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Financing smallholder agricultural production in Kenya: production for the market as a gauge of effective demand for credit

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Abstract

Financing smallholder farming has been one of the major concerns of Kenya's development efforts. Many credit programs have evolved over the years but with dismal performance. In a study that sought to find the best way to fund smallholder agriculture, it became necessary to analyze and document smallholders' effective demand for credit. Of particular interest was the comparison of the existing production plans and production plans under strictly profit maximization. Linear programming model was used to formalize observed plans and determine those under profit maximization. Both the activities and the values of outputs under different objectives were compared. Farm Investment Analysis was undertaken to determine the suitability of funding farm activities through credit. The study was undertaken in selected zones of Murang'a and Kisumu districts, being typical smallholder areas. Sample farmers were visited and structured questionnaires administered to cover farm events and physical resources of short rains 1995 and long rains 1996. This formed a basis of formulating the farm plans. Ten years down the road, objectives of smallholders have not changed as have been observed during outreach programs. The results showed that: (i) farmers' activities in the observed plans were different from those under strictly profit maximization; (ii) the observed plans had significantly lower profit than those under profit maximization; and (iii) meeting constraints through credit was only feasible when the objective was profit maximization. Smallholder agriculture, characterized by subsistence production, does not exhibit effective demand for credit, and funding it therefore requires means other than the competitive market.

Key words: Credit, Finance, Kenya, Smallholder

Introduction

Financing smallholder farming has been one of the major concerns of Kenya's development efforts. Smallholders are known to be resource poor and, operate below their potentials (Nyikal 2000). The use of credit, envisaged as a means of promoting technology transfer and the use of recommended farm inputs, and key to agricultural development (GoK 2002), however, has been inadequate. The high risks associated with agriculture makes potential creditors cautious about lending to the sector. The government is aware of the challenges and indeed has attempted to improve the agricultural credit market. During the current plan period, the government is trying to restructure the major agricultural finance institution, streamline the management of cooperative societies and support microfinance institutions to improve access to credit (GoK 2002). These efforts all address the supply side of the market, while assuming there is effective demand for credit. There is need to address some of the apparent constraints in the demand side. The concept of *effective demand* is often used in macroeconomic terms, to mean aggregate demand for goods and services, which is backed up with the resources to acquire them (Pearce eds. 1992). The definition distinguishes itself from national demand which refers to the desire for goods and services, which is not supported by the ability to pay, and therefore cannot be communicated to suppliers through the price mechanism. If the price mechanism cannot signal national demand then the tendency for a disequilibrium position to persist in a market economy is high. From a microeconomic perspective, the use of credit funds to finance activities and enterprises that would contribute directly to the repayment forms effective demand. Otherwise, non-market rationing of credit funds would cause disequilibria both in the farm and in the credit market. In the last two decades the government directed bank and non-bank financial institutional to direct part of their deposit liabilities to the agricultural sector, a phenomenon that could perpetuate a disequilibrium situation in the market

economy. Indeed these phenomena present some of the lags in policy and legal framework, which are not in line with a liberalized economy. If Kenya is to benefit from the planned reforms in the supply side of the credit market, then Kenya must also address effective demand.

Materials and methods

The data used in this paper is based on a multiple visit survey and subsequent analysis of 238 farms in Murang'a and Kisumu districts between 1995 and 1996 (Nyikal 2000), where twenty different farming systems had been defined. One decade down the line, the farmers' objectives have not changed. Outreach visits to Murang'a and Kisumu districts at the beginning of the rainy season, in April 2007, confirmed farmers were busy preparing land for food production, regardless of the relative returns, even where cash crops like tea were apparently successful. This paper uses the model or pattern farms that had been developed from the twenty farming systems, as a basis of comparing the existing production plans with hypothetical production plans under strictly profit maximization. The objective of strictly profit maximization spells a propensity for the market economy and therefore proxy for effective demand for credit. A linear programming model was used to formalize the pattern farms, assuming the objective of profit maximization. Where formalized plan differed from the observed situation in the field, *ad hoc* constraints were introduced to create a pattern similar to the observed. Both the activities and the values of outputs under the two different objective functions were compared. Farm Investment Analysis was then undertaken to determine the suitability of funding farm activities through credit. Farm Investment Analysis is an analysis of a farm to determine the attractiveness of additional investment in the farm. The question to answer is whether there is any significant difference between commercial farming and semi-commercial farming under the circumstances of existing resources in smallholder farms. There is also the question whether increasing non-land resources could boost the prosperity of the small farmer. The returns are examined as total gross margins.

For each of the 20 pattern farms, various dimensions of TGM represent the output, as follows:

- total gross margin with only resource constraints of land, labour and operating capital (TGM_0), i.e. in commercial production with limited resources;
- total gross margin with resource constraints plus requirement for minimum subsistence production (TGM_1), i.e. semi-commercial (semi-subsistence) production with limited resources;
- total gross margin when all the resource and technology limitations on increased production are assumed to have been eased (TGM_A), but which considers subsistence production, i.e. semi-commercial production with possibility of increased resources; and
- total gross margin when all the resource and technology limitations are assumed to have been eased but where farming is strictly a business affair (TGM_B), i.e. no consideration of subsistence production, i.e. commercial production with possibility of increased resources.

These, together with some elements of the respective farm plans are presented in Table 1. Observing generally from the obtained data, TGM_0 is greater than TGM_1 and TGM_B is greater than TGM_A. That is, the value of output when subsistence production is not catered for is greater than that which considers subsistence production. This article tests the significance of these differences using *t-test* on paired samples. Subsistence requirement of every farm pattern was estimated from the Food Balance Sheet (in Barasa 1989). Food requirement is often treated as synonymous with cereal requirement (Agcaoili, M. and M. W. Rosegrant 1995). Cereals occupy the first position in all food security considerations worldwide. It is with this notion that the study had considered maize requirement as a good representation of subsistence requirement. In any case maize is the major staple food for all the zones of the study, and its production was observed in all the farming systems.

According to the Food Balance Sheet, the annual subsistence requirement is 118 kilograms of maize per caput. In summary, the following hypotheses are tested:

- Hypothesis 1
  - H_0: $TGM_0 = TGM_1$
  - H_1: $TGM_0 > TGM_1$
- Hypothesis 2
  - H_0: $TGM_B = TGM_A$
  - H_1: $TGM_B > TGM_A$

For each pattern farm, there are two pairs of observations.

Table 1. Some Characteristics of Output in Smallholder Kenyan Agriculture

Pattern or farm type	TGM_0 (Ksh.)	Enterprises in commercial plan	TGM_1 (Ksh.)	Enterprises in semi-commercial plan	TGM_A (Ksh.)	TGM_B (Ksh.)	Family size	Cereal requirement (kg maize)
1	177,000	Sugarcane, Dairy	173,828	Maize+beans, sugarcane, dairy	210,706	242,500	7	826
2	177,000	Sugarcane, dairy	173,651	Maize+beans, sugarcane, dairy	209,417	242,500	8	944
3	5,134	Beans, cassava	4,182	Maize, beans, sorghum, cassava	10,549	13,760	6	708
4	9,150	groundnuts	7,562	Maize, sorghum, groundnuts, cassava	18,741	21,825	6	708
5	70,123	Maize+beans, sugarcane	52,711	Rice, maize+beans, sorghum, sugarcane	62,703	101,200	7	826
6	41,709	Beans, sugarcane, kales	27,335	Maize, beans, sugarcane, kales, sorghum	103,701	108,903	6	708
7	54,443	dairy	42,168	Maize, kales, tea, dairy	51,048	67,550	5	590
8	65,432	Maize, beans, tea, dairy	53,787	Maize, beans, tea, dairy	56,167	90,739	7	826
9	50,394	Maize+beans, dairy	44,541	Maize+beans, dairy	63,883	95,504	5	590
10	20,886	Maize+beans, tea	20,128	Maize+beans, tea	34,312	55,725	5	590
11	53,729	Maize+beans, poultry	45,682	Maize+beans, tea, dairy, poultry	128,095	191,008	5	590
12	70,722	Maize+beans, dairy, poultry	61,183	Maize+beans, tea, dairy, poultry	172,932	228,522	6	708
13	73,676	Maize+beans, dairy	58,487	Maize+beans, dairy, poultry	152,015	190,147	6	708
14	70,253	Maize, beans, dairy	56,294	Maize, beans, pigeon peas	60,624	77,400	7	826
15	24,075	Maize, beans, pigeon peas	14,540	Maize, beans, pigeon peas, bananas	28,510	36,320	5	590
16	60,988	Beans, maize+beans, pigeon peas	27,841	Beans, maize+beans, pigeon peas, bananas, dairy	166,842	180,600	9	1,062
17	34,171	Coffee, sweet potato, bananas	30,907	Maize+beans, coffee, sweet potato, bananas	69,690	73,470	4	472
18	44,985	Coffee, bananas	32,938	Maize+beans, coffee, bananas	88,372	96,915	7	826
19	59,935	Coffee, maize+beans, potatoes, bananas	55,980	Coffee, maize+beans, potatoes, bananas, fodder	115,987	124,434	6	708
20	41,726	Coffee, maize+beans, potatoes, bananas	39,990	Coffee, maize+beans, potatoes, bananas, fodder	42,611	52,550	5	590

Source: Nyikal 2000

Pairing of observations presents a suitable starting point for comparing such observations, when the two members of any pair are alike in other respects. The means of the observations (TGM) are compared using *t-test*. In this paper, two measurements are made on a single individual, hence the need of pairing. The observations cannot be considered as random samples from a population corresponding to the "semi-

subsistence objective" situation and a population for the "business objective" situation.

Results and discussion

The plans under commercial farming were generally found be different from the observed Tables 1 and 2). In some cases, food enterprises were not included in the commercial plans. Imposing *ad hoc* constraints to include especially food enterprises changed the plans considerably, to lower profit, lower efficiency ones. Increasing resources also changed the total gross margins considerably (columns 6 & 7 of table 1).

Rejecting hypotheses 1 and 2 indicate that the money value of production for profit maximization is significantly different from that of semi-subsistence production that characterizes many Kenyan smallholder farms. Out of the 20 semi-subsistence patterns, seven had been subjected to increased resources and Farm Investment Analysis carried out. The Net Present Value, Internal Rate of Return and Net Benefit Increase were calculated, to assess the viability of increased resources via credit. Table 3 presents the results of the analysis. Whereas increased resources would bring increased returns, this investment is not always viable. Only three of the seven cases were viable (Nyikal 2000).

Conclusions

Household food production had dominated the agenda of many smallholders, at the expense of efficiency. The potential breakdown of agricultural commercialization strategies based on comparative advantage is attributed to non-separability of household production and consumption decisions, brought about by food market failures (Govereh and Jayne 2003). Small family farms are here to stay, may not be efficient and may not generate much income. Smallholder agriculture, characterized by subsistence production, does not exhibit effective demand for credit, and funding it therefore requires means other than the competitive market.

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Table 2. Results of the Paired Sample Tests

Pairs	Paired Differences					t	df	Sig. (2-tailed)	Remarks
	Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
TGM_0 & TGM_1	9173.6000	7712.7011	1724.6124	5563.9884	12783.255	5.319	19	.000	Reject hypothesis 1
TGM_A & TGM_B	-22233.35	17718.8775	3962.0615	-30526.04	-13940.66	-5.612	19	.000	Reject hypothesis 2

Table 3. Results of Farm Investment Analysis

Pattern	TGM semi-commercial, Limited resources	TGM semi-commercial, Increased resources	Farm Investment Analysis			Remarks
			NPV	IRR	NBI	
1	Sh. 173,828	Sh. 210,706 Dairy expansion	< 0	< opp. cost capital	NA	Not viable
2	Sh. 173,651	Sh. 209,417 Dairy expansion	< 0	< opp. Cost capital	NA	Not viable
7	Sh. 42,168	Sh. 51,048 Tea expansion	< 0	< opp. Cost capital	NA	Not viable
9	Sh. 44,541	Sh. 63,883 Tea expansion	< 0	< opp. Cost capital	NA	Not viable
17	Sh.30,907	Sh. 66,528 Coffee expansion	> 0	> opp. cost capital	> savings interest rate	Viable
18	Sh. 32,938	Sh. 88,372 Introd. dairy	> 0	> opp. cost capital	> savings interest rate	Viable
19	Sh. 55,980	Sh. 115,987 Dairy expansion	> 0	> opp. cost capital	> savings interest rate	Viable

Source: Nyikal (2000)