Research Application Summary

Determinants of smallholder farmers' participation in the potato market in Kabale and Mbale

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Abstract

This study was done in Kabale and Mbale districts of Uganda for the two potato growing seasons of 2011/2012. It sought to determine factors that hinder smallholder farmers' level of participation in the potato market in addition to those that influence their decisions to participate in the potato market. It also aimed at developing potato farmer typologies basing on levels of market participation. Data from a survey of 200 potato farmers selected from Kabale and Mbale using a multi-stage sampling process was collected and analysed. Two econometric models were employed in the analysis. 1) An ordered probit model and descriptive statistics were used to characterise potato farmers as net sellers, net buyers and autarkic and used to explain factors that lead to such farmer behaviour 2) A two-stage selectivity model similar to a Heckman was used in determining factors that influence farmers' decisions to participate in the potato market and factors that determine the level of participation. The study results indicated that farmer's marketing experience, garden size, distance to the nearest village market, road condition to market and possession of a mobile phone positively influenced potato farmers' decision to be autarkic other than net buyers and net sellers other than autarkic *ceteris paribus.* The two-step Heckman results on the other hand revealed that condition of roads from villages to potato markets as well as age of the farmer positively and significantly influenced decisions to participate in markets while size of land owned influenced potato volumes sold in the market.

Key words: Econometric models, Kabale, market participation, Mbale, net seller, potato

Résumé

Cette étude a été réalisée dans les districts de Kabale et de Mbale en Ouganda pour les deux saisons de croissance de pommes de terre de 2011/2012. Elle a cherché à déterminer les facteurs qui font obstacle à la participation de petits agriculteurs au marché de pommes de terre, en plus de ceux-là qui influent sur leurs décisions de participer au marché de

pommes de terre. Ellea visé également à développer des typologies des agriculteurs de pommes de terre fondant sur les niveaux de participation au marché. Les données d'une enquête auprès de 200 agriculteurs de pommes de terre sélectionnés à Kabale et Mbale à l'aide d'uneprocédure d'échantillonnage à plusieurs degrés ont été recueillies et analysées. Deux modèles économétriques ont été utilisés dans l'analyse. 1) Un modèle probit ordonné et les statistiques descriptives ont été utilisés pour caractériser les agriculteurs de pommes de terre en tant que vendeurs, acheteurs absolus et autarciques et ont expliqué les facteurs qui conduisent à des tels comportements des agriculteurs 2) Un modèle de sélectivité en deux niveaux, semblable à un modèle de Heckman, a été utilisé pour déterminer les facteurs qui influencent les décisions des agriculteurs à participer au marché de pommes de terre et les facteurs qui déterminent le niveau de participation. Les résultats de l'étude ont indiqué que l'expérience de commercialisation des agriculteurs, la taille du jardin, la distance au marché le plus proche du village, l'état des routes vers le marché et la possession d'un téléphone mobile ont positivement influencé la décision des agriculteurs de pommes de terre pour être autarciques autres que des acheteurs absolus et les vendeurs absolus autres que autarciques*ceterisparibus*. En plus, les résultats de Heckman à deux niveauxont révélé que l'état des routes des villages vers les marchés de pommes de terre ainsi que l'âge de l'agriculteur ont influencé positivement et significativement les décisions de participer aux marchés alors que la taille des terresqui leur sont propresa influencé les volumes de pommes de terre vendus sur le marché.

Mots clés: Modèles économétriques, Kabale, participation au marché, Mbale, vendeur absolu, de pommes de terre

Background

It is estimated that between 1994 and 2008, potato production in sub-Saharan Africa more than doubled from 100 metric tonnes to 290 metric tonnes (FAO, 2010). This increase was attributed to increase in area under potato much as average yields declined considerably due to inadequate use of quality inputs like certified seed and fertiliser. The main drivers of this growth in production are increasing urbanisation. IFPRI and UNEP (2003) predicted that by 2015, urbanisation will have risen to 47%. Therefore, to cater for the increasing demand due to the growing local population and regional market demand there is need to invest in potato market and value chain development in order to absorb future increases in production for continued growth and

sustainability of potato commercialisation in Uganda. It is estimated that about 60% of total Ugandan potato output comes from Kabale and Kisoro districts with South-Eastern Uganda contributing 10%. The remaining 30% is reported to come from the districts of Mubende, Nebbi, Masaka, Mbarara and Rakai (Ferris *et al.,* 2001; Okoboi, 2001). In recent years, the introduction of lowland varieties extended the crop to other regions like the central and west Nile as a commercial activity (Ferris *et al.,* 2001; Okoboi, 2001). The marketing of potato in Uganda is still isolated from regional and global markets and market participation by farmers in the potato value chains has grown slowly (Ferris *et al.,* 2001).

Despite the growing research on market access and smallholder market participation, much of it had concentrated on grains while perishables like potato with a short storage and shelf-life and whose marketing challenges are unique had not been given much attention. It was therefore the purpose of this research to contribute to the growing body of literature by finding out what motivates farmers to participate in the potato market and how profitable value-addition is to potato at farm level. The objectives of this study were to characterise potato farmers, analyse factors that influence them to participate in the market and how much they sell in those markets as well as assessing profitability of potato value-addition at the farm level. The hypotheses in this study were; 1) It is highly more likely for a potato farmer to be a net seller rather than a net buyer or autarkic; 2) Farmer participation in potato markets is a post-harvest decision influenced by surplus production volumes; 3) Potato sellers allocate higher proportions of land to potato production than autarkic farmers; and 4) Farmers who add value to potato operate above the break-even point.

Literature Summary

Smallholder farmers in a bid to participate in markets face two decision problems after production, the first being whether to sell or not to sell their produce and the second being how much to sell into a market (Goetz, 1992; Makhura *et al.,* 2001; Heltberg and Tarp, 2002; Boughton *et al.,* 2007; Persson, 2009). Jagwe (2011) using a two-stage Heckman and probit model found that belonging to a farmer's group, size of the household, distance to the market and ownership of transport means significantly influenced extent of farmers' participation in banana markets. Gebremedhin and Hoekstra (2009) found size of cultivable land, household labour supply and physical capital to be important factors in inducing smallholder market participation.

Study Description

This study was conducted in Kabale and Mbale districts found in the South-West and East of Uganda, respectively, because of their position as the leading potato producers in Uganda. Data were collected through a farm survey using a pre-tested structured questionnaire and focus group discussions with farmers and key informants. The survey captured data on potato marketing and production as well as inputs used in production and adding value to potato and costs incurred. Two sub-counties of Muko and Kamuganguzi in Kabale and one sub-county in Mbale (Wanale) were purposively selected because they are the leading potato producers. Two parishes from each sub-county were also purposively selected followed by stratification of farmers into net sellers, net buyers and autarkic categories and random sampling in each stratum to give rise to a total sample size of 200 potato farmers. A two-stage selectivity model similar to the Heckman model as previously used by Heckman (1979) and later by Goetz (1992), Makhura *et al.* (2001) and Heltberg and Tarp (2002) was employed to determine factors which influence the decision of smallholder potato farmers to participate in the potato market as sellers and factors that contribute to the level of participation. Potato farmer characterisation was done through descriptive statistics and an ordered probit model to characterise the farmers and explain the behaviours exhibited by the three farmer categories.

Research Application

This discussion is based on data from 138 farmers from Kabale and Kisoro. Data for Mbale is still being analysed. The results of the ordered probit regression and the two-step Heckman models are shown in Tables 1 and 2, respectively. The results in Table1 show that coefficients for size of potato garden in the last two seasons, distance to the nearest potato market, farmer's education level, farmer's marketing experience, possession of a mobile phone and road condition to the nearest market were positive and significant at 5% level meaning that these factors positively influenced potato farmers' decision to be autarkic other than net buyers and net sellers other than autarkic *ceteris paribus*. Farmers tend to sell more than they buy in the market that is being more of net sellers that net buyers when they are near the market, road condition is good, having means of communication with buyers via say a mobile phone and they know the tricks and dynamics of selling produce through their long experience. However contrary to what was hypothesised, having other sources of food other than potato negatively influenced farmers from being net sellers. This is possibly because many of the smallholders are subsistence and possess

Table 1.   Ordered Probit Results for three farmer typologies (Net seller, net buyer and autarkic).

Variable	Coefficient	Standard Error	P-value
Total farm land (Ha)	-1.029162	0.0990678	0.000
Marketing Experience(years)	0.0870388	0.0098013	0.000
Farmer's sex	-4.079372	0.1946084	0.000
Farmer's education level(years in school)	3.647866	0.0928819	0.000
Farmer has other food sources	-4.875386	0.1977938	0.000
Dependency ratio	-0.4841828	0.1897246	0.011
Potato garden size (Ha)	6.094419	0.3085829	0.000
Non-farm income (UShs)	-0.000015	0.00000054	0.000
Distance to nearest potato market (Km)	0.5358081	0.0489717	0.000
Farmer belongs to a group	-4.279128	0.1800312	0.000
Road condition to the nearest potato market	9.82972	0.2161959	0.000
Farmer has a mobile phone	1.918466	0.2090233	0.000

Ordered probit regression

Prob > chi2   =   0.0000

Log pseudolikelihood = -17.923316

Pseudo R2   =   0.4992

Number of obs   =   85

Wald chi2(15)   =   2.05e+08

Table 2.   Two-step Heckman Results.

Variable	Coefficient	Standard Error	P-value
Step 1: Does farmer sell any potato in the market?			
Road condition to the nearest potato market	0.2651763	0.1352619	0.050
Number of extension visits	0.0161037	0.0197051	0.414
Farmer has other food sources	0.1372777	0.1140584	0.229
Farmer's age	0.0103582	0.0030957	0.001
Distance to the nearest market(Km)	0.0186459	0.112888	0.099
Farmer's Non farm income (UShs)	-3.43e-07	4.11e-07	0.404
Step2: Volume of potato sold by farmer in two seasons (kg)			
Value of livestock (UShs)	5.36e-07	3.74e-07	0.152
Average Price of potato (Ush)	0.002258	0.0012856	0.079
Total farmland (Ha)	-0.3975668	0.1518809	0.009
Farmer's education level	0.1020684	0.2219114	0.646
Dependency ratio	0.0570528	0.4131852	0.890
Distance to the nearest market	0.0674501	0.706461	0.340
IMR (Lambda)	**0.8872582**	**0.342634**	**0.010**

Number of obs   =   131   Censored obs   =   11   Uncensored obs   =   120
Wald chi2(12)   = 243.61   Prob > chi2   =   0.0000

small pieces of land and having another source of food discourages them from growing more potato to have a marketable surplus.

The results in Table 2 above show that farmer age and the condition of the road to the nearest market (significant factors at 5%) and distance to the nearest potato market (significant at 10%) were factors that influenced farmers' decisions to participate in the potato market. This is because older farmers tend to posses larger pieces of land, larger family labour force and more experience in growing and selling potato which enable them to grow and sell more. On the other hand farmers who are nearer markets tend to participate more in the market because they have access to most of the market information. In step two of the Heckman model, results reveal that value of livestock owned by a potato farmer and price of potato positively influenced volumes of potato sold while farmers with bigger farmlands tended to sell less possibly because they tend to diversify into other enterprises.

Acknowledgement

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