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Full Length Research Paper

Modelling the role of pro poor agro based micro, small and medium enterprises on poverty reduction in Malawi

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This paper quantifies the impacts of pro poor micro, small and medium scale enterprise on households' poverty reduction in Malawi. The paper employs normalized censoring modelling on 1000 household dataset from across Malawi. The paper found that pro poor agro based micro, small and medium scale enterprises sure as fish and mushroom farming, cassava flour processing, pig and chicken rearing, rural bakeries, and others have positive effect on household poverty levels. Pro poor agro based enterprises generally reduced household poverty by 8-24% in Malawi at 5% level of significance. However, the data depicts that pro poor small and medium scale businesses owners are challenged by lack of credit, low bargaining power, high input costs, low product prices and lack of reliable markets. The paper strongly recommends that pro poor programs ought to be gender responsive and strongly mainstream micro, small and medium enterprises in poverty reduction programs at all levels of their operations.

Key words: Households, censoring modelling, pro poor agro enterprises, Malawi.

INTRODUCTION

This paper attempts to address a very pertinent empirical question of the role of micro, small and medium enterprises in Malawi on poverty reduction. In the 21st century, both the national and household economics have largely been characterized by paradigm shifts of paying attention to eradicate extreme poverty by half Millennium Development Goals (GoM, 2011). Food production has slowed down by 20% in 2000s from 7% in 1990s due to factors such as low soil productivity, changing climates and other related factors (Biacuana, 2009; Rosenzweig and Parry, 1994). In Southern Africa, food insecure households have increased from 160 million in 1996 to over a 200 million in the 2000s (Parry, 2007; FANRPAN, 2005).

In Africa, food production per capita shows a distinct downward trend since 1990s (FAO, 1998). In 1993, the per capita food production index stood at 93.36 compared with 97.55 in 1982 and 100 in 1979-81. In Southern Africa, however, most countries experienced a Steady production output from 1992-2002. After the 1991–2 crisis, there were high hopes that new thinking on food security in the context of structural adjustment and market liberalisation to generate economic growth would make the countries and populations of the region less vulnerable to food crises in the future. Nevertheless, this did not yield much result as evidenced by the 2001-03 crisis (FANRPAN, 2005).

Like most developing countries, in Malawi, poverty reduction efforts have been drastically affected. This has resulted into food shortages, hunger, malnutrition and low income levels among most population (Action Aid, 2006). Worse still, market oriented factors such as increased middlemen, input prices, lack of credits and others have impeded pro poor micro, small and medium enterprises (GoM, 2006). Malawi sought for food aid in 1994/5 and 2001/2 due to shortfalls in food production and high food price to access on the markets (FAO, 2011).

Malawi has experienced severe food shortfalls and wavering income due to low soil productivity, fragmented land, high food and agricultural input prices, lack of agribusiness capital, and climatic related factors over the past decade (GOM, 2008). Food crop production reduces

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by 20% to 60% annually and over a million households become food and income insecure every year (Fewsnet, 2011). Worse still, most of such (90%) households do not have income or do not have access to credits (Mk 36, 000) to purchase food on the market. NSO, 2005 reported that 52 % of Malawians are very poor as they spend less than US$ 1.5 a day. In Malawi, a proportion of rural ultra poor people has increased from 17% in 2008 to 24% in 2012 (NSO, 2012).

In order to reduce poverty levels in Malawi, a number of deliberate pro poor agribusiness interventions have been introduced to help households move out of poverty cycles. Such pro poor agro enterprises include mushroom/fish farming, social cash and food transfers, pig farming, chicken layering, cassava flour processing and rural bakery programs. Despite efforts to promote small and medium enterprises, their role on poverty reduction has remained much unknown due to few or lack of quantitative studies (Pangapanga et al., 2012). This has affected policy or decision making. Households have continued experiencing food shortages, hunger, malnutrition, and low income due to policy actions that are not supported by empirical findings (Action Aid, 2006; NSO, 2005). Using survey data from 1000 randomly selected households from low and highland of Malawi. This paper examines the contribution of micro, small and medium enterprises in reducing poverty levels i.e. improving food and income security.

Rationale of the paper

Malawi, with a population of 14 million people and a gross domestic product of about US$5.00 billion, is one of the third world countries that is heavily dependent on agriculture (International Monetary Fund, 2011). 90% of the population depend on agriculture as a source of livelihood. 52% of the population is poor and 36% is ultra poor. Presently, food productivity does not meet the food demand due to, in part, high population growth, low investments in agricultural activities and deteriorating soil productivity exasperated by climatic change and weather related factors (Action Aid, 2006). More than 40% of the population in Malawi is affected by droughts, floods, soil erosion, low agricultural produce prices and others.

In order to move poor population out of poverty, government and several development partners have designed a number of pro poor programs to help households become food and income secure (GoM, 2008). In 2012, the government of Malawi has champion a recovery plan as a vehicle to cushion and move poor population from deep and severe poverty traps (BPLC, 2012). Alternatively, agriculture sector, of which 70% is dominated by subsistence farming, forms the foundation of the national economy. According to World Bank (2010), the sector employs 85% of the labour force and contributes about 35% of gross domestic product and 85% of total export revenues. In addition, approximately 85% of household food and nutritional security is derived from agricultural sector.

On the other hand, pro poor interventions such as agribusiness interventions in Malawi are still minimal (GoM, 2004). This is despite, about 1.1 million people becoming food insecure due to low yield and lack of income to purchase food from the market. Sadly, little is known about what factors influence households' participation in pro poor agribusiness actions with regards to household food and income security. This is in spite of several qualitative studies in/outside Malawi indicating that pro poor micro, small and medium enterprises enhances food availability by 32% and 15% between the low and highland areas respectively (Pangapanga et al., 2012). This paper therefore examines economic impacts of micro, small and medium enterprises on household food and income security in Malawi.

RESEARCH METHODOLOGY

Theoretical and Empirical Frameworks

The modelling in this paper is based on the notion that an individual derives utility by choosing a number of alternatives. The paper adapts a theoretical framework that follows a random utility structure which describes engagement/choice decision in which an individual i has a set of pro poor micro, small and medium enterprises j from which to participate in and improve food and income security (McFadden, 1978). Random utility model helps us address how households participate in various pro poor enterprises (i.e. mushroom farming (MFP), pig rearing (PRP) and chicken rearing (CRP), cassava flour processing (CFPP), and rural bakery (RBP) programmes) and how we can model them to evaluate their role on poverty reduction.

Pro poor programs tackle risk, vulnerability and wellbeing (food and income) in several ways. First, they directly protect consumption, enabling households to better cope with both shocks and chronic poverty. In addition, they mitigate the worst downside consequences of high-risk investments, promoting more productive activities. Pro poor programs support investments in health, nutrition and education that help to break the inter-generational transmission of poverty (Michael, 2009). In this paper, household food and income security is a situation where all household members have adequate income or food that can be consumed throughout the year.

In Malawi, households are considered food secure if each household member has at least 300 kg of food or a minimum of Mk37000 per year (NSO, 2012). Firstly, it assumes that 300 kg per year person of the food crop produced is a threshold. In terms of income, it assumes

an internationally agreed threshold of US$ 1.5 per day consumption per individual. Any household that has more or equal to 300 kg per person per year is food secure and not otherwise. This threshold assumption allows us to adopt a censored data-modelling criterion.

One of the censoring regressions is a Tobit model which illustrates the relationship between non negative variable G_{ih} and independent variables H_{ih}. This model assumes that there is a latent dependent variable. Mathematically, a latent model can be simplified as follows:

$$G_i = f(H_i, M_i) + \kappa_i$$

[17]

where $\mathrm{G_i}$ is the total food or income availability at household level. $\mathrm{Q_i}$is equal to zero if the household has total food (income) available of less than 300 kg (Mk37, 000) per person per year. $\mathrm{G_i}$ equals the actual total food (income) available amount if the household has food of more than or equal to 300 kg (Mk37, 000) per person per year. $\mathrm{H_i\ and\ M_i}$ are vectors of household specific characteristics and adaptation strategies. $M_i = 1$ if the household adapt to changes in climate and $M_i = 0$ if otherwise. $\mathrm{k_i}$ is a vector of non observable characteristics. Since equation [25] censors some data, it is called a Tobit model. A Tobit Model has the characteristics of assessing the contribution of pro poor agro enterprises on food and income security. In other words, each person at household level is food and income secure if they have at least (T) 300 kg per year. $\mathrm{Q_i}$ is a censored dependent variable that is presented as follows:

$$\mathrm{E[G_i/(H)] = \Phi(\Delta)T + \big(1 - \Phi(\Delta)\big)\big(\Delta H + \sigma\lambda(\varrho)\big)}$$

[18]

where $\varrho = \frac{(T-\Delta H)}{\sigma}, \lambda(\varrho) = \frac{\phi(\Delta H)}{(1-\Phi(\Delta H))}. \Phi(.)\ \mathrm{and}\phi(.)$ are standard normal distribution and density functions, respectively (Greene, 2003). T is a vector for 300 kg (Mk37, 000) per person per years. $\lambda(\varrho) = \frac{\phi(\Delta H)}{(1-\Phi(\Delta H))}$is called an inverse mills ratio. A Mill ratio indicates how one unit change in exogenous variables alters the latent dependent variable. Marginal effects of a tobit model is represented as follows:

$$\frac{\delta E[G_i^*/H]}{\delta H} = \Delta\Phi((\Delta H - T)/\sigma) = \Delta\left\{1 - \lambda(\varrho)\left[\frac{\Delta H}{\sigma}\right] + \lambda(\Delta\varrho)\right\}$$

[19]

where T is a censoring point that has a numeracy of 300 kg (Mk37,000) /person/year. For censored data, the marginal effects are as follows:

$$\frac{\delta E(G_i)}{\delta H} = \Phi\left(\Delta H/_{\sigma}\right)\Delta$$

[20]

Furthermore, we derive the log likelihood expression for the censored regression model as:

$$\ln L = -\frac{1}{2}\sum_{\geq 275\mathrm{kg}}(\ln(2\pi)) + \ln(\sigma^2) + \left(\left(G_{i_i} - \Delta H\right)^2/\sigma^2\right) +$$

[21]

where $\sum(.)$is a sum over the non censored and censored observations. From the theory above, we derive and illustrate our empirical model as follows:

$$G_i = \Delta H_i + \zeta M_i + \kappa_i$$

[22]

where $\Delta\ \mathrm{and}\ \zeta$ are vectors of unknown parameters. Other variables are as described above in equation 26. Our censored Tobit model considers two categories. Firstly, there is information on both independent variables and dependent variable. Secondly, it has limited information on dependent variable and is specified as follows:

$$G_i(x) = \begin{cases} 0,\ G_i^* = G_i = \Delta H_i + \zeta M_i + k_i < 300\ kg\ (T) \\ \text{actual \#},\ G_i^* = G_i = \Delta H_i + \zeta M_i + k_i \geq\ 300\ \mathrm{kg}\ (T) \end{cases}$$

[23]

Where $\mathrm{G_i^*}$ is equal to zero [0] if food (or income) available at the house is less that 300 kg (Mk37, 000) /person/year. On the other hand, $\mathrm{G_i^*}$is equal to the actual food (income) quantity if food is at least 300 kg (Mk37, 000) /person/year. In other words, expression [23] can be illustrated as follows:

$$\mathrm{P(censored) = P(G_i^* < T) = \Phi\left(\frac{T-\Delta H}{\sigma}\right) = 1 - \Phi\left(\frac{\Delta H - T}{\sigma}\right)}$$

[24]

Table 1. Definition of Variables used in this paper.

Variables	Measurements	Variables	Measurement
Gender	1=Female; 0=Male	Free seeds	Kilograms
Education	Years	Pig farming	Malawi Kwacha
Labour	Man-day	Bakery	Malawi Kwacha
Household size	Number	Mushroom	Malawi Kwacha
Age (Experience)	Years	Chicken rearing	Malawi kwacha
Income	Malawi Kwacha	Cassava flour	Malawi kwacha
		Business info.	1= Yes; 0=No

$$P(\text{uncensored}) = 1 - \Phi\left(\frac{T-\Delta H}{\sigma}\right) = \Phi\left(\frac{\Delta H - T}{\sigma}\right)$$

[25]

The log likelihood function for the censored normal distribution can be rewritten as follows:

$$L = \prod_i^N \left[\frac{1}{\sigma}\phi\left(\frac{Q_i-\Delta H}{\sigma}\right)\right]^{d_i}\left[1-\Phi\left(\frac{\Delta H - T}{\sigma}\right)\right]^{1-d_i}$$

[26]

It can also be extended as:

$$\ln L = \sum^N \left\{ d_i\left(-\ln\sigma + \ln\phi\left(\frac{Q_i-\Delta H_I}{\quad}\right)\right) + (1-d_I)\ln\left(1-\Phi\left(\frac{\Delta H_i}{\quad}\right)\right)\right\}$$

[27]

Equation 36 is made of two components. The first correspond is a classical regression for the uncensored observations. The second part corresponds to relevant probabilities that an observation (food or income availability) is censored on. Data used in this analysis was collected from a household survey through semi-structured questionnaires from 26 villages of 6 Traditional Authorities in Malawi. Table 1 shows how variables used in this paper were defined and measured.

Empirical analysis was supported by participatory rural appraisals. Participatory rural appraisals were in the form of focus group discussions and key informants interview. Interviews included questions such as what are the perceived roles of adaptation on household food security and food production.

RESULTS AND DISCUSSION

Descriptive Statistics

This paper asks whether pro-poor micro, small and medium enterprises could contribute significantly on reducing poverty. In order to answer the question, the paper describes socioeconomic characteristics of pro poor enterprises' households. Household characteristics such as education and gender of the household head are vital and influence the level of understanding and application of poverty reduction strategies (Edris, 2003; Pangapanga et al, 2012). Gueye & Gauci, 2003 argued that education in particular, has been increasingly recognized as a key element in the reduction of poverty whether it is defined in terms of potential provision of income earning assets or production of public goods. Pro poor growth cannot be measured by economic results alone, it must also result in improved social conditions for the poor. The endowment of educational assets renders poor people more equipped in modern economies.

In the case of Malawi, it is shown that on average 60% of the households in low and highland areas of Malawi have attended primary school. In terms of gender, about 41 % and 47 % of the households in both low and highland areas of Malawi district are headed by female heads, respectively. Conversely, male heads about 59% and 53% of the lowland and highland households. The mean age of household head in Malawi is 38 (see Table 2). This is accordance with National Statistical Office (NSO) 2012 findings that most households in Malawi are headed by people that are in the economic active age group.

The household size in this study is in line with the national statistics that, on average, households have five members (NSO, 2012; NSO, 2010). Additionally, the results revealed that low and highland areas have 1.7 acres (0.69 ha) and 1.4 acres (0.57 ha), respectively. The mean value of household annual income for lowland households is MK 46,202 (US $ 308) and highland households have MK45, 466 (US$ 303). These findings confirm that most households in Malawi live below a poverty line of US$ 1.5 a day. Extreme poverty in Malawi has increased by 3% from 22% in 2005 to 25% in 2011 (NSO, 2012).

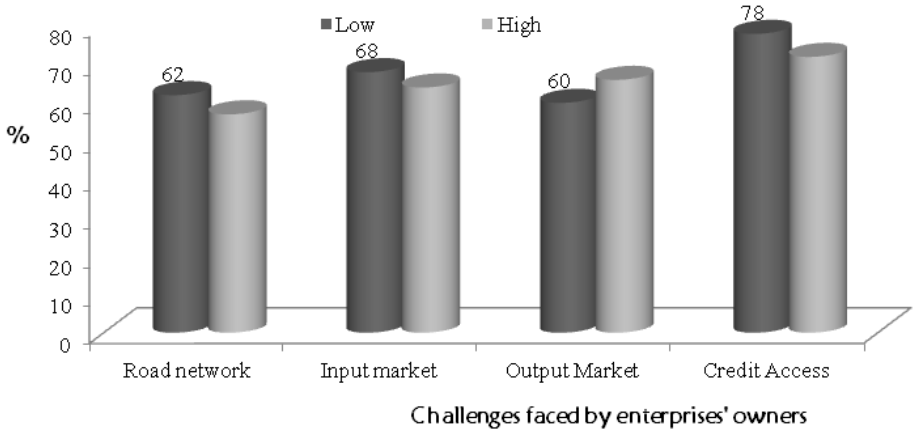
Pro poor agro enterprises and challenges faced

Pro poor programs such as social safety nets are emerging in many developing countries as a lead social protection initiative tackling poverty. Importantly, increasing evidence is suggesting that such programs (i.e. social cash transfers) can contribute to pro-poor growth by providing an effective risk management tool by

Table 2. Household characteristics.

Variable		Lowlands (500)		Highlands (500)		
		Mean	Std. E.	Mean	Std. E.	t-test
Gender	Female	41	0.035	47	0.053	*1.019*
	Male	59	0.035	53	0.053	
Household head Age		39.29	0.997	34.66	1.426	*1.315*
Family Size		5.902	0.190	5.269	0.245	*0.971*
Labour (People>15yrs)		3.073	0.120	3.136	0.182	*-0.294*
HHD Education		3.784	0.260	4.652	0.382	*-1.483*
Educ. levels	None (%)	28.35		22.47		
	Prim (%)	58.25		62.92		
	Second(%)	12.37		13.48		
	Terti(%)	01.03		01.12		
Total Land (acres)		1.703	0.069	1.429	0.098	*1.122*
FDIVP (Free Seeds) (%)		72	0.032	70	0.027	*1.002*
PFP (Pig farming) (%)		32	0.035	09	0.031	*4.26**
RBP (Bakery) (%)		32	0.035	15	0.038	*3.10**
MFP (Mushroom) (%)		84	0.027	47	0.053	*6.79**
CRP (Chicken) (%)		09	0.020	69	0.050	*-13.2**
Cassava flour (%)		87	0.025	06	0.025	*20.3**

Figure 1. Challenges faced by enterprises' owners.



empowering poor households to lift themselves out of poverty (Michael, 2009).Households have participated in a number of pro poor agro enterprises to improve their food and income security needs. Seventy two percent (72 %) and 66% of low and highland households received and grow free improved varieties, respectively (Table 2). A focus group discussion reported that households have received for free improved varieties such as DK5083, locally known as *kanyani* (for maize) and *kapire* (for millets). Pig rearing is practised by 32% of the lowland and 9% of the highland households. Thirty two (32%) percent of the lowland and 15% of highland households in the study area engaged in rural bakery enterprise.

Furthermore, a substantial ($p < 0.05$) disparity over mushroom farming is depicted between lowland and highland household (see Appendix B). The paper results depict that 84% of the lowland households participated in mushroom farming whereas only 47% of the highland households engaged in a similar enterprise. Chicken (layer) rearing is statistically different between low and highland areas ($p < 0.05$). Chicken (layer) rearing is practised by 69% of the highland and only 9% of the lowland households as a source of income to purchase food during food shortages (see Table 2). Social safety nets are non-contributory transfer programs seeking to prevent the poor or those vulnerable to shocks and

Table 4. Normalized tobit regression estimates.

	Lowland		Highland	
	dy/dx	Std. E.	dy/dx	Std. E.
HHD_Gender	0.136*	0.356	0.042*	0.551
HHD_Education	0.227*	0.214	0.159*	0.376
HHD_Labour	0.008	0.118	0.035	0.173
Land holding size	0.078*	0.020	0.042**	0.027
Age (Experience)	0.01*	0.002	-0.023*	0.004
Business infomation	0.267*	0.103	0.179**	0.111
CRP	0.239*	0.033	0.198*	0.028
MFP	0.242*	0.090	0.185*	0.082
RBP	0.206*	0.102	0.104	0.084
FDIVP	0.235*	0.187	0.047	0.084
PFP	0.264*	0.083	0.052	0.059
CFPP	0.479*	0.185	0.151*	0.073
MFP*RBP	0.213	0.110	0.123	0.105
FDIVP*MFP	0.204*	0.137	0.007	0.119
MFP*CFPP	-0.209	0.213	-0.40**	0.255
FDIVP*PFP	0.487*	0.195	0.033	0.124
FDIVP*MFP*PFP	-0.716*	0.220	-0.158*	0.028
Area(Highland=1)				
LR	-1213.23		-570.06	
χ^2	27.45*		17.78*	

*;** siginificant at 1% and 5%.

poverty from falling below a certain poverty level. In Malawi, the most vulnerable include the elderly, the chronically sick, orphans and other vulnerable children, persons with disabilities, and destitute families. These categories of people are vulnerable to risk and lack resilience. In order to move them out of poverty, a number of assistance have been initiated to engage vulnerable people in higher economic return activities (GOM, 2012; NSO, 2012).

The operations of the micro, small and medium enterprises do not happened in a vacuum. There are challenges that are met. Figure 1 shows that about 78% of the household in lowland areas in the study area face credit access challenge. From the focus group discussions, it was reported that lack of access to credit limits the operations or economic of scales of micro, small and medium enterprises. More than 60% of the respondents in this study mentioned markets as one of the major barrier to conducting of enterprises in the study area. From the group discussions, it was singled out that most produce from the enterprises are traded locally or in markets that are mobile.

Contributions of pro poor agro enterprises on household poverty level

The study analyzed the contribution of pro poor micro, small and medium enterprises (PPMSME) on household food and income security. Contributions of MSME on household food and income security are captured through application of a normalized censored regression (Tobit) model (see Table 4). Through the maximum likelihood estimator, a Tobit model shows strong and goodness of fit to capture the the role of PPMSM enterprises at household level as indicated by the χ^2.

In this study, mushroom farming (MFP), pig rearing (PRP) and chicken/layer rearing (CRP), cassava four processing (CFPP), and rural bakery (RBP) programmes significantly influence household food and income security in both areas. Holding other factors constant, MFP improved food and income security by 24% and 19% in low and highland areas, respectively. PRP enhanced food and income security by 26% and 5% in low and highland areas, respectively. Likewise, it is indicated that CRP boosted food and income security by 24% and 20% in low and highland areas, respectively. On the other hand, RBP reduced household food and income security by 21% and 10.4% in low and highland areas, respectively. CFPP negatively affected food and income security. Focus group discussions reported that CFPP may not automatically translate into more food due to time lag involved in farming cassava.

Focus group discussions further reported that households simultaneously participate in various MSME to augment

food and income security. This paper depicts that combination of MFP with FDIVP increased food and income security by 20% and 7% in low and highland areas, respectively. On the other hand, Mixture of CRP with MFP and FDIVP reduced food and income security by 72% and 16% in low and highland areas, respectively. Focus group discussions pointed out that combination of some MSME (such as simultaneous implementation of MFP and CRP) resulted into reduced food and income security because of resource diversion between these two agro-enterprises. For instance, household labour is likely to be divided between enterprises if more than two enterprises at adopted at once. Gender, land holding size and educational status of the household heads plays a very important role in influencing food and income security at household level.

CONCLUSION AND POLICY IMPLICATIONS

This paper has examined the role of pro poor agro based micro, small and medium enterprises in Malawi. It employed a normalized censored regression analysis on dataset of 1000 households from low and highland areas of Malawi. Based on results from the censoring (Tobit) function, mushroom farming enterprise improved food and income security by 24% and 19% in low and highland areas, respectively. This paper therefore concludes that pro poor micro, small and medium enterprises positively and significantly contribute to food and income security at household level. However, the paper found that enterprises' owners are challenged by lack of credit, low bargaining power, high input costs, low product prices and lack of reliable markets. The paper strongly recommends pro poor programs ought to be educational and gender responsive and strongly mainstream such social characteristics and enterprises in poverty reduction programs at all levels of their operations.

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