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Agrekon

Agricultural Economics Research, Policy and Practice in Southern Africa

ISSN: 0303-1853 (Print) 2078-0400 (Online) Journal homepage: www.tandfonline.com/journals/ragr20

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To cite this article: Greenwell Collins Matchaya & Virginie Perotin (2013) The impact of cooperative patronage: The case of National Small Holder Farmers' Association (NASFAM) of Malawi in Kasungu District, *Agrekon*, 52:2, 75-103, DOI: [10.1080/03031853.2013.798066](https://doi.org/10.1080/03031853.2013.798066)

To link to this article: <https://doi.org/10.1080/03031853.2013.798066>



Published online: 11 Jun 2013.



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THE IMPACT OF COOPERATIVE PATRONAGE: THE CASE OF NATIONAL SMALL HOLDER FARMERS' ASSOCIATION (NASFAM) OF MALAWI IN KASUNGU DISTRICT

Greenwell Collins Matchaya** and Virginie Perotin*

ABSTRACT

This paper analyses the impact of individual farmers' participation in the National Smallholder Farmers' Association of Malawi (NASFAM). Precisely the paper analyses the effect of participation on credit market access, fertilizer use and total incomes of its participants in the Kasungu district of Malawi. NASFAM is a form of producer cooperative with a number of socio-economic functions. Using data on income per capita, fertilizer expenditure and access to credit, this paper tests the hypothesis that participation in NASFAM positively impacted incomes, fertilizer use and credit acquisition. Employing Propensity Score Matching methodology to estimate Average Treatment Effects (ATT) on programme members, this paper finds evidence that participation in NASFAM had a positive effect on all the endogenous variables. Membership enhances household level incomes, fertilizer use and credit acquisition and is hence in line with national goals of poverty reduction, the Comprehensive African Agriculture Development Program (CAADP) principles, the SADC's Regional Indicative Strategy Development Plan (RISDP) and the achievement of the Millennium Development Goals. Based on these findings and the fact that credit and fertilizer access are still problematic in Malawi's rural areas, it appears that there is great need for NASFAM to expand to areas where it currently does not have activities. Such expansion would ensure food security over a wider range of rural households through improved input access.

Keywords: NASFAM, impact, cooperatives, Malawi, participation, propensity score matching

JEL: Q12, Q13; Q18

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Agrekon

Vol. 52 (2) 2013 • ISSN Print 0303-1853/Online 2078-0400

© Agricultural Economics Association of South Africa pp 75–103

DOI: 10.1080/03031853.2013.798066



Routledge
Taylor & Francis Group

UNISA



1. INTRODUCTION

Tight liquidity constraints continue to be one of the many constraints that bedevil agricultural production, thereby undermining rural livelihoods. The pervasive weaknesses in rural credit, insurance, input and output markets of developing countries, serve only to further tighten the liquidity problems and make it difficult for smallholder farmers to realise their productive potential (Ellis, 1993; Obare *et al.*, 2006; Shiferaw *et al.*, 2006). In general, most of the sub-Saharan rural areas are characterised by thin markets, missing markets and asymmetric information between buyers and sellers (Obare *et al.*, 2006). Other constraints to productivity and food production in sub-Saharan Africa (SSA) are degrading natural resources, limited and uncertain rainfall, and poor infrastructure and service support (Dey *et al.*, 2010). On top of the above, efforts to modernize agricultural production through a green-type revolution appears to be facing many problems because of the transaction costs and other reasons related to rural infrastructure (Kydd *et al.*, 2004; Reardon *et al.*, 1999). As a consequence, the agricultural sector, which provides income and livelihood to the majority of people in SSA, is characterized by low and in many locations decreasing productivity such that raising agricultural productivity is crucial to increase food production and to generate employment (Meier and Rauch, 2000). Rural development policies that deliberately endeavour to address the imperfections highlighted above could perhaps be useful in any efforts to free rural farmers from chronic poverty.

Being among the world's least developed countries, Malawi has a large proportion of people living in the rural areas and earning their living from agriculture. Not surprisingly, a majority of its rural population faces many difficulties in agricultural production. There appears to be a realization among the third sector institutions too that efforts in favour of rural poverty reduction must aim to resolve the market imperfections in various markets of importance to farmers. One of the organisations involved in work aimed at this is the National Association of Smallholder Farmers of Malawi (NASFAM), which was formed in 1997 by smallholder farmers. NASFAM's goals in organizing the farmer groups are to help farmers in the marketing of their farm produce; and to help them get access to markets for output and inputs which normally do not have well-defined or readily accessible markets (markets for ground nuts, beans, soy beans, fertilizers, modern seeds and others which do not have readily accessible markets in Malawi). The cooperative also helps farmers to transport agricultural produce to markets at relatively cheaper prices per unit of transported items than other alternatives. Despite the potential importance of NASFAM, no rigorous studies known to the author have been carried out to understand NASFAM's impacts.

The objectives of this paper are to (1) assess the impacts of membership/participation in NASFAM and (2) determine other major factors that determine

how much participants in NASFAM gain from participation. The issue of determinants to participation has been extensively dealt with in Matchaya (2010). The results potentially provide valuable insights for other donor and/or civil society driven organisations with similar goals to help rural people through cooperatives. The novelty of this paper is in the application of the powerful but rarely used propensity score matching methods to understand the impact of cooperatives in a developing country setting. The paper adds to the recent literature on the impact of cooperatives by using a different and more adaptable methodology. Rather than using traditional matching methods to solve the sample selection problem that bedevil similar studies, this paper implements propensity score matching. This method is able to match households simultaneously in as many dimensions as needed, and thus it overcomes the “*dimensionality curse*” that troubled earlier findings in traditional matching studies (Li and Zhao, 2006). The study also further adds to the blossoming but currently narrow pool of cooperative impact literature for developing countries..

The rest of the paper is organised as follows. Section 2 presents background to NASFAM and producer organizations; section 3 presents data sources, while section 4 discusses theoretical roles of Rural Producer Organizations (RPOs) and further presents a theory of programme evaluation. Section 5 presents results and discussion, whereas Section 6 finally presents conclusions and recommendations.

2. BACKGROUND TO NASFAM AND PRODUCER ORGANIZATIONS

NASFAM emerged as the result of USAID-funded projects. The first project was initiated in 1994/1995 with the objective of increasing the number of smallholder burley tobacco producers and their returns from growing tobacco (Arnesen *et al.*, 2002). The next project, Smallholder Agribusiness Development Project, focused on supporting decentralized Agribusiness Development Centres (ADC), which were designed to promote the development of smallholder farmers’ clubs consisting of 10–20 individual farmers collaborating on procurement, marketing and shared transport. These clubs make up Group Action Committees (GAC) with an aim of increasing bargaining powers and facilitating the dissemination of new technologies and improved agribusiness system through information, demonstrations and training. These in turn form farmers’ organizations that are registered under the Trustees Incorporation Act and operate as corporate bodies. NASFAM was formally established in 1997 and today, it boasts 35 components called associations, serving circa 90 000 members. The organisation has potential for profitable crop diversification, thereby reducing dependency on one cash crop such as tobacco. It has also successfully linked with the credit association (MUSCCO). This has diversified the local credit market since NASFAM has

established links with national banks and several credit institutions (Arnesen *et al.*, 2002). This is crucial for poor farmers. NASFAM covers a larger area in Malawi but this research was conducted in Kasungu District in the Central region of Malawi, an area where agriculture has a great potential. In general the farmers involved were of low incomes deriving a greater part of their living from agriculture as opposed to off farm business.

2.1. Mission and objectives of NASFAM

NASFAM's mission is to operate a sustainable smallholder-directed network that increases rural incomes and addresses food security issues through expanded business opportunities diversification, market access and improved productivity whose activities are centred on the following objectives:

- (1) To facilitate smallholder empowerment through improved information, training and advocacy;
- (2) To improve land use management practices of smallholders;
- (3) To improve the economic and social conditions of the smallholder farmer through direct interaction with, and intervention for, member organizations;
- (4) To improve the business, financial and marketing management capability of smallholder member organizations;
- (5) To improve the economic and social conditions of the smallholder farmer through direct interaction with, and intervention for, member organizations;
- (6) To promote the participation of women in institutional development. At the club level, farmers are interested in improved livelihood opportunities and security. These can be achieved through improved access to input and output markets, access to financial services (mainly credit), advocacy, education and others (World Bank, 2001). These functions imply that farm/household level outcomes such as income, fertilizer application and credit acquisition, among other things, could reasonably be expected to improve.

2.2. Rural producer organizations

Rural producer organizations (RPOs) are membership organizations created by producers to provide services to them. They differ from service NGOs, which also provide services to producers (Bosc *et al.*, 2002). One dimension of RPOs is that they are democratically managed. Mercoiret and Mfou'ou (2006) argue that RPO action improves the production and living conditions of rural populations and changes relations between rural societies and their environment.

However, it is often difficult to sort through the very diverse forms of rural organizations that exist for different purposes and at different levels (local, regional

and national levels). In all rural societies, traditional forms of organizations exist with an inward-oriented or “bonding” function to facilitate collective actions, mitigate the uncertainties of agricultural production and regulate relations within the groups. In contrast, formal producer organizations are often created to organize the relationships between the group concerned and the outside world, a “bridging” function. However, formal producer organizations have elements of both: they are rooted in local customs, while economic principles for organizing tend to prevail. Other differences have to do with inclusion: everybody in the society is inherently a member of traditional groupings (Bosc *et al.*, 2002). Formal producer organizations tend to be more exclusive.

Rural Producer organizations (RPO) perform *advocacy or policy* functions (syndicates or unions), *economic and technical* functions, and sometimes local development functions (when decentralization has yet to take place and local governments do not exist). Many RPOs tend to address the three above-mentioned functions to various degrees. RPOs are also very diverse in terms of scale: they can be only local entities (at village and inter-village levels), or be represented up to the regional and national levels (unions and federations). Functions and level of organization are often related. According to Bosc *et al.* (2002), lack of economic opportunities and access to resources contribute to poverty, a condition that is also profoundly affected by empowerment. In the competition for economic and political power, the voices of the poor, particularly the rural poor, are usually not heard. They cannot access services or means of production, and have limited influence, if any, in bargaining processes. Rural producer organizations, if well planned, may reverse the plight of such poor people.

“Producers” is a term that encompasses all aspects of natural resource management, including crop production, livestock, forestry and fisheries, as well as processing agricultural products. One producer strategy to help the poor emerge from poverty is organizing them to (a) more effectively manage their own assets; (b) gain access to services, inputs, credit, and markets; and (c) to have more effective input in decision-making processes that affect their livelihoods. When poor producers band together, they gain bargaining power. One way of contributing to the fight against rural poverty, and to address two of the four dimensions of rural poverty – empowerment and capabilities are to help producers in their efforts to build their capacities (World Bank, 2000; Narayan, 2000). Strengthening the capacity of producer organizations is also an investment in social capital that complements investments in other forms of capital – natural, human, physical, and financial (Dasgupta and Serageldin, 2000).

2.3. Transaction costs and goods/input market access.

When costs of undertaking transactions are very high, which is typically the case in rural settings, farmers may not readily perceive signals from markets for credit, inputs, output and labour even if they work well. On the other hand, the high transaction costs may bedevil the proper functioning of markets. When markets are imperfect, farmers in the rural areas face a problem of constrained maximization. They cannot be expected to make similar decisions as farmers facing perfect markets. It is logical to think that activities of NASFAM (which aims to enhance market access), if effective, should better the conditions of participating farmers. This is because on average, one should expect NASFAM members to have better access to markets. The training offered by NASFAM aids their decision-making whose outcomes might be reflected in their livelihoods. Besides, group work creates economies of scale and gives them market power though there is always a cost of organising group participants and the larger the group to organize the larger the value of costs associated with organization. Indeed, for various reasons, size of income, risk of default and the lack of collateral, small holder farmers rarely have access to formal channels of credit at competitive interest rates (Ellis, 1993).

2.4. Hypotheses

Rural producer organisations have a function of providing services to members and it is these services that in turn help explain farmers' propensity to become members. It has already been stated that one of the objectives for farmers to join and continue to be members in NASFAM is to have improved access to input and output markets, besides endeavouring to improve access to financial services (mainly credit). It is plausible therefore to evaluate the impact of the programme by, among other criteria, analysing changes in credit acquisition, fertilizer market participation etc.

On the other hand, a great deal of literature on farmers' behaviour report that farmers are rational and that the rational decisions they take are reflected in their decision making. It would therefore be interesting to examine the impact of membership to NASFAM on incomes per capita. If NASFAM is positively impactful then membership in NASFAM should lead to increased credit access to members, it should lead to increased market (fertilizer) participation and it should increase incomes per capita of members. It could be argued that rural producer cooperatives are complex structures with a multiplicity of goals such that the analysis of their impacts is cumbersome. While this is indeed true, it is still very useful to have an approximation of how the beneficiaries of these interventions are affected. The overall hypothesis is therefore that membership to NASFAM increases household level incomes through its positive effect on family level credit access and fertilizer access. The relationships are hence somewhat recursive.

3. DATA AND METHODS

Data used in this study captures household characteristics, production and income activities and had originally been collected by the corresponding author with a team of researchers from the Agricultural Policy and Research Unit at Bunda College, with funding from the Norwegian government. It is cross sectional data and was collected from Kasungu district in Malawi in 2003 using a household questionnaire on households selected at random in two stages. The first stage involved randomly selecting households from villages earmarked by NASFAM as potential areas where the programme may be introduced in the near future should resources be available. The second stage involved randomly sampling households that were NASFAM members. It is important to note that at the time of the research cooperatives such as NASFAM were in short supply and also that NASFAM did not force households to join it. There was a seemingly market and location specific fee for membership, which makes it a plausible case for programme evaluation using the counterfactual outcomes framework discussed in the next section.

The data collection exercise spanned 250 households. The data included 125 random households of individuals participating in NASFAM activities, 125 random households of non-members from areas where NASFAM did not have activities. The fact that the non-member household were drawn from villages that were earmarked by NASFAM for future intervention ensured that there was not much heterogeneity between the treated group and the comparison group. This was an important step in a bid to compare like-with-like based on observables. The question of the effect of unobservables in the decision to select into and make use of the programme pales upon realising that the intervention was managed from the supply side (De Janvry *et al.*, 2010).

Data on credit and fertilizer purchase consists of values that appeared at the beginning of a growing season while income data consists of observation at the end of the growing season.

From table 1 below, it can be seen that the average per capita income for members to NASFAM (where member is one) was greater than that of non-members (where member takes the value of zero). The average per capita income for members to NASFAM was US\$391.51 (antilog of 5.97) or MK46980 with a standard deviation of US\$2.35 (MK282.45) at current prices. The average per capita income for interviewees who were not members to NASFAM was US\$199.54 (MK23944) with a standard deviation of US\$2.14 (MK253.79) at current exchange rates. The means of fertilizer expenditure, that of land per capita and credit acquired per capita, were slightly larger for members than for non-members, while dependency ratios (cw-ratios) were on average greater for non-members than for members. There was a slight difference in terms of the means for the indicator variable for education with the mean for members, being slightly

greater than for non-members and most of the people who joined NASFAM had fewer opportunities outside the farm compared with the non-members.

From a theoretical point of view, provided that the treatment induces adoption for all farmers who would adopt under real-world conditions while not inducing adoption for real-world non-adopters, the Local Average Treatment Effect (LATE) gives the desired quantity for impact analysis of a technology/intervention: the ATT plus the average spill-over effect per adopter (De Janvry *et al.*, 2010). The *local average treatment effect* (LATE), introduced by Imbens and Angrist (1994), identifies the causal effect of programme participation on a restricted sub-sample of potential beneficiaries that meet the eligibility criteria. Because NASFAM targeted broad areas such as entire villages with its programmes, it is similar to using supply-side interventions where the new technology is introduced to entire villages (De Janvry *et al.*, 2010), which is important if regression models are to capture the true Average Treatment Effect on the Treated (ATT) including any spill-overs. The spill-overs could arise because adopters of the NASFAM programme could create other opportunities including employment for non-adopters. If the intervention were not randomised at the village level, analysis of household data seeking to capture the effect of the intervention would not pin down the true ATT.

The analysis presented in this article can be divided into two parts: the first part identifies factors determining membership to NASFAM and thus establishes which technical, socioeconomic, institutional and policy factors are associated with the decision to join NASFAM. In part two, the impact joining NASFAM on household level credits access, fertilizer and incomes, is assessed using Propensity Score Matching approach to the analysis of Treatment effects. The overall hypothesis is that membership to NASFAM increases household level incomes through its positive effect on family level credit access and fertilizer access. The relationships are hence somewhat recursive. The section below discusses an evaluation framework that purports to judge the cooperative against some counterfactual outcome.

4. THE THEORY OF PROGRAMME EVALUATION

When thinking about programme evaluation, it is often very useful to make two distinctions. In the first place we should distinguish between research describing the outcomes between different groups (also known as monitoring) and evaluation that focuses on particular policies and interventions. Second, in the evaluation context, it is useful to distinguish between descriptive research that outlines the intended design and actual implementation of a particular policy or intervention and evaluative research that assesses how well a policy works (Cobb-Clark and Crossley 2003). Human Resource Development Canada (1998) for example classifies evaluation methods into first, methods that aim to determine if the

programme has been implemented as planned (process evaluation) and second, methods that measure whether the programme has succeeded in meeting its objectives (summative evaluation). This paper focuses on the summative evaluation and not the former.

Essentially, summative evaluation involves working out how individuals' outcomes were altered by a programme or policy (Cobb-Clark and Crossley, 2003). To do this we need to know what individuals' outcomes would have been had they not participated in the programme and how this differs from what we in fact observe. The difference in these two outcomes is the programme's impact. Unfortunately the counterfactual outcome is not observed and a way of estimating it must be devised. The key difficulty in summative evaluations lies in identifying a suitable counterfactual (Cobb-Clark and Crossley, 2003).

Whatever method is chosen, it must assume either that programme impact is homogeneous (meaning that programme effects are the same across individuals) or that it is heterogeneous (implying that programme effects do not necessarily have to be the same but can vary across individuals). In general estimation strategies of impact assume the following:

- (1) An assumption about how untreated outcomes vary across individuals. This in turn suggests how the counterfactual untreated outcomes of programme participants should be estimated.
- (2) A way in which the estimator aggregates or weights the programme impacts of different individuals in the treatment group (Cobb-Clark and Crossley, 2003).

4.1. The evaluation problem and the potential outcomes framework

Today the potential outcomes framework is the standard way of thinking about the evaluation problem. This framework is outlined as follows:

Suppose we wish to evaluate the impact of participation in a programme (for example NASFAM) on for example income, it is necessary to refer to the NASFAM as "treatment". Suppose Y_{1i} and Y_{0i} denote the realization of random variables Y_1 and Y_0 (which capture the outcome for an individual i , if she does and does not receive the programme, respectively), and then the impact of NASFAM is:

$$\Delta_i = Y_{1i} - Y_{0i}. \quad (1)$$

For those who receive the treatment we observe only the participation outcome (Y_{1i}) and only (Y_{0i}) – a non-participation outcome for those who do not participate leading to a fundamental problem in determining causality (Holland 1986). That is, for each individual the only observed outcome is:

$$Y_i = D_i Y_{1i} + (1-D_i)Y_{0i} \quad (2)$$

where D_i is a dummy variable indicating the incidence of participation. For no individual do we expect to observe more than one of (Y_{1i}, Y_{0i}) . Consequently, the programme's impact on an individual is never directly observed. This formulation is often referred to as the potential outcomes framework developed by Rubin (1974). The latter model captures heterogeneity in programme impacts as well as in untreated outcomes. Nevertheless it only evaluates partial effects and not general equilibrium effects.

4.2. Parameters of interest

Two parameters are frequently estimated in literature. The first one is Population Average Treatment Effect (ATE), which is $E(\Delta_i)$. This is simply a weighted average of the average treatment effect for the treated and untreated populations assuming random selection of an individual (Heckman, 2001). Mathematically,

$$E(\Delta_i) = E[Y_{1i} - Y_{0i} | D_i = 1]p(D_i = 1) + E[Y_{1i} - Y_{0i} | D_i = 0]p(D_i = 0) \quad (3)$$

The second parameter of interest is the Average Treatment Effect on the Treated (TT). This is the outcome gain from treatment for those who actually select into the treatment (Heckman, 2001). Mathematically,

$$E[\Delta_i | D_i = 1] = E[Y_{1i} | D_i = 1] - E[Y_{0i} | D_i = 1] \quad (4)$$

In the models above, $E[Y_{1i} | D_i = 1]$ can readily be estimated given data on outcomes of programme participants. On the other hand, Y_{0i} is not observed for participants unless one has baseline data. A possibility is to use outcomes of non-treated individual as a proxy of the state of participants had they not received treatment:

$$E[Y_{1i} | D_i = 1] - E[Y_{0i} | D_i = 0] = E[\Delta_i | D_i = 1] + (E[Y_{0i} | D_i = 1] - E[Y_{0i} | D_i = 0]) \quad (5)$$

In this model, the second term on the right hand side captures the bias due to selection, that is, that those who select into the programme have different untreated outcomes than do non-participants (Cobb-Clark and Crossley, 2003). All the methods that have been developed to capture impact of a programme in this case try to effectively estimate the untreated outcome Y_{0i} , while attempting to reduce selectivity bias.

4.3. Methods developed to capture impact.

The gold standard for programme evaluation is the randomised experiment used in fields such as medicine, and natural sciences in which other conditions can be controlled properly (Ohkusa, 2002). However, in the field of economics, because such randomized experiments need considerable time and money, and have serious ethical problems, it is very difficult to utilize them (Ohkusa, 2002). Instead, Instrumental Variables (IV), Selection Models and Matching methods are sometimes used. This paper uses Propensity Score Matching (using a kernel density estimator, stratification, radius, and nearest neighbour methods), which is discussed below.

4.3.1. Propensity Score Matching

Propensity score matching is a non-experimental method for estimating the average effect of social programmes (Rosenbaum and Rubin, 1983; Heckman *et al.*, 1998). To implement the propensity score matching, for every member of the treatment group, one or more members in a control group are selected on the basis of similar observed (and relevant) characteristics. The technique involves forming pairs, not by matching every characteristic exactly, but by selecting groups that have similar likelihoods of being included in the sample as the treatment group. The technique uses all available information to construct a control group. Rosenbaum and Rubin (1983) showed that the propensity score matching method makes it possible to create a control group *ex post* with characteristics that are similar to the intervention group that would have been created had its members been selected randomly before the beginning of the project.

This methodology has received much attention recently in econometrics (Heckman *et al.*, 1997). The underlying identification requirement of the matching methodology is that the programme choice is independent of outcomes conditional on a certain set of observables. While intuitively attractive in that the method replicates features of randomized experiments within observational data, the identification requirement excludes a possibility that the programme-choice decision could be correlated with the outcomes given the set of observables (Heckman *et al.*, 1997; 1998). Selectivity bias and spillover effects are problematic in these studies, but getting control households away from the programme site has the advantage that spill-over effects may be minimized.

Selection problems arise because one's decision to join a programme may be determined by other factors, for example education. It is then possible that members of a programme could have higher incomes just because they are well educated and hence higher education influences their incomes positively. In this case, to compare incomes of people outside and inside the programme, one needs

to find out about all variables influencing the decision to join the programme in order to estimate the outcome equation jointly with the equation to join the programme.

Owing to the recursive nature of the membership, credit, fertilizer and income equations that are dealt with in this paper, one possible way of estimation is through Zellner's Seemingly Unrelated Regressions (SUR) (Zellner, 1962) to ensure that correlations across equations are exploited, and estimation is efficient. The fact that the system had equations with continuous and dichotomous dependent variables implies that Zellner's SUR may not be the most appropriate as it would treat the dummy variable in the membership equation as continuous. The other possibility is to use Roodman's Conditional Mixed Process (CMP) estimator, which ideally estimates the equations together and does not make any assumptions about the nature of the dependent variables (Roodman, 2007). The experimental trials with the CMP models appeared to fail to achieve convergence perhaps because its set-up requires a lot of observations as many parameters have to be estimated. Ultimately, the study used the Propensity Score matching (PSM) methodology for programme evaluation discussed in Wooldridge (2003) and now widely applied in empirical work in this area (De Janvry *et al.*, 2010). Moreover, PSM is particularly useful here because the comparison group considered for this paper was mostly drawn from an area where the inhabitants were not offered an opportunity to join NASFAM.

In this study the decision to join NASFAM is thought to include several variables including distance from Kasungu NASFAM headquarters to villages where households were sampled.¹ The propensity score is obtained by running probit on z in equations below. The propensity scores are then used as in deciding which households among programme non-participants are similar to programme participants, for purposes of comparisons². Matching the samples was based on the explanatory variables (age, education, distance, land per capita). This makes it possible for any differences in the outcome variables to be attributed to the incidence of membership in NASFAM. Comparison would not have made any sense in the absence of some matching, as any differences in outcome variables between the two groups would result from anything else.

For the credit equation, the estimation of programme impacts on the amount of credit acquired was conceptualized as follows:

$$y_1 = \beta_1 x + d_1 z_{nasfam} + e_1 \quad (\text{the amount of credit equation}) \quad (6)$$

$$z = \beta_3 w + e_2 \quad (\text{the decision to join nasfam equation})$$

Y_1 is the logarithm of credit acquired; z is a membership dummy, while x includes age, education and sex of household head, female and male labour, consumer worker ratio, of farm income sources, land owned and tobacco activity; w stands for the factors that may affect the decision to join NASFAM. Among w is a variable (distance from NASFAM HQ to each household) that is highly correlated with membership to NASFAM but is ignorable in the credit equation. This variable identifies the system of equations and can also be considered literally as an instrument. In the event that error terms e_1 and e_2 are correlated Ordinary Least Squares (OLS), estimation of y_1 is inconsistent. How these might affect the dependent variable is discussed under expected signs section below.

For the income problem we can write

$$y_2 = \beta_1 x + d_1 z_{nasfam} + e_1 \quad (\text{income equation}) \quad (7)$$

$$z = \beta_3 w + e_2 \quad (\text{the decision to join nasfam equation})$$

Where y_2 is logarithm of income per-capita, while z is a dummy for membership into the cooperative and x contains age, education and sex of the household head, dummy for tobacco activity, land holding, household size, membership to NASFAM, male and female labour, credit access, fertilizer expenditure and consumer worker ratio. The section on expected signs gives a theoretical note on how these variables may affect the dependent variable.

For the fertilizer problem we can write:

$$y_3 = \beta_1 x + d_1 z_{nasfam} + e_1 \quad (\text{fertilizer expenditure equation}) \quad (8)$$

$$z = \beta_3 w + e_2 \quad (\text{the decision to join nasfam equation})$$

Where y_3 is the expenditure on fertilizer, z is the membership dummy and x contains land owned, education, sex and age of household head, dummy for tobacco production, consumer worker ratio, credit market participation variable, male and female labour force, household size, off farm activities and consumer worker ratio.

Table 1: Descriptive Statistics. Summary statistics: mean, sd, min, max in that order by categories of: member

Membership	Log Income per capita (US\$)	Age of house head	Sex of house head	Education of house head	C-w ratio	Tobacco dummy	Log Off farm income per capita (US\$)	Land per capita	Log Credit per capita(US\$)	Log Fertilizer per capita(US\$)
Non-member	5.296	37.52	.89	3.49	.798	.74	.66	.171	.097	.312
	.749	13.945	.314	.905	.609	.441	.197	.079	.190	.204
	2.807	20	0	2	.333	0	0	-.049	-.096	0
Member	6.556	80	1	5	3.5	1	1	.339	.632	.755
	5.970	39.57	.83	3.75	.778	.94	.55	.256	.537	.799
	.856	12.786	.377	.869	.124	.239	.359	.169	.488	.413
	3.161	21	0	1	.333	0	0	-.199	-.011	0
	8.581	75	1	5	1	1	1	.896	2.140	2.302

Tobacco is a dummy and =1 if a farmer grows tobacco and 0 otherwise, off farm measures off farm income; C-Wratio is the number of consumers per worker in a household; sex is sex of household head and =1 if one is male and 0 otherwise; age of the household head is in years; education is a score variable (standards 1-3 =1; 4-6=2; 7-8=3; forms 1-2=4 and forms 3-4=5). Land per capita is in acres and it is transformed into logarithms.

Table 2: Independent Sample Means Tests for continuous variables

	Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Sig. (2-tailed)
AGE of head	Equal variances assumed	0.240	0.625	-1.983	0.039
	Equal variances not assumed			-1.983	0.039
Consumer-worker ratio	Equal variances assumed	0.635	0.266	-0.320	0.750
	Equal variances not assumed			-0.320	0.750
Distance from NASFAM headquarters	Equal variances assumed	0.789	0.144	-15.395	0.000
	Equal variances not assumed			-15.395	0.000
Land holding	Equal variances assumed	0.046	0.830	1.996	0.037
	Equal variances not assumed			1.996	0.037

The table reports results of independent samples means tests for the variables grouped by NASFAM membership. The Levene's test result for equal variances indicates that the null hypothesis of equal variances cannot be rejected and the results are read with respect to the equal variances assumed rows. Except in the case of consumer/worker ratio, the results confirm that the two groups (members and non members of NASFAM) were slightly different in terms of the concerned variables. A more relatively robust analysis needs to include all the relevant variables in a regression setting because many factors could be at play.

4.4. Empirical model

To test the hypotheses in this paper we use Propensity Score Matching approaches on models 1-3 whose theory has been discussed above and whose variables are discussed below.

$$Member = \beta_{1,1} + \beta_{1,2}age + \beta_{1,3}agesquare + \beta_{1,4}sex + \beta_{1,5}educ + \beta_{1,6}cwratio + \beta_{1,7}Dtobcco + \beta_{1,8}offfarm + \beta_{1,9}land + \beta_{1,10}dis\ tan\ ce + e_1$$

$$\text{Credit} = \beta_{2,1} + \beta_{2,2}\text{age} + \beta_{2,3}\text{agesquare} + \beta_{2,4}\text{sex} + \beta_{2,5}\text{educ} + \beta_{2,6}\text{cwratio} + \beta_{2,7}\text{Dtobacco} + \beta_{2,8}\text{offfarm} + \beta_{2,9}\text{land} + \beta_{2,10}\text{member} + e_2$$

$$\text{Fertilizer} = \beta_{3,1} + \beta_{3,2}\text{age} + \beta_{3,3}\text{agesquare} + \beta_{3,4}\text{sex} + \beta_{3,5}\text{educ} + \beta_{3,6}\text{cwratio} + \beta_{3,7}\text{Dtobacco} + \beta_{3,8}\text{offfarm} + \beta_{3,9}\text{land} + \beta_{3,10}\text{credit} + \beta_{3,11}\text{member} + e_3$$

$$\text{Income} = \beta_{4,1} + \beta_{4,2}\text{age} + \beta_{4,3}\text{agesquare} + \beta_{4,4}\text{sex} + \beta_{4,5}\text{educ} + \beta_{4,6}\text{cwratio} + \beta_{4,7}\text{Dtobacco} + \beta_{4,8}\text{offfarm} + \beta_{4,9}\text{land} + \beta_{4,10}\text{credit} + \beta_{4,11}\text{fertilizer} + \beta_{4,12}\text{member} + e_4$$

In the above models β_j are impact parameters while member is a dummy variable taking the value of 1 if one becomes a member of NASFAM and 0 otherwise; credit, land, fertilizer and income capture the household's per capita amount of credit acquired, per capita land, per capita fertilizer and per capita income, respectively, and these are in logarithms. *Dtobacco* is a dummy equalling one if a household grows tobacco and 0 otherwise; age, sex and educ are age, sex and education of a household head. *Offfarm* captures a household's off farm opportunities while consumer worker ratio is the ratio of consumers per number of adults capable of working in a household. Studies have shown that gender (*sex*) plays a role in decision making when it comes to the adoption of new technologies (Doss and Morris, 2001; Adesina *et al.*, 2001). Generally, in sub-Saharan Africa, women have greater difficulty than men in obtaining labour needed for land preparation activities (Doss and Morris, 2001). Nevertheless, women may desire to join such farmer groups as a way of strengthening their bargaining power in markets for inputs and outputs. It was therefore hypothesized that (*Sex, which takes 1 for male*) could take either sign in the membership equation. It was, however, expected that *sex* would be positive in the income, credit as well as fertilizer expenditure equations partly because men had more opportunities than women which made it easier for them to acquire credit, necessary for the purchase of fertilizer leading to higher incomes.

Consistent with previous studies (Alavalapati *et al.*, 1995; Adesina *et al.*, 2001; Doss and Morris, 2001), it was expected that the age of the household head (*AGE*) would have a positive relationship with membership, but age squared will be negative signifying that as age increases a household may become risk averse and may not want to join such demanding ventures. *AGE* was expected to have positive signs in the credit, fertilizer and income equations because it was assumed that *AGE* had a positive correlation with one's asset holding, which could serve as collateral in other credit sources. Income sources may also increase with age as one's children become sources of remittances, while fertilizer expenditure might

increase with age mimicking the growth of a household as age increases. The age-squared was included to capture nonlinearities in the *AGE*-income relationships. The education level of the farmer (*EDUC*) was expected to have a positive impact on the decision-making process. It was expected that heads of households with more years of education understood the benefits of membership to a cooperative resulting in membership. It was expected that education positively impacted fertilizer use, credit acquisition and incomes. This is consistent with other studies that have shown that education leads to productive farming.

Farmers with more sources of income can afford to purchase chemical fertilizers. As such, it was hypothesized that farmers with more sources of income were less likely to join NASFAM and therefore (*offarm*) was expected to have a negative relationship with membership. Off-farm income may also have a negative impact on credit and fertilizer use but should have a positive impact on income per capita as the latter is the sum of all kinds of incomes. Consumer worker ratio (*cw ratio*) is the household's dependency ratio and it was hypothesized that the larger it was the poorer the household in terms of labour. It was expected that consumer to worker ratio was negatively related to income, credit and fertilizer use.

The land area held by the household in acres was expected to have an ambiguous sign in the membership equation but would positively affect credit acquisition, fertilizer use as well as income per capita. *Log of distance* is the logarithm of the distance from the offices of the cooperative to the village where the household was located. It was hypothesized that the greater the distance from a farmer's household to the cooperative offices in Kasungu, the less likely the household would have heard about the importance of NASFAM from field officers and hence the less likely they would become members, implying a negative relationship. The distance variable is an identification variable in the member equation that does not necessarily affect impact (fertilizer use, credit acquisition and income).

Dtobacco is a dummy variable stating whether a household grows tobacco or not. It was hypothesized that in general households, which grew cash crops requiring more fertilizer, were likely to join the cooperative in the quest for fertilizer credit or any other agricultural resources that would boost their cash crop farming. *Dtobacco* was expected to have positive signs in the credit, fertilizer use and income equations. Credit acquired before the start of a growing season was expected to impact positively on the amount of fertilizer use in the following growing season as well as on incomes realized from farming at the end of that farming year. Fertilizer use and as credit were therefore expected to positively impact income.

5. RESULTS DISCUSSION

In the next few pages we present results from Propensity score matching using a Kernel density estimator to answer the hypotheses posed in this paper. Of special focus in the results that follow is the dummy for membership to NASFAM or not. Our concern is about its magnitude, its sign, and its statistical significance. We first present results from probit analysis of the decision to become a member and it is from this model that propensity scores are obtained, which are then used as a variable matching and then calculating the programme impacts. As we have already argued, this kind of method helps in reducing endogeneity (selection bias therefore) resulting from selection on observables. This nonparametric “propensity-score matching” (PSM) method is discussed in Becker and Ichino (2002), Rosenbaum and Rubin (1983) and is in line with Heckman’s two-step procedure (Heckman, 1979). The procedure is such that after farmers’ propensity scores are estimated, the households are partitioned into groups with similar basic characteristics. Then members and non-members are compared within these groups. This step ensures that a like-with-like comparison is achieved (Greene, 2003).

5.1. Membership

Understanding determinants of membership ensures that information is available for authorities at the heart of development policy. If RPOs favour the educated, the resourceful, or men only for example, then development interventions seeking to reduce poverty among the poorest would have to use other avenues than RPOs (Arcand and Fafchamps, 2006).

Table 3: Determinants of membership to NASFAM (reporting marginal effects)

Dependent-membership	dF/dx	Standard error
Log of land holding	0.136***	0.054
Off farm income	-0.022**	0.011
Log of distance	-0.907***	0.13
Consumer-worker ratio	-0.095	0.1
Tobacco dummy	0.383***	0.122
Sex of house head	0.272**	0.125
Age of house head	-0.025***	0.01
Education of house head	0.14**	0.068
Age squared of head	-0.0001	0.001

Note. Significance levels: * 10%, ** 5%, *** 1%

Table 3 reports the results from the probit regression, showing changes in reporting the change in the probability for an infinitesimal change in each independent, continuous variable and, by default, the discrete change in the probability for dummy variables. All variables with statistically significant estimated coefficients had the expected signs. The consumer-worker ratio and the square of age had the expected signs but were not significant. The likelihood ratio statistic of 194.929 (9 degrees of freedom (df), $p < 1$ per cent) shows that at least one of the estimated parameters in the probit model is statistically significantly different from zero. The model also correctly predicted 89.5 per cent of the outcomes.

The results from Table 3 show a negative relationship between age and the likelihood of joining NASFAM. This finding is consistent with this study's hypothesis and the findings of Estrin & Jones (1995). It implies that a 10 per cent increase in age of a farmer would lead to a 0.2 per cent reduction in the likelihood that the farmer might join NASFAM.

Table 3 also shows that distance is negatively related to the likelihood of joining NASFAM, again confirming the prediction that would emanate from transaction cost and location distance. The results show that a 10 per cent increase in distance between NASFAM headquarters and the farmer's location leads to a 9 per cent decrease in the probability that a farmer would join NASFAM. This seems plausible as it was learned from farmers that field officers were rarely seen in remote areas where they were normally expected to work.

Land holding had the expected positive effect and this result is consistent with previous findings by Chambers & Foster (1983) and Klein *et al.* (1997), and with this study's hypothesis about the impact of household assets. The result shows that a 10 per cent increase in household land holding leads to a 1 per cent increase in the probability that a farmer would join NASFAM. Tobacco farming had the expected positive effect, implying that, keeping all other factors constant, farmers who rely on tobacco are associated with a higher probability of joining NASFAM in Kasungu District. This result seems plausible considering that membership of NASFAM, as argued above, increases the chance that a farmer will get credit in the form of money or fertiliser. The results show that a farmer's probability of joining NASFAM increases by 0.4 per cent upon adopting tobacco farming.

Off-farm income was negatively related to the decision to join NASFAM, consistent with this study's hypothesis about sources of income (see above), and the findings of Klein *et al.* (1997) and of Thangata and Alavalapati (2003). This finding implies that farmers with non-farming sources of income had a lower probability of joining NASFAM. The results showed that a change in status from being less dependent on off-farm sources to being more dependent leads to a 0.02 reduction in the probability that a farmer would join NASFAM.

The education of the farmer was positively related to the decision to join

NASFAM, again consistent with what was hypothesised in this study. It is also in line with the findings of Sidibe (2005). The results showed that an increase in farmer’s education level would increase the probability of joining NASFAM by 0.1 per cent. The estimated parameter for sex was positive, suggesting that male-headed households had a higher propensity to join. A discrete change from female to male increased the likelihood of joining NASFAM by 0.3 per cent. This finding again supports what this study hypothesised, and also the findings of Adesina *et al.* (2000). The forgoing model is further used to generate the propensity scores, which are again used in the matching exercise for purposes of identifying individuals from the control group with similar characteristics to those from the treated group (NASFAM members). The propensity score matching was achieved using Kernel density estimator based on the characteristics of age, education, land holding, off-farm employment, gender, consumer-worker ratio, tobacco farming and the household’s distance to the NASFAM’s district offices. Overall about 78% of treated households were matched with the control group.

Table 4: Description of the estimated propensity score in region of common support

Percentiles	Propensity score	Smallest		
1%	0.123	0.123		
5%	0.187	0.123		
10%	0.238	0.124		
25%	0.392	0.135		
50%	0.686		Mean	0.62
		Largest	Std. Dev.	0.26
75%	0.855	0.992		
90%	0.925	0.994	Variance	0.07
95%	0.973	0.997	Skewness	-0.35
99%	0.997	0.999	Kurtosis	1.73
Test that the mean propensity score is not different for treated and controls after matching is accepted	The optimal number of blocks chosen is 5	The balancing property is satisfied	Region of common support	[.123, .999]

The propensity score matching results are reported further in Table 4. The computation of propensity scores identified a region of common support as lying

between 0.123 and 0.999. The mean propensity scores for the treated group and the selected untreated group were not different in every one of the 5 blocks, and the balancing property was achieved, so that comparison of other outcomes between the treated and controls was reasonable. The corresponding values of Average Treatment Effects on the Treated (ATT) are reported in the tables that follow.

5.2. Credit, fertilizer and income

Table 5: Impact estimation with Ordinary Least Squares (OLS)

	Credit Per Capita		Fertilizer Use		Income Per Capita	
	Coef	Boot Std. Err.	Coef.	Boot Std. Err.	Coef	Boot Std. Err
1Membership to NASFAM	.465***	0.10	.178**	.084	.105**	.050
Age of house head	0.006	0.01	.016**	0.007	.073***	0.021
Sex of house head	0.01	0.07	0.0503	0.051	0.14	0.176
Age-squared of house head	0	0	-.0016**	0.001	-.001***	0.0002
Education of house head	.067**	0.03	0.003	0.02	0.0144	0.061
Consumer-worker-ratio	-0.001	0.03	-0.011	0.035	-0.104	0.075
Tobacco dummy	0.064	0.05	0.055	0.028	0.232	0.196
Off farm job	-0.042	0.1	-0.054	0.072	0.095	0.173
2Land per capita	.244**	0.12	1.004***	0.244	.564**	0.223
Credit per capita (predicted)			.354***	0.076	.284*	0.168
Fertilizer per capita (predicted)					.165*	0.087
_cons	-0.052	0.26	0.419	0.216	3.37	0.542
	R-sq=0.31		R-sq=0.35		Rsqr=0.36	

Note. Significance levels: * 10%, ** 5%, *** 1%.

The results in table five are indicative of the possible effects of membership in NASFAM on credit, fertilizer expenditure and income. However, due to the

problems outlined earlier regarding the potential selection bias problems, the coefficient of membership to NASFAM could be biased downwards or upwards. To understand the impact of membership, inference is based on the results from the Propensity Score Matching presented in table 6

Table 6: Propensity Score Matching results
(ATT estimation with the Kernel Matching Method Bootstrapped standard Errors)

TREATMENT EFFECTS - PROPENSITY SCORE MATCHING MODEL						
{Membership to {NASFAM (ATT)	2.156***	0.35	0.249**	0.09	0.635 **	0.018}
	Mean log credit (US\$) of matched treated = US\$2.93	Effect of treatment = antilog (US\$ 2.156)= US\$8.2	Mean log fertilizer spend of matched treated = US\$3.60	Effect of treatment =antilog (US\$	Mean log total income of matched treated = US\$5.97	Effect of treatment = antilog (US\$0.635) =US2
	Mean log credit (US\$) of matched controls =	N=184;	Mean log of fertilizer spend of matched controls = US\$3.35	N=180;	Mean log total income of matched controls = US\$5.334	N=174

Note. Significance levels: * 10%, ** 5%, *** 1%.

The results in tables 5 and 6 present correctly signed coefficients. Table 6 in particular shows that credit acquired before the growing season was determined by whether one was a member of NASFAM or not. Membership in NASFAM increased credit acquisition by US\$8.2 at the household level. This seemingly modest increase is significant at the 1% level. Considering the mean income in the sample and also the fact that it was very difficult to acquire sufficient credit outside such cooperatives, US\$8 is a considerable value. This implies that membership in NASFAM increased access to credit, which in turn might be used in several ways, some of which would be translated in increased incomes per capita. As well as being in agreement with the literature discussed previously, these findings are in line with Sacerdoti (2005), who also discussed the positive role of cooperatives on credit access in sub-Saharan Africa, as well as Agbo and Chidebelu (2010),

who found support for the effect of cooperatives on credit access by households in Nigeria. Credit acquisition was also affected by a household head's education and amount of land a household had.

Although land did not normally serve as collateral for rural credit access in Malawi (Matchaya, 2009), land holding was thought to proxy the farmer's ability to pay back the credit. In the empirical analysis land holding positively affected credit access. The positive finding is well supported in literature including by Feder *et al.* (1988), who found a positive relationship between credit acquisition and land holding sizes in Asia. Feder *et al.* (1988) also found a positive relationship between education and credit access for households. This relationship ensues partly because education proxies human capital and an individual's ability to pay back the credit, as education may positively be correlated with profitable decision making.

Fertilizer expenditure incurred at the start of, and in the growing season was determined positively by whether or not an individual was a member of the NASFAM. On average, households, which were members of NASFAM, spent more on fertilizer than non-members. Fertilizer expenditure increased by US\$1.3 per capita as a result of one's decision to become a member. Age of a household head and land per capita contributed to determination of fertilizer expenditure. Predicted credit per capita acquired before the start of the growing season positively impacted on fertilizer expenditure, supporting the hypothesis that credit is crucial in input purchase decisions.

The basic hypothesis was that since NASFAM played roles that may be considered as lifting the barricades preventing farmers from receiving better price signals, its members should have been well placed (at least compared with those outside it), to receive better price signals. They should have been in a position to have, on average, higher incomes than non-members with similar household characteristics. This was tested by checking whether the coefficient for variable "member" (which is, by definition, the ATT associated with treatment) was significant. The results that follow also present coefficients of other factors that would determine a household's income.

The primary determinants of income per capita at the close of the year (after the harvesting seasons) included land, age and membership to NASFAM. The coefficient for the amount of credit a household accessed before the ended growing season and fertilizer use was marginally significant at 10% level. The amount of land available to the household was significant at 5%, and the square of the age, as well as age of household head were significant at 1%. The average treatment effect on the treated (ATT), the coefficient of NASFAM, was positive and significant at 5%. Its coefficient shows that membership increased incomes per capita by US\$2 per capita. Considering the low per capita incomes in Malawi, an increase

of US\$2 per capita in rural incomes for those who are members is significant. The actual increases might have been even larger as inferred from discussions with farmers who recalled their miserable past incomes with their incomes after joining NASFAM. Any increase in rural income is desirable as rural incomes are markedly smaller relative to urban ones. This shows that regardless of the path followed by membership to increase incomes, our approximation here shows that membership is good for incomes. It is shown in table 2 that average incomes per capita were below the standard poverty line of one US dollar per day for both members and non-members. The US\$2 increase was therefore significant considering that the sample covered in this paper was very poor people.

According to Hansmann (2000), cooperatives such as NASFAM give farmers monopsony power, which makes it possible for them to produce and sell their crops at prices above costs of production regardless of whether the commodity of concern is perishable or not. On the other hand, although the organization process can be costly, farm marketing cooperatives economize on a variety of information costs. The other crucial role is that of easing farmers' access to credit-lending institutions for members. Although NASFAM does not explicitly provide credit to their members, the positive ATT implies that there are credit advantages associated with membership. This is so because membership on its own improves the creditworthiness of farmers who can access loans from other loaning organizations using group membership as collateral. Mobilization of farmers into groups therefore can be an important and effective rural development policy that developing countries in the sub-Saharan African region should seriously consider.

Membership to a group reduces the probability of default and hence reduces the likelihood that the lending company may not recover its loans. The creditor knows this and that is why creditors appear to have a higher propensity to lend out to people in groups than to individuals. Even if individual farmers defaulted, in most cases leaders of their cooperatives would arrange payment on behalf of the defaulting individual, hence ensuring that the creditors recoup their loans. NASFAM also trained illiterate farmers to read and make sense of sellers' sheets from markets and how to manage loans, which also worked to the farmers' advantage on the market place. Cooperatives give people access to markets and other services and therefore in Sen's language, they give people "functionings" –the ability to do things, which is boosted by membership to a cooperative. Since a person's capability is the set of alternative bundles of functions from which they may choose (Sen, 1988), then cooperatives also boost a person's capabilities.

NASFAM's trainings for farmers, its roles in aiding transportation of agricultural commodities to markets, its roles in marketing and bringing authentic farm inputs near farmers possibly lead to the farmer's change in mind-set towards one that is business oriented. The change in mind-set coupled with the support

systems provided by membership on the credit, input and output market, together explain the positive treatment effects (increase in credit, income and fertilizer use). Strengthening the role of cooperatives in agricultural development is an important step in poverty reduction and is in line with the the Comprehensive African Agriculture Development Program (CAADP) principles.

6. CONCLUSIONS AND RECOMMENDATIONS

The central issue around which this paper has been built concerns whether the activities of NASFAM, a rural producer organization in Malawi, has changed livelihoods of its members in any way. This paper has used Propensity Score Matching to answer this question. The selection bias problem has been considered through the act of matching on observables.

This paper has found that farmers' affiliation to NASFAM has a positive impact on their income per capita. There is also evidence that NASFAM has increased farmers' access to credits, their fertilizer expenditure (at least in Kasungu District). Since poverty reduction is one of the Malawian government's goals, this paper has grounds to contend that expansion of rural producer efforts, like those done by NASFAM, is one way to achieve poverty reduction. If a cross-sectional analysis like this paper is able to register gains from participation, chances are that the long-run effect of participation may be increased gains as individuals would adjust their economic behaviours in various ways in a bid to benefit more from the cooperative. Considering that circa 80% of Malawians live in the rural areas where agriculture emerges to be the mainstay of their economies, it is important to consolidate any interventions that seek to ameliorate harsh conditions in these areas. The findings in this paper show that farmer participation in NASFAM has the possibility of increasing their credit obtained and fertilizer budget. This in turn has various effects that would include increased incomes per capita. It follows from these findings that expansion of NASFAM, or at least other RPOs of such a nature, to other areas, would greatly benefit the rural masses. Future studies should consider using new data, while adopting the methodology employed herein, to understand whether the relationship between participation and outcomes has changed. The present study's conclusions are based on 2003 data and hence any extrapolation of the findings to the present should be done carefully while taking this fact in mind. As many agricultural development initiatives continue to take place across the African continent, more impact studies are needed and perhaps the Regional Strategy and Knowledge Support Systems (ReSAKSS) programme as a crucial resource for the successful implementation of the CAADP should consider intensifying this.

ACKNOWLEDGEMENTS

Thanks are due to NORAD and the Government of Norway for the financial support without which this research would have been impossible to conduct. We would also like to acknowledge Mette Wik for her constructive comments in the preliminary stages of writing this paper. The mistakes in this paper are, however, all ours.

NOTES

- 1 Distance may influence the decision to join NASFAM but not necessarily the outcome of joining. It is debatable but several authors have assumed so as well.
- 2 For an extensive discussion about generated instrument see Wooldridge (2002).

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