Future Agricultures

Working Paper

From Subsistence to Smallholder Commercial Farming in Malawi: A Case of NASFAM Commercialisation Initiatives

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Abstract

This paper investigates the relationship between food security and commercialisation using data from a household survey in National Smallholder Farmer Association of Malawi (NASFAM) operated areas. NASFAM promotes commercialisation of agriculture by introducing the principle of farming as a business among its members who are largely smallholder subsistence farmers.

The study finds that households with plenty of family labour are therefore likely to participate in NASFAM commercialisation initiatives. We also find a positive relationship between participation and value of durable assets, suggesting that wealth is an important determinant in the decision to participate in commercialisation. Household food security also increases the probability of participation, suggesting that when food markets are unstable, farmers that are not food secure may be constrained in their attempt to commercialize their farming systems. Furthermore, we find that the degree of commercialisation is negatively associated with age and household size but positively associated with food security, access to fertilizers, NASFAM business orientation and market access benefits.

1. Introduction

The economy of Malawi remains highly dependent on agriculture which contributes 35 percent to Gross Domestic Product (GDP). The agricultural sector in Malawi is categorized into estate agriculture sector and smallholder sector, with the latter accounting for 60 percent of agriculture GDP. Recent estimates indicate that 55 percent of smallholder farmers have less than 1 hectare of cultivatable land (Government of Malawi [GOM], 2002). Smallholder agriculture remains an important source of livelihoods for a majority of the rural population. For instance, approximately 84 percent of agriculture value-added comes from 1.8 to 2 million smallholder farmers who on average own only 1 hectare of land (World Bank, 2003). Most smallholder farmers in Malawi still cultivate using hoe technology and rely heavily on family labour. Most of smallholder farming is focussed on producing food staples such as maize and rice. Alwang and Siegel (1999) estimate that 70 percent of Malawian smallholder farmers cultivate 1.0 hectare with the median area cultivated being 0.6 hectares, and devote 70 percent of the land to maize, the main staple food. Others estimate that only about 15 percent of the maize that is produced in the country is marketed, while the rest is used to meet subsistence needs.

The dominant cash crops for smallholder farmers in the 1970s and 1980s were cotton and groundnuts, but with the collapse of the state marketing system, the role of these crops in the production basket among smallholder farmers has declined. Up to the early 1990s, smallholders were only allowed to produce northern division dark fired tobacco and varieties of sun dried tobacco, while burley tobacco was mainly produced in estates (Kadzandira et al. 2004). Tobacco is a major agricultural crop in Malawi, important for foreign exchange earnings and livelihoods. The liberalisation of burley tobacco production in 1992, has led to increased participation of smallholder farmers in the high value crop, which was hitherto dominated by estates. GOM (2004) reports that about 18.9 percent of smallholder farmers participate in burley tobacco cultivation. Estate production of burley tobacco has declined since the 1990s owing partly to declining profitability. According to GOM and World Bank (2007), smallholder farmers accounted for 80 percent of total tobacco production in the late 1990s. World Bank (2003) also notes that productivity in burley tobacco has declined over time, from 1,150 kilograms per hectare in 1990 to 973 kilograms per hectare in 2001. Liberalisation of burley tobacco production also led to the emergence of organisations with varying institutional arrangements to coordinate production and marketing among smallholders. Notably, 'burley clubs' affiliated to the National Smallholder Farmers' Association of Malawi (NASFAM), Tobacco Association of Malawi (TAMA), Malawi Rural Finance Company (MRFC), and intermediate buyers have emerged providing services to smallholder farmers (Chirwa, 2009).

NASFAM was created in 1994 out of the Smallholder Agriculture Development Project funded by the United States Agency for International Development (USAID) to organize smallholder tobacco production. Over the years, the mandate extended to diversification into the production of other cash and food crops including groundnuts, rice, chilli, cotton, soya and other legumes. The vision of NASFAM is to promote farming as a business among smallholder farmers: those who usually cultivate less than 1 hectare of land, producing 60 percent food and 40 percent cash crops and use a hand hoe as their main tool. NASFAM has grown in membership — to 110,000 smallholders, geographical coverage, scope of services and coverage of crops. NASFAM offers several services to members including training and capacity building in farming activities and management of associations, facilitating access to farming inputs, crop marketing, and extension services. Members are also provided with community support to mitigate the impact of HIV/AIDS, increase gender equality and food security, as well as ensuring that the voice of the smallholder is heard through policy lobbying and advocacy.

NASFAM therefore promotes the commercialisation of smallholder farmers by changing their mindset from viewing agriculture as a subsistence activity to seeing farming as a business that makes profits — consistent with the definition of commercialisation based on the objectives pursued by smallholders (Pingali and Rosegrant, 1995).

Groundnuts, always a smallholder cash crop, have reappeared as an export crop, thanks largely to NASFAM (Chirwa et al., 2008). Some of the associations involved in groundnuts cultivation have a fair trade label, which enable them export the groundnuts at a premium.

The dominance of subsistence farming with traditional farming systems in the smallholder sector is one of the concerns in achieving higher agricultural productivity. In 1994, it was estimated that the yield per hectare for maize was 32 percent of the potential yield while for tobacco and rice stood at 38 percent of the potential yield (GOM, 2001). Recent Government strategy recognises that intensification and commercialisation of smallholder agriculture are crucial to achieve increased productivity and profitability of smallholder agriculture (GOM, 2006). However, what is not known are the factors that explain smallholder farmers' participation in commercial agriculture in Malawi. Other studies, elsewhere, suggest that commercialisation has potential to unlock opportunities for better incomes and sustainable livelihoods for small-scale farmers (Von Braun and Kennedy, 1994; Omiti et al., 2009). The success of commercialisation to reduce poverty depends on how well households are integrated in markets, intensity of market participation and the extent to which new opportunities provided by commercialisation are exploited. Feder et al. (1985) identify farm size, risk exposure and capacity to bear risks, human capital, labour availability, credit constraint, tenure, and access to commodity markets, as factors that influence the adoption of agricultural innovations in developing countries.

Objectives

This paper aims to identify factors that influence smallholder farmers' decision to participate in markets. The main objective of the study is to investigate the link between food security and participation of smallholder farmers, who are largely subsisting, in commercialisation.

We also analyse the factors that determine commercialisation taking into account selectivity bias in participation in NASFAM commercialisation initiatives.

The paper is organised into five sections. The next section provides a brief overview on the concept of commercialisation and how various factors influence farmers' decision to commercialise their agriculture. Section 3 outlines the methodology used to collect survey data for the case study. In section 4, we focus on the findings from the survey based on our statistical and econometric analysis. Finally, section 5 presents concluding remarks.

2.0 Conceptual Framework

Agriculture commercialization can take many different forms and has generated many indicators[1]. Leavy and Poulton (2007) argue that such lack of clarity about what commercialisation actually means may give rise to misconceptions and obstruct the passage of policy into practice. Commercialization can occur on the output side of production with increased marketed surplus, or on the input side with increased use of purchased inputs. Discussions around agriculture commercialisation tend to separate producers into different types of farm (small farms, large farms) growing different types of crops (food crops, cash crops) with simple distinctions made between 'subsistence' and 'commercial' or 'export' agriculture.

Commercialisation can be measured as the proportion or volume of crop production marketed by a farm or household. In which case, a simple household crop commercialisation index[2] is measured as the proportion of output sold in markets. A value of zero of the commercialization index implies complete subsistence; while the closer the index is to 100, the higher the degree of commercialisation. Von Braun and Kennedy (1994) address other dimensions of commercialisation that include the volume or proportion of purchased inputs in total inputs utilised on the farm and measures of integration into the cash economy.

Others such as Pingali and Rosegrant (1995) argue that the process of commercialization involves transition from traditional self-sufficiency goals towards income and profit-oriented decision making. As economies grow, farmers tend to be more responsive to market trends in their production decisions and procure more of their inputs from the markets. Accordingly, use of inputs such as family labour declines relative to production for the market and hired labour becomes predominant. The proportion of farm income in total household income declines accompanied by significant reduction in the agriculture dependent population as family members find more lucrative non-agricultural employment opportunities. However, in the earliest stages of agricultural development, commercialisation may well be associated with diversification, because market-oriented crop or livestock represent diversification away from production of basic food for home consumption and may be an important way to spread market-related risks.

Heltberg (2001) observes that farmers tend to add cash crops to existing food production activities in order to achieve food self-sufficiency in environments of large transaction costs and high risks found in many sub-Saharan African (SSA) countries. The potential benefits from commercialisation such as higher product prices and lower input prices are not effectively transmitted to poor households when market access is poor. Poor households often sell early in the season when prices are at their lowest, and buy in the deficit season from markets when prices are highest (Omiti et al., 2009). This may threaten their food security and discourage them from greater commercialization.

Many factors facilitate or hinder commercialization in agriculture. The literature suggests that at household level, commercialisation is mainly affected by agro-climatic conditions and risks; access to markets and infrastructure; community and household resource and asset endowments; input and factor markets; laws and institutions; cultural and social factors affecting consumption preferences, production and market opportunities and constraints (von Braun and Kennedy, 1994; von Braun, 1995; Jaleta et al., 2009). The main exogenous forces that drive commercialization include population and demographic change, urbanisation, availability of new technologies, infrastructure and market creation, macroeconomic and trade policies. These factors affect commercialisation by altering the conditions of commodity supply and demand, output and input prices, transaction costs and risks that farmers, traders and others in the agricultural production and marketing system have to cope with (Pender and Alemu, 2007).

3.0 Methodology

3.1 Survey Methodology

We investigate commercialisation among smallholder farmers in Malawi, looking at changes in motives of farmers from subsistence farming to farming as a business, a principle promoted by NASFAM[3]. We conducted a survey in NASFAM areas where cash crops are being promoted among smallholders. Two areas — Ntchisi and Nkhotakota Districts — were selected specialising in groundnuts, rice and tobacco. Data were collected in October - November 2009 through a household questionnaire administered to 300 households, covering crop production, household consumption, marketing, ownership of assets among

others was collected from the smallholder farmers. These data were complemented by focus group discussions in eight communities. The survey was conducted in areas where NASFAM associations had experienced natural growth in the farming season of 2008/09. The target households were members of NASFAM that had one year experience with the organisation and non-members in Ntchisi and Nkhotakota Districts in Central Malawi.

The extension network of NASFAM is organised such that the smallest operational unit is the Club, made up of 10–15 individual farmers. Clubs combine to form Action Groups which are the key points for dissemination of information to members and the bulking of member crops. Action Groups in turn combine to form NASFAM associations which are legally registered entities, member-owned and managed by farmer boards. For the household survey, two-stage random sampling per Group Action Committee (GAC) was used to draw up a list of households to constitute the sampling frame. In each GAC with an average membership of 30, 20 members were randomly selected. A total of 5 GACs were interviewed in each of the districts. The survey applied snow-balling to identify non-members: for every two households interviewed, one non-member was identified by asking the members.

Using focus group guide questions, interviewees identified through local contact NASFAM office were engaged in discussions on how small-scale farming may become commercialised. The focus group discussion questions centred on the following themes; farming where strengths, weaknesses, opportunities and threats in the production, processing and marketing as promoted by NASFAM were identified, production and marketing issues that promote farmers access to markets and reduce associated risks, food security status of participating households, safety nets, membership to NASFAM and its impacts. These issues were differentiated among well-being groups including gender of the household heads.

3.2 Methods of Analysis

Two approaches have been adopted to analyse the quantitative data. The first uses descriptive statistics — sample mean, standard deviations, cross –tabulations, correlations, chi-square — to compare the characteristics of members and non-members of NASFAM. The main issue here is to determine whether the characteristics of NASFAM members are different from non-members, and whether NASFAM members' characteristics change after participation.

The second approach is econometric using multivariate regression model of the factors determining membership of NASFAM and the extent to which smallholder farmers commercialise, using a two-step Heckman procedure. The model is used to investigate whether food security influences the decision to commercialize and the extent of commercialisation among smallholder farmers in Malawi.

4.0 Results and Discussion

4.1 Statistical Analysis

4.1.1 Household Characteristics and Well-being

Table 1 reports descriptive statistics for participating and non-participating households. The average participating household size measured in terms of adult equivalents is 5 members while non-participating households consist of 4 members. This difference was found to be statistically significant at 1 percent. For the whole sample, the household heads age on average was 43, and no statistically significant differences were found between participants and non-participants. The number of male-headed households represented 87 percent of the sampled participating households; but only 65 percent of those not participating, a strongly significant difference.

These household heads attended 6 years of schooling on average relative to 5 years by non-participants. In terms of education qualification, 68 percent of the participating households have no education qualification, 16 percent have primary school certificate, 11 percent have junior certificate and secondary certificate of education constitute only 3 percent. The difference from non-participating household heads was only significant for the no qualification and junior secondary education cases at 10 percent level.

Most of the participating households ranked their household well-being[4] as poor (89 percent) in 2007/08, but the proportion decreased to only 87 percent in 2008/09 season. The number of ultra poor participating households reduced from 26 percent in 2007/08 to 14 percent in 2008/09. In both cases the reverse trend was also observed for the non-participants. Only 24 percent of the participants reported being satisfied or very satisfied with their life in 2009 while 39 percent indicated their well-being is better in 2009, which implies that 61 percent of the participating households' well-being either did not change or become worse off in 2009. The proportion of non-participants satisfied with their life or that experienced better well-being was lower in 2009 (18 and 20 percent, respectively).

4.1.2 Commitment of Land, Labour and Capital

We examine in Table 2 the way households allocated land in the two farming seasons of 2007/08 and 2008/09. On average participants cultivated 2.39 hectares of land in 2008/09 season, a reduction from the reported 3.14 hectares of land in 2007/08. About 48 percent of the participants stated that land was not available. It also emerged that 16 percent reported that labour constraints limited the amount of land that was cultivated in 2008/09 season while 12.9 percent of the households rented out

Table 1 Household Characteristics by Participation

Variables	Participant		Non-Participant	
	Mean	SD	Mean	SD
Household Characteristics				
Household size(adult equivalents)***	5.21	2.10	4.13	1.92
Marital household head (0/1)**	0.98	0.16	0.90	0.03
Age of household head	43	13.5	43	15.0
Sex of household head (0/1)***	0.87	0.34	0.65	0.48
Education Qualification of household head (0/1)				
No qualification*	0.68	0.47	0.78	0.41
Primary school	0.16	0.37	0.12	0.33
Junior Secondary school*	0.12	0.32	0.05	0.22
Secondary school	0.04	0.20	0.04	0.20
Years of schooling**	5.99	3.67	5.05	3.84
Household well-being (0/l)				
Well-being self assessment – better- in 2009***	0.39	0.49	0.20	0.41
Poor 2009	0.86	0.35	0.90	0.30
Poor 2008	0.89	0.32	0.89	0.32
Ultra-poor 2009***	0.14	0.35	0.32	0.47
Ultra-poor 2008	0.26	0.44	0.30	0.46
Satisfied/very satisfied with life in 2009	0.24	0.43	0.18	0.39
Number of observations	202		98	

Notes: (0/1) indicates dichotomous variable equal to 1 for the included category, otherwise equal to 0 for the base category. The asterisks ***, **, * represents statistically significant difference between participants and non participants at 1%, 5% and 10%.
Source: Computed by authors.

their land. About 3.2 percent mentioned that their land was water logged and a similar proportion left their land fallow. In both years, most land was allocated to maize, the main food crop, confirming the observation made by Heltberg (2001) that smallholders produce market-destined crops in addition to the subsistence food crops. Maize was cultivated by participants on 1.95 hectares of land in 2007/08 compared to 1.68 hectares in 2008/09 farming season. Overall, the land allocated to commercial crops such as groundnuts, rice, tobacco, soya beans declined in the 2008/09 season. Only 39% of the participating households were already growing NASFAM promoted crops in 2007/08 farming season.

With regards to labour usage, 46% of participants hired labour in 2008/09 farming season relative to 31% engaged by non-participants, an increase from 2007/08 figures (Table 3). In turn, annual expenditure on labour for participants was higher than that of non-participants. However, both participants and non-participants relied heavily on family labour. On average, in 2008/09 participants hired 55 man-days of labour while using 155 man-days of family labour. On the other hand, non-participants hired 44 man-days of labour and used 122 man-days of family labour.

Despite these notable differences in labour use between participants and others, the differences for both family and hired labour were not statistically significant. Nonetheless, hiring of labour represents commendable strides given that participants have only been in the NASFAM program for one year.

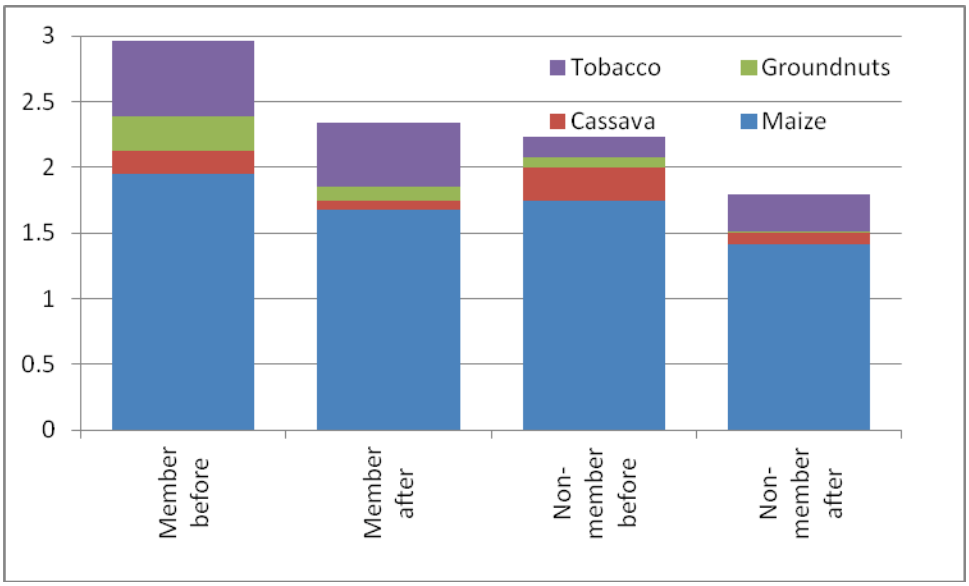
We asked households about their ownership of assets and livestock in the two farming seasons. The asset values were determined by asking respondents the price that

Table 2 Land allocation to crops

Variables	Participant		Non-Participant	
	Before intervention (2007/08)	After intervention (2008/09)	Before intervention (2007/08)	After intervention (2008/09)
Total land cultivated	3.14	2.39	2.33	1.80
Land allocated to maize	1.95	1.68	1.74	1.41
Land allocated to cassava	0.17	0.06	0.26	0.09
Land allocated to g/nuts	0.27	0.11	0.08	0.01
Land allocated to tobacco	0.57	0.49	0.15	0.28
Number of Observations	199	199	91	91

Source: Computed by authors.

Figure 1 Land allocation



Source: Table 1

can be paid to buy or make a similar item while the approximate average market value was used for the livestock value. We find significant differences at 1 percent in value of assets between participants and non-participants with an increase in value of assets in 2008/09 for all households. However, livestock values slightly declined in 2008/09 for both participating and non-participating households.

4.1.3 *Total Farm Production and Sales*

Households in the sampled region cultivated various crops. As indicated in Table 4 participants produced more maize, groundnuts, rice, soya bean and tobacco than non-participants; while less cassava, sweet potatoes and Irish potatoes. Statistically significant differences were observed only for maize harvests at 5 percent level.

Results further indicate that on average a large amounts of cassava (390kg) followed by tobacco (369kg) and sweet potatoes (363kg) were sold for all households. In particular, participants sold more produce from all crops except maize and potatoes than non-participants, although no statistically significant differences in crop sales were found between the two groups.

About 81 percent of the harvests were sold to private traders or vendors while 44 percent was sold

Table 3 Household's ownership of assets and labour use

Variables	Obs	Participant		Obs	Non-Participant	
		Mean	SD		Mean	SD
Ownership of Assets						
Land cultivated 2007/08	199	3.14	6.55	91	2.33	4.17
Land cultivated 2008/09	199	2.39	6.61	91	1.80	4.18
Value of assets 2007/08 (Mk)***	202	67,366	110,592	98	23,431	24,521
Value of assets 2008/09 (Mk)***	202	76,273	119,272	98	26,870	29,291
Value of livestock2007/08(Mk)**	202	33,696	67,398	98	17,684	40,622
Value of livestock 2008/09 (Mk)**	202	32,981	79,134	98	16,929	41,086
Labour usage for hiring households						
Household hired in labour 2007/08**	199	0.30	0.46	91	0.20	0.40
Household hired in labour 2008/09**	199	0.46	0.50	199	0.31	0.46
Total hired labour man days 2007/08	59	23.6	41.2	18	19.7	46.8
Total hired labour man days 2008/09	92	54.9	186.8	28	43.5	116.7
Total family labour man days 07/08	197	70.5	62.1	91	72.8	70.4
Total family labour man days 08/09	199	155	202	91	122	124

Notes: The asterisks ***, **, * represents statistically significant difference between participants and non participants at 1%, 5% and 10%.
Source: Computed by authors.

Table 4 Farm production and crop marketing for 2008/09 farming season

	Participant			Non-Participant		
	Obs	Mean	SD	Obs	Mean	SD
Total maize harvested (Kg)**	177	1,029	1266	88	662	542
Total cassava harvested (Kg)	29	1,900	2542	17	2,160	2018
Total sweet potatoes harvested (Kg)	8	424	598.3	4	580	529.6
Total Irish potatoes harvested (Kg)	3	268	257.9	4	477	525.3
Total groundnuts harvested (Kg)	72	945	1232	28	532	473.8
Total rice harvested (Kg)	19	733	684.8	8	408	232.2
Total soya beans harvested (Kg)	26	597	635.5	21	456	783
Total tobacco harvested (Kg)	95	558	1089	27	362	441.5
Maize sales (Kg)	60	317	347.2	32	352	459.4
Cassava sales (Kg)	6	437	166.5	1	140	-
Sweet potatoes sales (Kg)	3	65	74	2	520	552
Irish potatoes sales (Kg)	2	90	299.8	2	138	101.8
Groundnuts sales (Kg)	56	356	612	17	240	287
Rice sales (Kg)	13	291	185.7	5	169	105.1
Soya beans sales (Kg)	25	307	293.7	19	207	252.4
Tobacco sales (Kg)	82	325	429.4	23	281	340.9
Proportion of maize sales (%)**	77	11	0.2	78	17	27.7
Proportion of cassava sales (%)	29	9	23	12	0	0.29
Prop. of sweet potatoes sales (%)	8	16	35.2	3	57	51.3
Prop. of Irish potatoes sales (%)	3	53	50.3	4	27	34.4
Proportion of groundnuts sales (%)	72	35	34.04	27	31	35.32
Proportion of rice sales (%)	19	44	39.1	8	25	25.1
Proportion of soya beans sales (%)	25	65	33.6	21	64	34
Proportion of tobacco sales (%)	95	88	26.9	26	88	26.2

Notes: a) The asterisks ***, **, * represents statistically significant difference between participants and non participants at 1%, 5% and 10%. b) Reported statistics are for farmers who actually harvested and sold the crop.
Source: Computed by authors

among relatives and friends. The village market was the main trading place reported by 39 percent of the households.

We computed the proportion of crop sales out of harvested produce for the farmers that were selling the crops and determined the mean proportions for the sample. The results show that participants sold a higher percentage of cassava, Irish potatoes, ground nuts and rice harvests than non-participants with slight differences in soya beans and same proportions of tobacco. Of the harvested maize, participants sold 11 percent while non-participants sold 17 percent of their yield. The large percentage of retained maize harvests indicates the role food security plays in market participation.

4.1.4 *Main Economic Activity, Income Diversification and Expenditure*

Households' main economic activities differed between participants and non-participants (Table 5). On average 50 percent of the surveyed participating households indicated their main economic activity to be production of cash crops, while 25 percent of participants grow staples even if cash crops would give more return in normal years pointing to concerns about food insecurity. In contrast, 30 percent and 37 percent of non-participants concentrate on food crop and cash crop production, respectively. Statistically significant differences at 10 percent level between participants and non-participants were observed for cash crop production only.

Table 6 presents income sources among participants and non-participants. Income shares highlight the main channels through which trade opportunities can affect household income. On average the mean household income realised from crop sales was Mk46,564.07 [US$325] for the whole sample. Crop farming contributed 54 percent to the total household annual income in the year 2008/09 farming season while the remaining income was generated from livestock sales, remittances, ganyu wages among other sources.

Important differences can be seen in income sources between participants and non-participants. Notably non-participants received substantial percentage of their income from remittances and ganyu wages; 14.9 percent and 15.6 percent, respectively. Again, non-participants received 3 percent of their income from land rentals relative to participants who received only 0.4 percent. Participants also engage in ganyu employment with their wages contributing a substantial amount of 12.2 percent to their total household income. The level of income generated from business enterprises is very similar among participants and non-participants.

Participants derive most of their income from crop sales, business and ganyu wages, while non-participants get most of their income from crop sales, business, ganyu wages and remittances. The proportion of non-farm income in household income is higher among non-participating than participating households, accounting for 49 and 35 percent, respectively. Off-farm income allows smallholders to finance their farming, thereby increasing returns to labour and land and household consumption.

The highest total annual income and per adult equivalent incomes were observed among participating households. Figure 2 shows the distribution of total household incomes per year. All distributions are right skewed, but the income distribution among participants is much flatter than that of non-participants implying wide dispersion of income among participating households. On average participants had an annual income of MK87,634 (MK19,072 per adult equivalent) [US$626, US$136] per year compared to MK41,414 (MK 11,531 per adult equivalent) [US$296, US$82]for non-participants.

Further analysis consumption differences between participating and non-participating households, see Table 7, shows that most of the budget was spent on food as expected, with an average share of 75.1 percent for the whole sample. The average expenditure on food was higher for non-participants compared to participating households, although the differences are not statistically different. Non-participating households spent 79.9

Table 5 Description of main economic activities

Variables	Participant		Non-Participant	
	Mean	SD	Mean	SD
Main economic activity (0/1)				
Food crop production	0.252	0.436	0.296	0.459
Cash crop production***	0.505	0.501	0.367	0.485
Wage employment	0.089	0.286	0.092	0.290
Business enterprising	0.079	0.271	0.051	0.221
Number of observations	202		98	

Notes: (0/1) indicates dichotomous variable equal to 1 for the included category, otherwise equal to 0 for the base category. The asterisks *, **, *** represents statistically significant difference between participants and non participants at 1%, 5% and 10%.

Source: Computed by authors.

Table 6 Sources of household income

Source of income	Diversification of income sources (% derived from …)		
	Pooled	Participants	Non-Participants
Crop sales*	54.0	58.5	44.6
Livestock sales	5.7	5.9	5.3
Fishing	0.4	0.6	0.0
Business Enterprise	10.6	10.6	10.5
Remittances*	8.3	5.0	14.9
Wages- safety nets	1.1	0.9	1.5
Salary - farm	0.7	0.6	0.8
Salary - non-farm	3.2	3.8	2.0
Wages - ganyu	13.3	12.2	15.6
Land rentals**	1.3	0.4	3.0
Other sources	1.5	1.4	1.9
Total household annual income (Mk)	72,535.56	87,634.30	41,413.67
Income per adult equivalent[5] (Mk)	16,608.22	19,071.57	11,530.70

Notes: 9a) The asterisks *, **, *** represents statistically significant difference between participants and non participants at 1%, 5% and 10%.
(b) The adult equivalent conversion factors are reported in the appendix.

Source: Computed by authors.

percent on food in contrast to 72.8 percent among participating households, statistically significant at the 1% level.

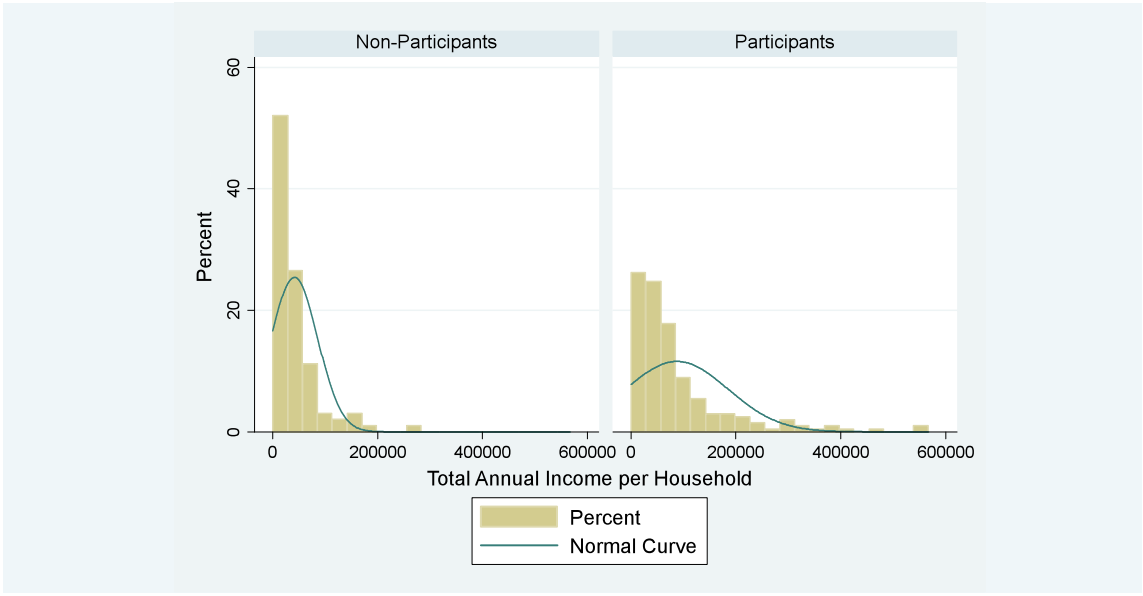
Non-food items expenditure accounted for 27 percent and 20 percent of participants and non-participants budgets, respectively. The participants spent statistically significant larger amounts of money on farm inputs and labour (8.96% and 2%) than their counterparts (5.3% and 0.8%). Other items such as clothing, health, transport, utilities and housing accounted for shares of less than 10 percent.

4.1.5 *Access and Use of Fertilizers*

Table 8 shows the proportion of NASFAM farmers that applied fertilizers and the sources of fertilizers in different farming seasons. Access and use of fertilizer is promoted by government, non-governmental organisations and farmer associations for increased agriculture productivity. We assess the number of households that benefited from such initiatives and sources of the fertilizer.

We find that more participants, 95% applied fertilizer after the intervention. However, they rely mainly reliance on subsidized fertilizer, with only a slight difference

Figure 2 Distribution of Annual Income by Household Status



Source: Computed by authors.

Table 7 Annual expenditure variations between participants and non-participants in 2008/09

Expenditure type	Participant		Non-Participant	
	Mean (MKW)	SD	Mean (MKW)	SD
Food	166,310	345,249	281,351	1349264
Non-food***	60,549	76,772	31,989	35,675
Health	1,264	3,339	920	2,856
Clothes***	6,693	7,467	3,974	4,724
House	1,507	8,157	1,274	5,623
Private goods***	14,288	13,749	9,237	10,700
Transport*	2,383	2,840	1,832	2,359
Utilities**	4,524	6,855	2,718	5,752
Farm inputs**	21,405	36,511	9,707	19,988
Labour*	7,034	27,977	1,669	5,703
Other	1,051	5,801	466	3,738
Number of observations	202		98	

Notes: The asterisks ***, **, * represents statistically significant difference between participants and non participants at 1%, 5% and 10%.

Source: Computed by authors.

between the two farming seasons. Chirwa et al. (2010) find that households with larger parcels of land and those who sell part of their produce are more likely to receive fertilizer subsidy coupons and also acquire more fertilizers. About 12% of the participating farmers had to obtain credit in order to purchase fertilizer in 2008/09; an increase from 4 percent in 2007/08.

Overall households used 91kg of fertilizer per hectare cultivated on average in 2008/09[6]. Statistical differences at 5 percent level were observed between participants and non-participants, with the latter using 59kg of fertilizer while the former used 105kg of fertilizer per hectare of land cultivated.

4.16 *Benefits from Participating in NASFAM Initiatives*

Participating in farmer organisation has potential benefits, ranging from securing better prices for the produce, lower prices for inputs as associations could buy in bulk, to making available technical assistance and technology that allows participating farmers harvest higher yields.

We asked farmers to list the three most important benefits from their participation. The prominent benefit reported by 32 percent of the participating farmers from NASFAM membership is access to produce markets as highlighted in Figure 3 below. This is not surprising given the difficulties farmers face in Malawi to market their produce – either the markets are thin or missing especially for cash crops. Another 14 percent mentioned access to extension services, while 13 percent consider access to inputs as more important. The change in orientation to farming as a business was most important to 12 percent of the participating farmers.

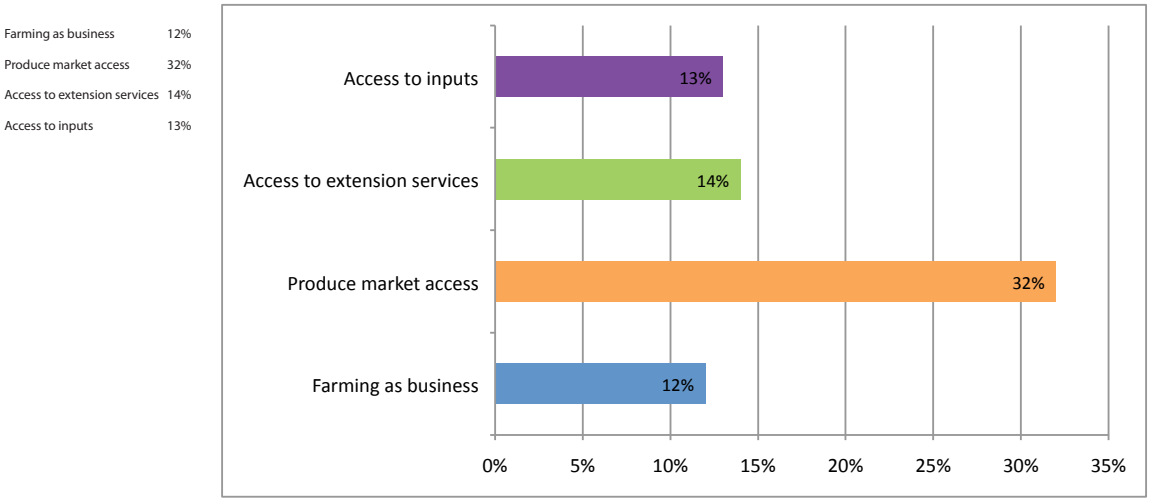
The results also showed that 48 percent of participants were satisfied with the way NASFAM is providing services to smallholder farmers. Apparently based on focus group

Table 8 Access and use of fertilizer among farmers

Variables	Participant		Non-Participant	
	Before intervention (2007/08)	After intervention (2008/09)	Before intervention (2007/08)	After intervention (2008/09)
Household applied fertilizer	92%	95%	84%	88%
Source of Fertilizer				
Subsidy	51%	55%	53%	53%
Cash	47%	41%	33%	36%
Credit	4%	12%	7%	5%
Number of Observations	202		91	

Source: Computed by authors.

Figure 3 Most important benefits from NASFAM Membership



Source: Computed by authors.

discussions, dissatisfaction results from failure of NASFAM to buy farmers' produce in 2008/09 season and provide input loans; late transportation of farmers' tobacco to auction floors; and unreliability of cash crop market prices which poses a hunger threat to participants in times of low returns and limited food stocks. Notably in 2008/09 season farm prices, especially of tobacco and cotton, soured relative to what farmers were getting in 2007/08.

Members of NASFAM also revealed several other benefits. First, 51 percent of participants indicated that belonging to NASFAM made access to credit easier. Incidentally, Finance Trust for the Self Employed (FITSE) offers credit to NASFAM members only in Ntchisi District. Secondly, participation in NASFAM commercialisation activities has led to increased income among 33 percent of participants. However, only 11 percent of the participants re-invested the increased income in agriculture. Thirdly, during the period 2008/09 NASFAM managed to reach out to 40% of the participating farmers with its extension services. Other extension service providers (such as government, non-governmental organisations, other farmer organisations or farmer to farmer method) reached 57 percent of the participants.

Several factors motivated farmers to join NASFAM. Focus Group Discussions revealed that farmers were motivated by potential reduction in transport costs to markets for their tobacco; access to markets, especially since NASFAM was buying farmers' groundnuts and soya beans at good prices; access to extension services; and, linkages with other farmer institutions. Others mentioned that they joined having seen fellow farmers' livelihoods improving with club membership. Food security did not play a major role in the decision to participate in NASFAM commercialisation initiatives, with only 25 percent of participating farmers were influenced by increased food adequacy to join NASFAM.

4.1.7 Food Security and Household Participation

In assessing the food security of farming households we use three indicators: the coping strategy index, the food consumption scores and households' own assessment of the food situation. First, following Maxwell and Caldwell (2008), the frequency of use of coping strategies — such as relying on less preferred foods, borrowing food or relying on friends and relatives, limiting portion sizes, restricting consumption by adults in favour of small children, and reducing the number of meals eaten per day — is combined with severity weights to generate the Coping Strategy Index (CSI). The CSI is a proxy for household food security interpreted such that the higher the CSI the more a household has to cope, the more food insecure is the household.

Secondly, following WFP (2008) we use the Food Consumption Score (FCS) which is a composite score based on dietary diversity, food frequency and relative nutritional importance of different food groups consumed in the household during the previous seven days. The higher the score the more food secure is the household.

Table 9 indicates that for the pooled sample, CSI scores show households had to cope more in 2007/08 than in 2008/09. Similar trend is seen when the data is disaggregated by gender of household head with female headed households associated with more food insecurity for both farming seasons. Notably, participants in NASFAM initiatives were more food insecure in 2008 before joining than in 2009 after the intervention. The reverse is true for non-participating households.

It is also evident that on average the food consumption score (FCS) for both participants and non-participants was acceptable, that is a score above 35.[7] The same profile of food consumption is observable with respect to

Table 9 Food security indicators by participation and gender of household head

Food Security Indicator	Pooled sample	Participants	Non-participants	Male-headed households	Female-headed households
CSI – 07/08	4.19 (7.08)	4.34(7.27)	3.88 (6.69)	3.83 (6.49)	5.60 (8.98)
CSI – 08/09	3.71 (7.32)	3.26 (7.05)	4.63 (15.03)	3.36 (7.31)	5.12 (7.23)
FCS – 07/08	45.71(15.32)	46.32(15.46)	44.46(15.03)	45.84(15.11)	45.22(16.26)
FCS – 08/09	42.12(14.29)	42.63(14.26)	41.07(14.37)	42.84(13.94)	39.27(15.40)
N	300	202	98	240	60

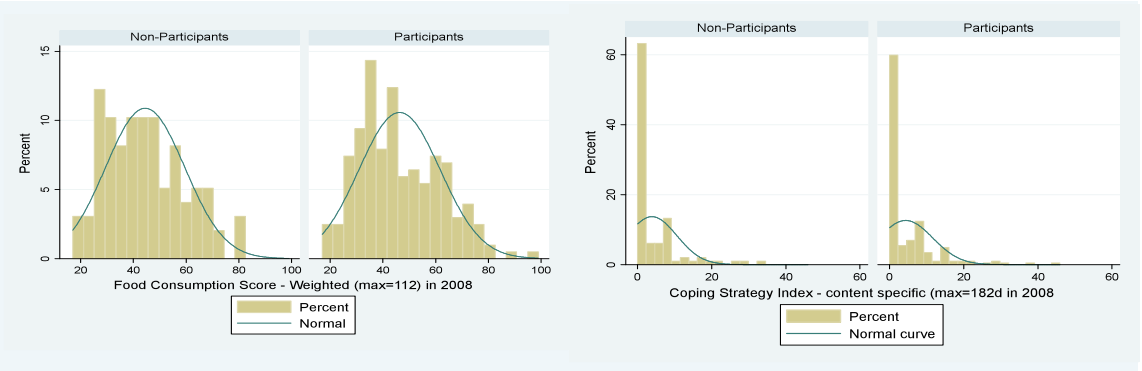
Note: Figures in parentheses indicate standard deviation
Source: Computed by authors.

gender during the period under study. In all cases there has been a decline in the score for the farming season 2008/09. However, we did not find statistically significant differences between participants and non-participants, or between male-headed and female-headed households. Figure 4 show the distribution of the FCS and CSI for 2008/09 farming season.

We also asked the households to indicate adequacy of food consumption from their own assessment. We find that 72% and 81% of the participants had adequate food consumption in 2007/08 and 2008/09, respectively. Similarly, non-participants reported increasing adequacy of food consumption from 74% to 77% representation in 2007/08 and 2008/09, respectively. Such positive indications were also observed for disaggregated data by sex of household head. This result is not surprising since Malawi experienced considerable bumper yields during the two farming seasons, reinforced by the availability of fertilizers under the subsidy programme and good weather. However, the difference between participating and non-participating households is not statistically significant. These results are different from the movement in the FCS above, in which we observed falling food security. However, it must be noted that the adequacy in food consumption gives an average assessment of the household and neither dietary diversity nor relative nutritional value of the food is taken into account. Although most households indicated adequate food in the last 30 days of the survey, the change in FCS suggests that dietary diversity declined: so it is likely that the diet may have been dominated by increased consumption of maize.

We tested the relationship between the different food security indicators. We find that CSI correlates positively with share of expenditure on food, and statistically significant at less than 1 percent negative correlations exist between CSI and the other measures of food security such as assets and FCS. This agrees with literature that CSI is significantly correlated with other measures of consumption adequacy and equally well correlated with measures of assets and expenditure (Maxwell et al. 1999). Furthermore, the correlation between FCS and measures of assets and expenditure devoted to food per adult equivalent was statistically significant and positive validating the use of FCS as a measure of food consumption and food security.

Figure 4 Distribution of FCS and CSI by participation



Source: Computed by authors.

In table 10 we present the proportion of households in various Food Consumption Score Groups. Majority of the households in the two farming seasons under study showed acceptable food security, although there was a decline in the share in this category from 2007/08 to 2008/09.

Evidence from the above descriptive statistics suggests that cropping patterns in the sampled areas are driven by food security concerns, see Figure 1. Such behaviour could have several explanations, including risk reduction, taste preferences for local varieties, market transactions and more importantly lack of confidence in food markets. Access to functional markets for participants as well as

Table 10 Food consumption score groups by participation and gender of household head

Food Consumption Score Group	Pooled sample	Participants	Non-participants	Male-headed households	Female-headed households
Poor – 07/08	3%	3%	3%	1%	8%
Poor – 08/09	5%	5%	5%	3%	13%
Borderline– 07/08	26%	23%	32%	26%	25%
Borderline – 08/09	32%	30%	36%	32%	32%
Acceptable – 07/08	71%	74%	65%	73%	66%
Acceptable – 08/09	63%	65%	59%	65%	55%
N	300	202	98	240	60

Source: Computed by authors.
Note: According to the WFP (2008), a FCS 0– 21 represents poor food security; 21.5 – 35 represents borderline cases; and above 35 represents acceptable food security.

non-participating households would help mitigate food security concerns and allow households to choose higher value production patterns (Alwang and Siegal, 1999). Although the largest percentage of land is allocated to food crop production, realised harvests are not sufficient to meet household food requirements hence the fraction of household expenditure on food is high. This implies that household consumption will be heavily affected by changes in prices of food.

4.2 Modelling NASFAM Membership and Commercialisation

4.2.1 Model Specification

Participation in NASFAM by smallholders is voluntary. NASFAM markets its services to potential members, and based on the information smallholders make their decision whether or not to participate. Prior to NASFAM arriving in the area, several farmers were already selling some of their agricultural produce, hence they were commercialized. Participation in NASFAM activities may have enhanced their degree of commercialisation. We model the degree of commercialisation by controlling for selectivity bias in membership to NASFAM, using the two-step Heckman procedure.

In the first step, using data for the year prior to introduction of NASFAM services, we investigate factors that influence farmers' decision whether to participate or not participate in NASFAM commercialisation initiatives. We define NASFAM commercialisation initiatives as acceptance of a change in the objective of the farmer from subsistence farming to commercial farming.[8] Such decision making can be assessed using the probit model based on utility theory or rational choice perspective. In this, the decision of the ith household to participate or not depends on a latent variable which is a function of some explanatory variables, say food security of the household, in such a way that the larger the value of the latent variable the greater the probability of a household participating. The household decides to participate as long as the expected benefits exceed alternative arrangements. We model the probability of participation using the standard probit model as follows:

$$\text{Prob}(\gamma = 1 | \chi) = \varphi(\chi'\beta)$$
$$\text{Prob}(\gamma = 0 | \chi) = 1 - \varphi(\chi'\beta) \quad (1)$$

where $\gamma=1$ denotes participation in NASFAM initiatives, $\gamma = 0$, denotes non-participation, φ is the normal distribution function, χ is the vector of characteristics that determine the household choice to participate in output markets, and β is the vector of parameters or coefficients. The probability of participation can therefore be obtained by evaluating φ given χ 'β, and obtain the Inverse Mills ratio to be included in our second stage regression.

We hypothesize that participation in NASFAM is influenced by socio-economic and household characteristics such as sex of household head (male), age of household head, marital status of household head (married), household size, the education levels of household head, land holdings, food security (food consumption score), asset ownership, participation in markets for inputs, labour and credit markets. The age of the household head is measured as number of years while sex of the household head is represented by a dummy variable equal to 1 if the household head is male and zero, otherwise. Household size in terms of adult equivalents is included to capture the effects of availability of family labour which is important in agriculture activities in Malawi. We expect a positive relationship between household size and participation. Land cultivated in 2007/08 farming season is also included, expecting that households with more land to participate in initiatives to commercialise. We control for the effect of growing NASFAM promoted crops before joining the association. This is represented with a dummy variable equal to 1 if household grew a NASFAM promoted crop in 2007/08, otherwise zero. It is expected that households that were already growing a NASFAM crop in 2007/08 are likely to join the association to reap the benefits from participation. The value of durable assets in 2007/08 in Malawi Kwacha represents household wealth which can be converted into cash to leverage risks in farming or smooth

consumption. Our hypothesis is that wealthy households are likely to participate in commercialisation initiatives.

We also include years of schooling of household head or the education of the household head. We include different indicators of food security (Food Consumption Score in 2007/08 and food consumption adequacy in 2007/08) to assess its role in the decision to participate. With respect to the FCS, we use a dummy equal to 1 if the food security of the household is deemed to be adequate (FCS of more than 35), otherwise equal to zero. Since both food and cash crops were cultivated, we assume that households that have met their food requirements will be more willing to sell their output. Households that attain an acceptable level of food consumption score are expected to participate in commercialisation initiatives. In addition, we include participation in other commercial markets represented by dummies of procurement of fertilizers by cash in the previous season, use of hired labour in the season and access to a loan during the season. These variables represent household participation in the input, labour and credit markets for inputs into their production process.

In the second stage, we model factors associated with the degree of commercialisation while controlling for selectivity bias. This is estimated using a Tobit model where the dependent variable is the commercialisation index defined as the ratio of value of output sold to the total value of crop production. The value of the commercialization index varies from 0 to 1, where zero implies that the farmers does not sell any of the production (no commercialisation) while a value of 1 implies that all the crops produced are sold (high commercialisation). We estimate the following model:

$$CI = f(HC, FC, MC, IMR) \quad (2)$$

where CI is the commercialisation index in 2008/09 season, HC is a vector of household characteristics (sex of household head (male), age of household head, education of household head, household size), FC are farming characteristics (food security indicator, cultivated land, method of fertilizer acquisition, access to extension services), MC is a vector of main benefits from NASFAM membership (such as farming as business, market access, input access, extension services) and other control variables (main occupation of household head as business enterprise and wage employment, with crop production as control group) and IMR is the inverse Mills ratio from equation (1).

4.2.2 *Econometric Results*

Table 11 below presents the maximum likelihood estimates of factors that influence participation in commercialisation initiatives among smallholder farmers. The model explains about 14 percent of the variation as indicated by the Pseudo R^2. The Wald Chi-squared statistic shows that we reject the hypothesis that the marginal effects are equal to zero at the 1 percent significance level. The results from the model show that participation is significantly influenced by gender of household head, household size, value of assets and food security. Age, marital status, years of schooling of the household head and land cultivated or devoted to commercial crops are statistically insignificant.

Table 11 Probit estimates for determinants of participation in NASFAM commercialisation initiatives

Variables	dF/dx	z -stat
Male household head (0/1)*	0.1711	1.97 [b]
Married household head (0/1) *	0.0501	0.35
Age of household head (years)	0.0003	0.13
Years of schooling of household head	-0.0023	-0.27
Adult equivalents	0.0345	2.04 [b]
Land cultivated in 2007/08 season in hectares	-0.0006	-0.13
Natural logarithm of value of assets in 2007/08 (Mk)	0.0897	3.48 [a]
Household grew NASFAM promoted crop in 2007/08 (0/1) *	-0.0398	-0.63
Adequate food consumption scores 2007/08 (0/1) *	0.1232	1.83 [c]
Cash acquisition of fertilizer 2007/08 (0/1) *	0.0690	1.14
Use of hired labour in farming in 2008/09 (0/1) *	0.0600	0.98
Access to loan in 2008/09 (0/1) *	0.0669	1.05
Number of Observations		300
Log Likelihood		-162.80
Wald Chi-squared (12)		55.56
Prob > Chi-squared		0.000
Pseudo R^2		0.1411

Note: * dF/dx (marginal effect) is for discrete change of dummy variable from 0 to 1. Superscripts a, b and c denote statistically significant at 1%, 5% and 10% level, respectively.

Gender in terms of sex of household head plays an important role in the participation, with the probability of men participating being around 17 percent higher than that of females participating in commercialisation initiative. The coefficient of sex of household head is statistically significant at the 5 percent level. This confirms the assertion that gender represents differences in market orientation between male and female heads of households. This gender differentiation may be a result of biases in access to various forms of capital against female-headed households. It is also well-known in Malawi that female-headed households are poor and one of the vulnerable groups relative to male-headed households (GOM and World Bank, 2007).

Household size measured in terms of adult equivalents is positively associated with participation and the coefficient is statistically significant at 10 percent level. The marginal effects show that one more adult member of the household increases the probability of participation by 3 percent, underscoring the importance of family labour in commercial activities among smallholder farmers. Since most households rely on family labour, households with more labour are more likely to commercialize (Jaleta et al., 2009).

The natural logarithm of the value of assets in the household, a measure of wealth, increases the probability of participation in commercialisation initiatives. The coefficient of value of assets is statistically significant at the 1 percent level. The marginal effect shows that a unit increase in the natural logarithm of assets prior to participation increases the probability of NASFAM membership by 9 percent. Jaleta et al (2009) note that asset holding facilitates commercialisation by mitigating adverse consumption shocks, such as when incomes from commercial crops unexpectedly fall. The positive impact of assets on commercialisation initiatives in this study confirms this hypothesis.

Households whose food consumption scores (FCS) prior to participation in the NASFAM commercialisation initiative were adequate were more likely to participate, a relation statistically significant at the 10 percent level. The results imply that household food security increases probability of participation by 12 percent.

Table 12 presents Tobit estimates of determinants of the degree of commercialisation in 2008/09 season. The model explains 34 percent of the variation in the degree of commercialisation and based on the F-statistics we reject the null hypothesis that all the coefficients except the constant are equal to zero. The significance of the Inverse Mills ratio shows that there is selectivity bias in the participation of NASFAM commercialisation initiatives, hence confirming the validity of the Heckman two-step procedure.

The results show that the age of household head, number of adult equivalents, food security, commercial

Table 12 Tobit estimates of determinants of the degree of commercialisation in 2008/09

Variables	coeff.	t -stat
Male household head (0/1)*	-0.0889	-1.42
Age of household head (years)	-0.0054	-3.06[a]
Years of schooling of household head	-0.0003	-0.05
Number of adult equivalents	-0.0252	-2.08[b]
Adequate food in 2008/09 season (0/1) *	0.0927	2.12[b]
Land cultivated in 2008/09 season in hectares	0.0045	1.63
Acquired subsidized fertilizers (0/1) *	0.1139	2.27[b]
Acquired commercial fertilizer by cash in 2008/09 (0/1) *	0.1407	2.77[a]
Acquired commercial fertilizer by credit in 2008/09 (0/1) *	0.2455	3.81[a]
Main benefit from NASFAM is farming as business (0/1) *	0.1907	2.58[a]
Main benefit from NASFAM is produce market access (0/1) *	0.1714	3.52a
Main benefit from NASFAM is input access (0/1) *	0.0304	0.39
Main benefit from NASFAM is other services (0/1) *	0.0879	1.71[c]
Main occupation of household head is business enterprise (0/1) *	-0.0024	-0.05
Main occupation of household head is wage employment (0/1) *	-0.1114	-1.40
Inverse Mills ratio	-0.3832	-3.95[a]
Constant	0.8031	4.61a
Sigma		0.3065
Number of Observations		300
Log Likelihood		-99.50
F (16, 284)		9.85
Prob > F		0.000
Pseudo R^2		0.3419

Note: * indicates dummy variable. Superscripts a, b and c denote statistically significant at 1%, 5% and 10% level, respectively.

fertilizer and NASFAM membership benefits are important determinants of the degree of commercialisation among smallholder farmers. We find that the age of household head is negatively associated with the degree of commercialisation, with the coefficient being statistically significant at the 1 percent level. This implies that younger farmers tend to have a higher degree of commercialisation compared to older farmers. This result is also reinforced by the number of adult equivalent household members which is also negatively associated with the index of commercialisation. Older household heads are more likely to have large household sizes, increasing the food need requirements of households.

The role of food security in the commercialisation of smallholder agriculture is also evident from the results, the coefficient of food security being statistically significant at the 5 percent level. This shows that households that revealed that they had 'more than adequate food for household needs' in the 2008/09 season on average are 0.09 points more commercialized than those that were food insecure. Access to fertilizer also plays a significant role in smallholder commercialisation with the coefficients of fertilizer acquisition types statistically significant at the 1 percent level. More interestingly, the differential effects are evident between subsidized, cash and credit acquisition. Households that acquired fertilizers by credit are 0.25 points more commercialized compared to 0.11 for those that had access to subsidized fertilizers and 0.14 for those that had access to cash purchases. The lower marginal effects of subsidized fertilizers and cash purchases may also reflect the limited amounts of fertilizer acquired by the households using these methods, but also the greater incentives for commercialisation imposed by the credit market. These results suggest that addressing the credit market constraints among smallholder farmers has the highest potential to encourage the commercialisation of smallholder farmers.

The other interesting insight from the results is the role of NASFAM membership and farmer's benefits from for participating in NASFAM commercial initiatives as incentives for commercialisation. Farmers were asked to reveal their main benefits from participating in NASFAM commercial activities and these included farming as a business concept, access to product markets, access to input markets and access to extension and other services, with the non-members as the base category. The coefficients of farming as a business and access to product markets are positive and statistically significant at the 1 percent level while the coefficient of access to other services is statistically significant at the 10 percent. The coefficient of access to inputs is not statistically significant. The value of coefficients show that the orientation of smallholder farmers toward the concept of farming as business is an important factor driving the commercialisation of farmers followed by access to product markets. Access to other services which includes extension services, predictable prices and access to financial services also play a role albeit weak. In any case, NASFAM core service to smallholder farmers seems to be facilitating market access which is important if commercialisation of smallholder farmers is to occur.

5.0 Conclusion

In this paper we set out to investigate the factors that influence smallholder farmers' decision to participate or not to participate in NASFAM commercialisation and the factors associated with the degree of commercialisation. More specifically, the main objective was to analyse the relationship between food security and commercialisation of smallholder agriculture. The sample was drawn in NASFAM areas that had witnessed natural growth in membership. The NASFAM farmers in the sample were randomly selected from groups that had only one year experience as members. A third of the sample includes non-members identified through snow-balling by asking members.

The descriptive statistics indicate that households cultivated various crops with most land allocated to food crops. A greater proportion of their maize harvests were sold during the beginning of the marketing season and consequently annual expenditures on food constituted a substantial component of their budgets, a marketing behaviour consistent with other studies (Omiti et al., 2009). Non-farm income, including ganyu wages, remains prominent in household income. Participating households' income and food security indicators were higher than those of non-participants. For instance, participants had to cope more in 2007/08 before intervention than after the intervention to commercialise.

Using data prior to NASFAM activities, results from regression analysis reveal that the probability of participating in NASFAM commercialisation initiatives increases with sex of household head being male, household size, value of assets and food security. There is weak evidence that food adequacy influences farmers' decision to participate in NASFAM commercialisation. The continued production of food crops together with cash crops indicates food sufficiency concerns that farmers have, although food adequacy weakly affects participation. There is need to promote access to markets and minimise market unreliability and particularly the volatility of food prices evident in Malawi. Furthermore, commercialisation may not be appropriate where the largest fraction of household expenditure is on food since farmers will have limited opportunities to re-invest in farming and therefore move from small-scale to large-scale farming that aims to maximise profits.

We also reject the hypothesis that land cultivated, marital status of the household head, years of schooling of the household head, cultivation of NASFAM promoted crop in 2007/08 and participation in commercial input markets influences participation. The results suggest the crucial role wealth plays in decision to participate in farmer organisation commercialisation among smallholders. Wealth represents a resource base that facilitates affordability of farm inputs as well as smoothes consumption of participating farmers in periods when

food requirements are not met. Programmes aimed at enhancing the commercialisation of agriculture should include interventions to build assets and their capabilities.

The extent to which smallholder farmers commercialize depends on many factors including age of household head, household size, food security, access to fertilizer and benefits derived from participation in farmer organisations. Households that were food secure had higher levels of commercialisation. Access to fertilizer by credit has a higher differential impact on commercialisation compared to access to fertilizers through subsidy or cash purchase. This implies that an entitlement approach such as micro-credit provision would increase farmer's access to resources and inputs that enable them raise their productivity or scale up their existing activities and enter markets. The importance of orienting farmers to commercial objective setting and facilitating access to markets are critical in the commercialisation of smallholder farmers. The results highlights the importance of supporting the development of farmer organisation, such as NASFAM, that provide capacity building training to smallholder farmers in business management and promote market access.

This paper is a one of the outputs of the Future Agricultures Consortium (FAC) on the thematic area of Commercialisation.

END NOTES

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1 Jaleta et al. (2009) provides a recent review of agricultural commercialisation and the various indicators that have been used to measure the extent of commercialisation.

2 See Leavy and Poulton (2007) for details.

3 NASFAM is an affiliate of several associations based on geographic areas and cash crop specialisation. Some associations specialize in one cash crop while others specialize in a mixture of cash crops.

4 Households' well-being is according to a rank of six steps; the first step being the poorest people, and the highest step, rich people in their community.

5 Different weights i.e. adult equivalent scales were assigned to individual household members depending of their age. We measure household size not in number of persons, but in number of adult equivalents. The adult equivalent scales used were determined by World Health Organisation for Southern Africa. The conversion factors are reported in the appendix.

6 Quantity data is not available for fertilizer used in 2007/08 farming season.

7 According to WFP (2008) the FCS between 0 and 21 represents poor food security, 21.5 – 35 represents borderline cases and above 35 represents acceptable food security situation.

8 Although both participants and non-participants of NASFAM sell food and non-food crops, NASFAM orients smallholder farmers to the concept of farming as a business enterprise – making farmers perceive their activities as business activities, and we therefore model such orientation.

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Appendix Table A1 Adult Equivalent Scales	
Age in Years	**Conversion Factor**
>12 years	1
>=10 <=12	0.95
>=7 <10	0.78
>=4 <7	0.62
>=1<4	0.36

Appendix Table A2 Descriptive statistics for variables in the Probit model

Variables	Mean	S.D	Min	Max
NASFAM member (0/1)*	0.6733	0.4698	0.00	1.00
Male household head (0/1)*	0.8000	0.4007	0.00	1.00
Married household head (0/1) *	0.9500	0.2183	0.00	1.00
Age of household head (years)	43.723	13.930	20.00	84.00
Years of schooling of household head	5.6800	3.7449	0.00	14.00
Adult equivalents	4.8533	2.1033	1.00	10.95
Land cultivated in 2007/08 season in hectares	2.5686	5.8117	0.00	66.00
Natural logarithm of value of assets in 2007/08 (Mk)	0.3267	0.4698	0.00	1.00
Household grew NASFAM promoted crop in 2007/08 (0/1) *	0.7133	0.4530	0.00	1.00
Adequate food consumption scores 2007/08 (0/1) *	10.091	1.2363	4.61	13.75
Cash acquisition of fertilizer 2007/08 (0/1) *	0.4067	0.4920	0.00	1.00
Use of hired labour in farming in 2008/09 (0/1) *	0.3967	0.4900	0.00	1.00
Access to loan in 2008/09 (0/1) *	0.3133	0.4646	0.00	1.00

Note: * indicates dummy variable.

Appendix Table A3 Descriptive statistics for variables in the Tobit model

Variables	Mean	S.D	Min	Max
Commercialisation index	0.4268	0.3232	0.00	0.99
Male household head (0/1) *	0.8000	0.4007	0.00	1.00
Age of household head (years)	43.723	13.930	20.00	84.00
Years of schooling of household head	5.6800	3.7449	0.00	14.00
Number of adult equivalents	4.8533	2.1033	1.00	10.95
Adequate food in 2008/09 season (0/1) *	0.2400	0.4278	0.00	1.00
Land cultivated in 2008/09 season in hectares	2.6083	5.8459	0.00	66.00
Acquired subsidized fertilizers (0/1) *	0.5000	0.5008	0.00	1.00
Acquired commercial fertilizer by cash in 2008/09 (0/1) *	0.3667	0.4827	0.00	1.00
Acquired commercial fertilizer by credit in 2008/09 (0/1) *	0.0900	0.2867	0.00	1.00
Main benefit from NASFAM is farming as business (0/1) *	0.0800	0.2717	0.00	1.00
Main benefit from NASFAM is produce market access (0/1) *	0.2133	0.4103	0.00	1.00
Main benefit from NASFAM is input access (0/1) *	0.0900	0.2867	0.00	1.00
Main benefit from NASFAM is other services (0/1) *	0.2900	0.4545	0.00	1.00
Main occupation of household head is business enterprise (0/1) *	0.1867	0.3903	0.00	1.00
Main occupation of household head is wage employment (0/1) *	0.0900	0.2867	0.00	1.00
Inverse Mills ratio	0.5453	0.3200	0.06	2.17

Note: * indicates dummy variable.

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