consumption, food and nutrition security among rural farm households. At the macro-level agricultural commercialisation promotes trade and efficiency, resulting in economic development and enhanced welfare in a country. The second contribution is in the area of the methodology; the current study employs the conditional mixed process (CMP) approach. Unlike the PSM and IV techniques used in previous studies by Cavatassi et al., (2011), Biggeri et al., (2018) and Adenegan et al., (2018), the CMP is able to correct for selectivity bias, unobserved endogeneity and avoid the problems associated with poor instruments (Woodridge, 2009). In addition, the CMP allows for joint modelling of two or more equations with mixed nature of equations (i.e. binary and continuous dependent variables) (Roodman, 2011). In general, we seek to offer some guidelines to policy makers by empirically verifying whether the goal of promoting access to productivity enhancing farm inputs such as improved seeds and fertilizers will boost commercialization of maize in Ghana.

The rest of the paper is as follows: Section two discusses the literature on the subject area whiles section three describes the methodology. Section four presents the results and analysis. Section five draws conclusions and make policy recommendations based on the conclusions drawn.

LITERATURE REVIEW

In an effort to encourage farm households' engagement in agricultural programme and commercialization, as well as provide evidence-based research to assist policy makers, discussions have been held and some empirical studies (see Yakubu, 2019; Ansah et al, 2018; Adenegan et al., 2018) carried out to analyse the factors that encourage participation in agricultural programmes. Yakubu et al. (2019) examined the factors that influence participation of cassava farmers in survival

farming intervention programme (SFIP) in Nigeria using logistic regression. They observed that age, labour, education, land tenure, awareness, extension contact, planting material, marital status and gender statistically influenced SFIP. Ansah et al. (2018) also used the Sen's capability concept to assess how human and institutional capabilities and socio-economic factors influence farmers' participation in the PFJ programme in Ghana. Using an instrumental variable probit model they reported that human capability and institutional capability influenced farmers' engagement in the programme. In Nigeria, Adenegan et al. (2018) examined the drivers of farmers' participation in a Growth Enhancement Support Scheme (GESS) using the probit model. They reported that farmers' association, participation in past programme and access to credit predicted farmers' decision in participating in the GESS scheme.

Concerning agricultural commercialization, a lot of empirical studies have been conducted (see Sigei et al 2014; Abu, 2015; Tura et al., 2016; Abdullah et al., 2017) and have identified households' socio-economic, farm level characteristics and institutional factors as the predictors of agricultural commercialization. For example, Abu (2015) used the Tobit model and found marital status, output, mobile phone ownership, credit access, access to market information and form of sale to influence intensity of market participation in Ghana. Sigei, et al. (2014) employed the Heckman's (1979) treatment effect model and reported that age, gender, education level and pineapple yields significantly influenced the decision to participate in pineapple marketing, while gender, price information, group marketing, marketing experience, vehicle ownership and marketing under contract significantly influenced the extent of market participation in Kenya. In a similar study, Dessie et al. (2018) applied the multivariate probit model and observed that age, education, credit access, livestock number, off-farm income and total land-holding size of farmers significantly affected the market channel choice decisions of Ethiopian's farmers.

Another strand of literature examined the participation effects of agricultural development interventions and is outlined as follows: Cavatassi et al. (2011) employed the PSM technique and they observed that government programmes to improve returns to potato production via training and linking smallholders to high-value market enhances yield through increased input use in Ecuador. In a similar study, Biggeri et al. (2018) applied instrumental variable (IV) and propensity score matching (PSM) techniques and the results revealed that Agricultural Value Chains (AVC) Project had positive effects on gross and net values of cereal production per hectare in Oromia. In their study, Adenegan et al. (2018) employed the PSM

technique and found the Growth Enhancement Support Scheme (GESS) had a positive impact on the on-farm income of cassava and maize farmers in Nigeria. In Nigeria, Kuza et al. (2018) used the t-test and they revealed that the mean annual farm income for farmers engaged in the National Fadama III Development Project (NFDPIII) intervention increases from N 788, 636.36 to N 1, 013,022.73.

From the above literature review, it can be concluded that most of the empirical studies on the effect of agricultural programme on farmers' welfare have concentrated on farm income and productivity, ignoring its effect on commercialization. Furthermore, the commonest models employed include the PSM, IV and the Heckman's (1979) model.

METHODOLOGY

Study area and data

The study was conducted at the Savelugu Municipality in the Northern region of Ghana. The population of Savelugu Municipal, as projected by 2010 Population and Housing Census, is 139,283 representing 5.1 percent of the region's total population. About 60 percent of the population are in rural areas. Males constitute 48.5 percent and females represent 51.5 percent. About 4 in 10 (43.5%) of the population of the district is youthful (0-14 years) with a small number of elderly persons (6.5%). Majority of the people engage in the production of food crops at subsistent level (GSS 2014). As high as 89.3 percent of households in the district are engaged in agriculture. In the rural localities, eight out of ten households (93.3%) are agricultural households while in the urban localities, 83.3 percent of households are into agriculture. Cash crop production is very minimal and includes Shea nut, soya beans and cotton. Food crops produced include groundnuts, maize, millet, guinea corn, cassava, yam and cowpea. Agro-processing is generally carried out by traditional methods on very small-scale. There is also a large plantation of grafted mangoes at Gushie, cultivated by ITFC which provides employment for a number of people in the area.

The data for the study was obtained through a cross-sectional survey of farmers solely engaged in maize production in the Municipality. The study employed two-stage sampling technique, where at the first stage, the sampling frame was the list of communities in the municipality and then random sampling was used to select ten (10) communities in the Savelugu municipality. In the second stage, the sample frame was the list of farmers in each of the selected communities, which includes

Pigu, Balshei, Pong Tamale, Tibala, Kpong, Kpendua, Yiworgu, Boggu, Ying and Damdu. Using the sample frame thirty (30) respondents were selected from each of the 10 communities using systematic sampling technique. At a start a household was randomly selected and at an interval of 3, the other households were selected giving a total sample size of 300 respondents which was used for this study. This method was used because each respondent in the population has a known and equal chance of selection.

Following Cochran (1977) sample selection formula, a minimum sample size of 298 was obtained. The assumptions underlying the determination of the sample size are as follows: a margin of error of 5.2 % (standard value of 0.052); 95% confidence interval and an estimated population percentage of 70. To increase the reliability and decrease the degree of error the study sampled 300 respondents for the cross-sectional survey (Cohen, 1992). Structured questionnaire was used to elicit data on farm households' socio-economic, farm level and institutional factors. Other information collected included the challenges they face in participating in the market.

Theoretical framework and estimation techniques: Participation in PFJ programme and its effect on maize commercialization: Conditional Mixed Process

According to Barrett (2008), farm households participate in the market either as net seller or net buyer or autarkic. Decision is based on the concept of utility maximization. Following the work of Awotide et al. (2016), we argued that farm households participate in market as net seller and is expressed as:

$$MC_i = \gamma X_i + \delta \boldsymbol{PFJ_i} + \mu_i \qquad\qquad [1]$$

where MC is the commercialization level and is defined as the ratio of the gross value of crop sales to the gross value of crops produced by the same household (Govereh et al. 1999 and Strasberg et al. 1999),), X_i is a vector of household socio-economic characteristics, farm-level and institutional factors. γ and δ are the vector of parameters for X and PFJ respectively and   is an error term.

The participation variable (PFJ) is a dummy variable, 1 = participation in PFJ programme and 0 = otherwise. Following the utility maximization theory, maize farmers are assumed to be rational economic agents that take into account the net benefits (P*M) obtained from maize production from participating in the PFJ programme and the expected net benefits (P*N) derived from being non-

participants of PFJ. The model that expresses the difference between the expected net benefits from participation and non-participation in PFJ is as follows:

$$PFJ_i^* = P_M^* - P_N^*$$

[2]

Thus, the maize farmer would choose to participate in the PFJ programme if $PFJ_i^* > 0$. PFJ_i^* is unobserved and is expressed as a function of observable variables as follows:

$$PFJ_i^* = X_i\beta + \varepsilon_i$$

[3]

$$PFJ_i = 1 \ if \ PFJ_i^* > 0 \ ; or \ 0 = otherwise$$

where X_i is as defined previously, β is a vector of parameters to be estimated and ε_i is an error term assumed to be normally distributed with zero mean. Thus, the probability of participating in the PFJ programme is expressed as:

$$\Pr(P_i = 1) = \Pr(P_i^* > 0) = \Pr(\varepsilon_i > -X_i\beta) = 1 - F(-X_i\beta)$$

[4]

where F is the cumulative distribution function for ε_i. If estimated as single, the binary nature of the dependent variable suggests that equation (3) be estimated using logit or probit model (Woodridge, 2009).

From the derivation above, the structural equations to identify the determinants of participation in PFJ programme and measure the effects of PFJ on commercialization may be re-stated as follows:

$$MC_i = \gamma X_i + \delta PFJ_i + \mu_i$$

[5]

$$PFJ_i = X_i\beta + \varepsilon_i$$

[6]

However, equations [5] and [6] raise the issues of endogeneity and selection bias making the application of probit (for equation 6) and OLS estimation (for equation 5) invalid. For instance, farmers may self-select into the PFJ programme depending on their inherent characteristics, rather than being randomly selected. In addition, unobservable factors may affect the error term (ε_i) in the selection equation [6] and the error term in the outcome equation [5] simultaneously. This

Furthermore, the outcome variable of equation [6] (PFJ) is an explanatory variable in equation [5], with the argument that PFJ induces farm output and enhances commercialization (Biggeri et al, 2018). Thus, failure to account for such selectivity and endogeneity bias may lead to inconsistent estimates.

Based on these arguments, an appropriate structural system was adopted. The conditional mixed process (CMP) developed by Roodman (2011) was employed to overcome the specified limitations possessed by the conventional structural models. The CMP framework performs a joint modelling of two or more equations, allows for cross-equation correlation of the error terms, permits mixing of these models in multi-equation systems and ultimately ensures individual models vary by observations. Based on the CMP format, equations (5) and (6) are expressed as:

$$y_1^* = \theta_1 + \varepsilon_1 \qquad [7]$$

$$y_2^* = \theta_2 + \varepsilon_2 \qquad [8]$$

where $\theta_1 = \beta_1 X, \qquad \theta_2 = \beta_2 X + \delta y_1$

$$y = g(y^*) = (1\{y_1^* > 0\}, y_2^*)' \qquad [9]$$

$$\varepsilon = (\varepsilon_1, \ \varepsilon_2)' \sim N(0, \Sigma) \ and \ \Sigma = \begin{bmatrix} 1 & \rho_{12} \\ \rho_{12} & 1 \end{bmatrix}$$

where y_1^* and y_2^* are respectively latent factors of PFJ and MC, X is as defined before, ρ_{12} represents the correlation between the error terms of PFJ and MC. Suppose that $y_i = (0, y_{i2})'$ is observed, then a corresponding likelihood function is expressed as:

$$L_i(\beta_1, \beta_2, \delta, \Sigma; \ y_i | x_i) = \int_{-\infty}^{-\theta_1} \int_{-\infty}^{-\theta_2} \int_{-\infty}^{-\theta_3} \phi_j \{(\varepsilon_1, y_{i2} - \theta_{i2})'; \Sigma\} d\varepsilon_1 d\varepsilon_2 \qquad [10]$$

Following Osmani and Hossain (2015), the maize commercialization index is expressed as equation (11)

$$MC_i = \frac{Value \ of \ output \ sold(y_i^*)}{Value \ of \ output \ produced(y_i)} \times 100 \qquad [11]$$

The index measures the extent to which household crop production is oriented toward the market. According to Govereh et al. (1999), a household is considered totally subsistence-oriented or completely commercialized with value of zero and 100 respectively. The study further used the Kendall's coefficient of concordance approach to rank the constraints or challenges farmers encounter in participating in the market as is often applicable when ranking problems in situations where a homogenous group is affected by similar problems (Legendre, 2005).

The Kendall's coefficient of concordance is specified as follows:

$$W^A = \frac{12S}{p^2 (n^3 - n) - pT} \qquad [12]$$

where W^A is the Kendall's coefficient of concordance which shows the agreement between the farmers ranking the challenges. The value lies between 0 and 1 and the more the value lies closer to 1, the higher the agreement between the farmers and vice versa. One (1) represents total agreement and 0 represents total disagreement among the farmers. S is the sum of squares statistics over sums of ranks, p is the number of judges which reflect the number of smallholder maize farmers, n is the number of objects being ranked, that is, the various challenges faced by these farmers in their quest to participate in the market and is 6 challenges and T is the correction for tied. The various hypotheses underlying this model are:

Ho: The judges (respondents) produce independent ranking of the challenges or constraints

H1: The judges (respondents) produce a joint ranking of the challenges or constraints

RESULTS AND DISCUSSIONS

Demographic and Socio-economic characteristics of the farmer

Table 1 presents the summary statistics and statistical significance tests on equality of means for the continuous variables and equality of proportions for binary variables for both participants and non-participants of PFJ programme. From the pooled data, we observe that most of the respondents are male (92.52%). Majority of the respondents (88.09%) are married and the average age of the farm household head is 38.71 years. The proportion of the married that participated in the PFJ was significantly higher than those that did not as shown by the significance of their mean difference. It could imply that, the PFJ programme could target the married in order to achieve desirable outcome among households. In terms of educational level, the average years spent in formal education is about 5 years, signifying a generally low educational level of farm household head. There was some statistically significant difference in the mean years of education of PFJ participants relative to the non-participants with more participants being educated. Specifically, about 58% of the educated participated in the PFJ programmes as compared to 45% that did not participate. Similarly, the household head years of education was significantly higher for PFJ participants as compared to non-participants. Since household head and often considered as the key stakeholders in the household decision making process, it suggests that education is key in

increasing participation in government programmes like the PFJ. The average household size is approximately 14 members and the mean farm size is 2.28 acres with more than half of the farmers (53.06%) owning their plots. Only 2.38% of the farmers got access to credit while 39.40% had access to extension services. Also, only 18.03% belonged to FBOs. However, the proportion of respondents belonging to FBOs who participated in the PFJ was as high as 32% as compared to 15% for non-participants. It could mean that, FBO membership offers respondents with better education thus helping them to take advantage of the programme. The results also indicate that 56.8% of the farmers participated in the market. However, the average commercialization level of the maize farmers in the study area was found to be 30.29%. Thus, on average, farmers sell just about one third of the total value of their maize output; an indication that the farmers are generally subsistent. Maize is a staple food often grown for household consumption in the study area. However, this value is low compared to Asuming-Brempong, (2013) who had 64% for both tomatoes and pineapple and Mignouma et al (2015) whose commercialization value for yam was 55%.

As evident in Table 1, there are some statistically significant differences between participants and non-participants of PFJ programme with respect to some socioeconomic indicators of the respondents. In particular, participants generally have higher proportion of household heads with higher education than non-participants. In addition, participants have higher proportion of married household heads. Similarly, more participants owned their farm plots than non-participants. Lastly, participants belonged to FBOs more than non-participants.

Table 4. 1: Descriptive statistics of socio-economic characteristics of responden

Variable	PFJ Participants (n = 60)		PFJ non-participants (n = 240)		Mean difference (S.E)	Pooled data (n = 300)	
	Mean	S.D.	Mean	S.D.		Mean	S.D.
Participation in PFJ (yes=1)						0.19	0.39
Sold crop (yes=1)	0.54	0.07	0.57	0.03	0.03 (0.07)	0.57	0.49
Commercialization index (ratio)	0.30	0.04	0.30	0.02	-0.00 (0.05)	0.30	0.31
Gender of household head (male=1)	0.95	0.23	0.92	0.02	-0.03 (0.04)	0.93	0.26
Education dummy (educated=1)	0.58	0.07	0.45	0.03	-0.13* (0.07)	0.47	0.50
Household head education (years)	6.52	0.84	4.67	0.37	-1.86** (0.89)	5.02	5.90
Experience of household head (years)	22.07	1.84	20.77	0.93	-1.29 (2.11)	21.02	14.26
Age of household head (years)	39.72	1.54	38.47	0.88	-1.25 (1.94)	38.71	13.17
Household size (number of persons)	15.75	2.14	13.51	0.59	-2.25 (1.59)	13.94	10.85
Married (yes=1)	0.96	0.02	0.86	0.02	-0.10 (0.05)**	0.88	0.32
Farm size (acres)	2.38	1.12	2.26	1.07	-0.12 (0.16)	2.28	1.08
Farm ownership (yes=1)	0.63	0.06	0.51	0.03	-0.13* (0.07)	0.53	0.49
Yield (Number of 50kg bags of maize per acre)	7.25	2.97	7.55	3.10	0.31 (0.45	7.49	3.07
Price (GH¢ per 50kg bag)	96.23	17.63	94.66	12.84	-1.57 (2.05)	94.97	13.87
Easy access to transport (yes=1)	0.49	0.07	0.48	0.03	-0.01 (0.07)	0.48	0.50
Non-farm engagement (yes=1)	0.93	0.03	0.85	0.02	-0.08 (0.0505)	0.86	0.34
Member of farmer based organization (yes=1)	0.32	0.06	0.15	0.02	-0.17*** (0.06)	0.18	0.39
Access to extension (yes=1)	0.39	0.25	0.39	0.22	-0.10 (0.15)	0.39	0.20
Access to motorbike (yes=1)	0.74	0.44	0.58	0.49	-0.15** (0.07)	0.61	0.29
CBO membership (yes=1)	0.18	0.05	0.14	0.05	-0.04 (0.09)	0.15	0.66

Note: Statistical significance at the 99% (***), 95% (**) and 90% (*) confidence levels.
T-Test and chi-square are used for continuous and categorical variables, respectively.

The determinants and effects of PFJ Participation on commercialisation

Table 2 presents the CMP estimation results of the drivers of PFJ participation columns (1& 2) and MC (column 3). The rho parameter which measures the cross equation correlations is used to determine the presence of selection bias. The rho parameter for the model is statistically significant at 1% suggesting that there is evidence of self-selection which is at the same time accounted for. Thus, the joint estimation of these two equations is superior to single estimations. The likelihood ratio test is also significant at 1% suggesting that the model fits the data well.

The results indicate that education, married, non-farm engagement, farm size, farm land ownership and FBO membership are positive and significant in influencing the decision to participate in PFJ. For instance, a year increase in educational level increases the probability of participation in PFJ programme by 0.01. A possible explanation is that, the more one is educated the greater one's ability to evaluate the pros and cons of participating in a project such as the PFJ programme. The results confirm the finding by Yakubu et al. (2019) and Nxumalo et al. (2013) that a higher education level of a farmer translates into higher engagement in agricultural projects. The finding, however, contradicts that of Kgosiemang et al. (2012) and Defrancesco et al. (2008). Also, the study observed that, married people are more likely to participate in PFJ programme. This is reasonable because married people are more likely to have a larger household size which increases the rate of consumption; and thus stands to benefit most from participation. This result supports the finding of Yakubu et al. (2019).

Consistent with our a priori expectation, increases in farm size and ownership of farm land positively influence participation or engagement in PFJ programme. Thus, farmers with larger farms and owners of farm land have higher likelihood of participating in PFJ programme, as access to farm land is one of the requirements to qualify to participate in the PFJ programme. In addition, participation in PFJ may lead to cutting down costs of production because participants benefit from subsidized improved maize varieties, fertilizers, established markets channels, etc. for production. This corroborates the findings of Omotesho et al. (2016), that farm size is a major factor in farmers' decision to participate in agricultural programmes.

Non-farm engagement increases the probability of participating in the PFJ programme by 0.11. This finding is consistent with the argument made by Ansah et al., (2018) that non-farm activity encourages participation in PFJ programme

as engagement in non-farm work enhances farmers' financial capability and motivates them to participate in any policy or programme introduced. As expected, membership of FBOs also increases the probability of participating in PFJ programme by 0.08. This is associated with the role of information transmission among members of such group, thus aiding in in-depth understanding of the PFJ policy which influences their decision to participate. Similar findings were made by Arayesh, (2011) and Omotesho et al. (2016).

As shown in Table 2, the drivers of maize commercialization are gender, household size, CBO membership, participation in PFJ programme and yield. Surprisingly, male headed households have lower commercialisation level compared with female-headed households. This contradicts our a priori expectation because males are more likely to be better resourced to access productivity enhancing inputs and market information which enhances participation in the output market (Adereti 2005; Peterman et al., 2010). This finding also corroborates with that of Adewale and Ikeola, (2005) and Onoja et al., (2012), but contradicts that of Ouma and Abele (2010). Household size negatively influences commercialization level and is significant at 1%. The fact that greater household size discourages farmers from entering the market is attributed to the fact that increase in household size leads to increase in consumption level which is likely to reduce the marketable surplus available for sale in markets. This contradicts the findings of Musah, (2013).

Yield has a positive relationship with commercialization level and is 1% significant. Specifically, farmers with increased yield engage more in selling of their produce than those with poor yields. This confirms the findings of Makhura (2001) who reported that as output increases, the marketable surplus ratio increases resulting in an increase in value of output sold. In general, surplus production is an incentive for a household to participate more in the market (Rios et al., 2008; Barrett, 2008; Omiti et al 2009; Abera 2009; Reyes et al.,2012; Adenegan et al., 2012). Contrary to our a priori expectation, being a member of CBO decreases farm household commercialization level. The probable reason for this finding is that such community groups are gradually losing their relevance and rather serve as disincentive for information dissemination among members. This finding is in tandem with that of Abayneh and Tefera (2013) and Awotide et al. (2016), but contradicts that of Jagwe (2011) and Shepherd (2007).

Finally, the estimated positive coefficient of participation in PFJ programme shows that participation in the PFJ programme increases the commercialization drive. This meets our a priori expectation as PFJ participants who had received

productivity enhancing inputs such as improved seeds and fertilizer subsidy are more likely to have a higher output, and thus higher marketable surplus than the non-PFJ participants. This also goes to confirm the argument made by Ebata and Huettel, (2019) and Biggeri et al., (2018) that participation in agricultural programme promotes commercialization.

Table 2: CMP estimation for the determinants of participation in planting for food and job program and commercialization level of farm household.

Variables	Participate of Planting for Food and Jobs		Commercialization (MC)
	Coeff.	M. E.	Coeff.
Age of farmer	0.0032	0.0008	-0.0012
	(0.0054)	(0.0014)	(0.0017)
Male farmer	-0.5178	-0.1325	-0.2133***
	(0.3229)	(0.0823)	(0.0771)
Married	0.9077***	0.2322***	-0.0419
(yes=1)	(0.2910)	(0.0735)	(0.0642)
Years of education	0.0458***	0.0117***	-0.0007
	(0.0144)	(0.0035)	(0.0038)
Household size	0.0094	0.0024	-0.0055***
	(0.0072)	(0.0018)	(0.0018)
Non-farm engagement	0.4171**	0.1067**	-
	(0.1733)	(0.0450)	
CBO	0.0305	0.0078	-0.0368**
	(0.0918)	(0.0483)	(0.0181)
FBO	0.3305*	0.0846*	-
	(0.1970)	(0.0483)	
Farm size	0.1664***	0.0426***	-
	(0.0649)	(0.0170)	
Land ownership	0.3470**	0.0888**	-
	(0.1638)	(0.0402)	
Access to mobile phone	-	-	-0.0316
(yes=1)			(0.0802)
Price	-	-	-0.0008
			(0.0014)
Log of yield	-	-	0.1683***
			(0.0385)
PFJ	-	-	0.5029***
Planting for food and job participant			(0.1356)
Constant	-2.7225***		0.3580*
	(0.4628)		(0.2071)
Observations	294		
Wald chi2(20)	150.55***		
Log likelihood	-180.6499		
Atanrho_12	-1.2124***		
	(0.3803)		
Rho_12	-0.8374***		
	(0.1136)		

Constraints to maize commercialisation

The study also identified and ranked the challenges that farm households faced in their quest to participate in the maize market. Based on the results from the Kendall's coefficient of concordance (as shown in Table3), the most influential challenge is low demand for produce with mean rank of 2.98, followed by low selling price (3.13) and price instability (3.48). Low demand for produce implies that farmers will have to decrease prices in order to sell their produce. It thus means that, government might have to employ the national buffer stock system to buy these produce at a better price when it is harvested. This will help to ensure that, farmers sell at good prices after harvest and since most smallholder farmers are net consumers, the government can then re-sell it back to them at a moderate price. Transportation cost (3.60) is the fourth most influential challenge followed by default payment by customers (3.77). Again, with the low demand for farm produce, farmers might have to travel to farther markets within the country or neighbouring Burikina Faso or Togo to sell their produce or another farther town in the country which will increase the transportation cost. The poor road network linking many rural farming communities is another reason for the high transport cost because fewer buses ply those roads. The least ranked constraint is complaint about the bagging of the maize with a mean rank of (4.04). According to the respondents, they received low prices for their produce as a result of their inability to store the produce in anticipation of high prices. The net effect is that they received low incomes despite the fact that they participated in the market. The Kendall's coefficient of concordance (W) obtained from the analysis is 0.082 and the p-value is (0.0000). This means that even though the statistic is low there was general agreement in ranking by the different respondents.

Table 3: Kendall's Coefficient of Concordance Estimation results of the constraints to commercialisation

Constraints	Mean Rank	Test statistics	
Low demand for produce	2.98	Number of constraints	6
Low price for produce	3.13	Kendall's W^a	0.082
Transportation cost	3.60	Degree of freedom	5
Price instability	3.48	Chi-Square	9.891
Bagging	4.04	p-value	0.000
Default payment	3.77		

CONCLUSIONS AND RECOMMENDATIONS

Ghana's "Planting for Food and Job" programme aims to improve upon farmers' access to farm inputs and the output market. The idea is that through improved access to quality seed varieties, fertilisers and good agronomic practices, output would increase leading to increased market surplus. Motivated by this argument, this study examined the factors that influenced participation in PFJ programme and how participation influences maize commercialization in Savelugu Municipality in Northern region of Ghana. The recursive CMP estimation approach was applied as a way of controlling for selectivity bias, unobserved endogeneity and also to avoid the problem of weak instrumentation.

The results from the analysis reveal that about 56.8% of the farmers participated in the market and the average commercialization index was 30.29%. This indicates a relatively low commercialization index for maize, which did not come as a surprise to us given that maize is the main staple food in the study area. The estimation results showed that participation in PFJ programme increases maize commercialization level. In addition, yield increases commercialization, while gender, household size and membership of CBOs decrease commercialisation. Lastly, years of education, married people, non-farm engagement, membership of FBOs, farm size and land ownership significantly increased farm household participation in the PFJ programme. Employing the Kendall's Coefficient of Concordance, it was observed that the most pressing challenge or constraint faced by maize farmers in their commercialisation drive was low demand for produce, followed by low selling price and the least ranked constraint is complaint about the bagging of the maize.

Based on the conclusions above, the following policy measures are recommended. First, Ghana government's agricultural programme, Planting for Food and Jobs (2017-2022) encourages maize commercialization, suggesting that the Ministry of Food and Agriculture (MoFA) should increase educational programmes on the benefits of the PFJ programme to encourage farmers participation as this promotes maize commercialization. In addition, government should promote participation in PFJ programme by increasing farmers' access to education, promoting non-farm engagement and farmer-based organizations. Non-farm work may be promoted by taking advantage of the One District, One Factory (1D1F) development agenda to encourage farmers to engage in non-farm work. Considering increased yield as one of the factors that encourage commercialization, it will be helpful if MoFA broadens access to subsidized improved seeds and fertilizer in order to improve land and labour productivity so as to increase farmer's yield.

The study further recommends that, the national buffer stock should work hand in hand with the Ministry of Food and Agriculture in order to absorb surplus farm produce after harvest. Also, rural road network should be improved so as to help farmers transport their produce to the market.

Acknowledgement

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