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## THE EFFECTS OF INCREASED EARNINGS FROM TRADITIONAL AGRICULTURE IN LEBOWA

Johan van Zyl  
*Faculty of Agriculture, University of Pretoria, Pretoria*

Charles Machethe  
*Department of Agricultural Economics, University of the North, Sovenga*

Helmke Sartorius von Bach  
*Department of Agricultural Economics, University of Pretoria, Pretoria*

Richard Singini  
*Evaluation Unit, Development Bank of Southern Africa, Halfway House*

### Abstract

#### The effects of increased earnings from traditional agriculture in Lebowa

Effects of increased earnings from agriculture on consumption and investment on households in the Phokoane area of Lebowa are determined by utilising cross-sectional survey data. Income elasticities indicate that the demand for goods (staple food) produced by households increases less than the demand for purchased goods. A discriminant analysis of surplus versus deficit products indicates that surplus production is associated with farmers who participate in the Farmer Support Programme (FSP) (i.e., farmers using insecticides and purchase inputs on credit). Availability of labour, specifically female labour, also plays an important role in explaining the difference in production performance between surplus and deficit food-producing households.

### Uittreksel

#### Die effekte van hoër inkomste vanuit tradisionele landbou in Lebowa

Die effek van hoër inkomste vanuit landbou op die verbruik en investering van huishoudings in die Phokoane gebied van Lebowa is bepaal deur die gebruik van deursnit opnamedata. Inkomte-elasitisiteite toon dat die vraag na goedere (stapel voedsel) geproduseer minder sal toeneem as die vraag na gekoopte goedere. 'n Diskriminant-analise van surplus teenoor tekort produsente toon dat surplus produksie geassosieer word met boere wat aan die "Farmer Support Programme" (FSP) deelneem (bv. boere gebruik insekmiddels en koop insette op krediet). Beskikbaarheid van arbeid, spesifiek vrouens, speel ook 'n belangrike rol in die verklaring van verskille tussen surplus en tekort voedselproduserende huishoudings.

### 1. Introduction

Increased earnings from traditional agriculture affect consumption and investment patterns of rural households. Effects of increased real income have been examined by Hymer & Resnick (1969), Barnum & Squire (1979), Singh, Squire & Strauss (1986) and Nieuwoudt & Vink (1989). The purpose of this paper is to analyse the effects of increased real income from agriculture of rural households in Lebowa with a view to evaluating policy strategies.

The study employs the same methodology and structure as those of Nieuwoudt and Vink (1989). This was done for the following reasons: (a) the two studies are similar; and (b) it is desirable to compare the results of the two studies.

Special attention is given to the emerging commercial farmer with a view to promoting food production in less developed agriculture. Data used in the study were collected by final year students of the University of the North by means of a questionnaire survey conducted in June 1991. The sample included 100 rural households in the Phokoane area of Lebowa and 92 of the completed questionnaires were usable ( $n = 92$ ).

### 2. Income effect on consumption and investment

According to Nieuwoudt and Vink (1989), increased real income from agriculture may affect household decisions in various ways: (a) through the income effect the household would want to purchase more leisure if leisure is a normal good; (b) as profitability in agriculture increases, the opportunity cost of leisure increases; (c) real increases in farm in-

come mean that farming will become more attractive relative to non-farming employment; and (d) the improved liquidity effect will lead to greater investment in agriculture.

### 2.1 Income elasticities

Income elasticities were estimated for selected items from cross sectional survey data using regression procedures similar to those employed by Nieuwoudt & Vink (1989). The weighted average of a consumer's income elasticity is unity if expenditures are taken as weights according to the Hicks-Allen mathematical relation (Wold and Jureen, 1962). This theorem was applied to the elasticities derived from the different regression equations to obtain elasticities which agree more with expectations. The adjusted elasticities are slightly larger than the derived elasticities. Results are presented in Table 1.

Of the items studied, the income elasticity for staple food was the lowest while that for clothing, durable household commodities, education and transport were the highest. The income elasticity for other food was significantly higher than that of staple food. Income elasticity estimates for household expenses, savings and farm expenses varied between 0,9 and 1,0. According to the adjusted income elasticity, clothing, durable household items, education and transport are luxury goods while all other items are normal goods.

Table 1 also provides limited information on expected price elasticities. The price elasticity of a commodity equals its income elasticity if cross price elasticities are zero and income elasticities of necessities (luxuries) are smaller (larger) than their price elasticities (Wold and Jureen, 1962). The implication is that the price elasticity of staple food is expected marginally to exceed  $-0,417$ .

Table 1: Rural income elasticities and expenditure contribution in Phokoane, Lebowa, 1991

Expenditure item	Expenditure		Coeff. of variation %	Item's contribution to total expenditure	Income elasticity	
	Mean value (R)	Standard deviation (R)			Adj. Values	Significance P < t)
Staple food	184.14	330.48	1.795	3.55	0.417	0.0001
Other food	760.74	1149.60	1.511	14.68	0.963	0.0001
Household expenditures	306.18	564.75	1.845	5.91	0.974	0.0001
Transport	216.34	280.98	1.299	4.17	1.046	0.0001
Clothing	615.36	615.02	0.999	11.88	1.275	0.0001
Savings	1008.93	4131.30	4.095	19.47	0.900	0.0001
Durable household	906.81	2458.82	2.711	17.50	1.086	0.0001
Farm expenditures	646.21	1276.22	1.973	12.47	0.942	0.0001
Education	536.19	2211.68	4.125	10.37	1.068	0.0001

The results on staple food in Table 1 should however be treated with circumspection. The majority of households surveyed (73,3 per cent) are deficit producers with respect to staples, and can therefore be regarded as net consumers.

This implies that farm expenses should also be taken into account when determining the effects of increased earnings on food consumption. When expenditures on staples are adjusted for this reality, an income elasticity of 0,547 is obtained ( $p < 0,0017$ ). This also implies that the price elasticity of staples is expected to be higher than  $|-0,547|$ .

## 2.2 Income effects and total (ordinary) demand response

If the income elasticity of staple food is taken as 0,547, the proportion of total expenditure spent on staple food as 19,3 per cent and the elasticity of demand for constant real income (Slutsky definition) as -0,547, then the price elasticity of ordinary demand is estimated for a deficit producer as -0,653. For a surplus food producer, the profit effect can be calculated by using cost data obtained from the survey (Barnum & Squire, 1979; Nieuwoudt & Vink, 1989) as -0,044. Table 2 summarises the results.

Table 2: Total demand elasticity for food deficit and surplus producers in Phokoane 1991

Item	Deficit producer	Surplus producer
Staple food	-0.653	- 0.004
Other food	-1.143	

The total (ordinary) elasticity of demand for staples for all producers is estimated at -0,490 if it is assumed that 26,7 per cent are surplus producing farmers. This indicates that a one per cent increase in the price of maize will lead to a 0,49 per cent decline in consumption for all households. Expectations are thus that total consumption will fall, but that total production will not increase much due to the negative impact of the small size of holdings on the responsiveness of farm output to higher product prices. For food deficit producers, consumption falls if price increases due to the substitution effect (negative) and the negative income effect. For food surplus producers, consumption is estimated to fall less as the negative substitution effect is partially cancelled out by a positive income effect. These results thus correspond closely to the findings of Nieuwoudt & Vink (1989).

Policies to promote agricultural production through higher maize prices will thus impact negatively on the majority of producers (households) who are net consumers of staples (73,3

per cent). In the following section the impact of possible policies to promote agricultural sales and commercialisation of farming is discussed.

## 3. Factors associated with surplus and deficit producers

Using the survey data a discriminant analysis was undertaken to determine which factors are associated with sales of agricultural produce. Similar to the study of Nieuwoudt & Vink (1989), attention was focused on the possible income or liquidity effect on surplus production and labour allocation. Results obtained from the discriminant analysis are presented in Table 3. The entries in the first column indicate the relative contribution of each variable to the discriminant function.

The purpose of the analysis was not to classify new data. Attention is focused on the contribution of each variable to the group centroid's separation as measured by the F-test.

A highly significant factor was that surplus producing farmers use chemical insecticides. The coefficient in the discriminant function was the second highest ( $p = 0,0085$ ), while the difference between the group means test was highly significant ( $p = 0,0011$ ) for this variable. The use of chemical insecticides is also highly correlated with the purchasing of inputs on credit at the Co-op ( $r = 0,89$ ;  $p = 0,0001$ ), as well as participation in the FSP programme ( $r = 0,91$ ;  $p = 0,0001$ ).

Another important factor was that surplus producing households have a larger number of adult females. The standardised coefficient was the highest ( $p = 0,0174$ ), while the difference in the group means was highly significant ( $p = 0,0049$ ). There also is a highly significant correlation between number of adult females in the household and wage remittances received ( $r = 0,81$ ;  $p = 0,0087$ ). Surplus producing households thus receive more wage remittances than deficit households.

Other discriminating factors were that surplus producing households intercrop a larger area, but plough a smaller area. Differences in group means between surplus and deficit producers were significant in both cases. The discriminant function classifies 72,1 per cent of all farmers correctly in known groups. Correct classifications for deficit and surplus producing farmers respectively were 75,0 per cent and 63,6 per cent.

## 4. Policy issues

Various policy strategies have been suggested to develop small scale agriculture. Most of these policies affect farm real earnings directly or indirectly. Amongst the policies are (a) product price support, (b) resource subsidies and (c) farm consolidation (Nieuwoudt & Vink, 1989).

Table 3: Variables discriminating between deficit and surplus subsistence producers in Phokoane, 1991

Discriminant variable	Standard discriminant function		Significance (P < F)	Group means		Significance (P < t)
	Coefficient	Partial R <sup>2</sup>		Deficit farmer	Surplus farmer	
Chemicals: Insecticides	0.2647	0.1572	0.0085	5.015	7.077	0.0011
Area intercrop	0.1993	0.1493	0.0105	1.667	1.938	0.0352
Area ploughed	0.0974	0.1162	0.0253	2.598	2.180	0.0489
Number of adult females	0.3605	0.1302	0.0174	1.050	1.554	0.0047

The policy implications derived from this study correspond to a large degree with that proposed by Nieuwoudt & Vink (1989), mainly due to the similarity of the results obtained. Product price support is an undesirable policy under conditions encountered in the Phokoane area of Lebowa as it may harm the majority of households (73,3 per cent) who are net consumers of staples. This also corresponds to the findings and recommendations of Van Zyl & Coetzee (1990).

Although surplus producing farmers ploughed less land than deficit farmers, they worked the land more intensively (they intercropped a larger area). The larger number of adult females in surplus producing households probably contributed to this phenomenon. It is also relevant to mention that land size and labour availability are severe limiting factors in the Phokoane area.

Policy intervention through resource markets such as credit at favourable interest rates to small farmers should be actively pursued. Small farmers lacking collateral to borrow, may underinvest in agriculture. Resource market intervention in this manner may improve both efficiency and equity.

Surplus producing households receive more from wage remittances than deficit farmers (more absent males and more adult females per household). Similar to the results of Nieuwoudt & Vink (1989), this may be attributed to the liquidity constraint on food production where farmers with access to non-farm income are better able to invest in agriculture. The relationship between agriculture and non-agriculture is expected to be competitive as far as the labourer's time is concerned, but it could be complementary as far as other factors are concerned, i.e. where wage remittances can be an input in agriculture. The surplus household also faces a selling price of farm products which is less than the purchase price faced by the deficit household. Wage employment is thus more attractive for the surplus household than for the deficit household and remittances are higher for the former. The implication of this observation is that increased earnings in agriculture will make agriculture more attractive for some members who were previously engaged in non-farm employment.

The results thus also illustrate that the financial side is important in promoting an emerging commercial farmer. Financial measures such as 'purchase inputs on co-op credit' and 'wage remittances' are dimensions of the income of liquidity impact on food production. Improved earnings from agricultural production are expected to have similar positive income effects on food production through their effects on the demand for resources. As earnings from agriculture are a small share of rural earnings, income effects from non-agricultural sources such as wage remittances are important.

##### 5. Conclusions

The results of this analysis of the effects of increased earnings from traditional agriculture in the Phokoane area of Lebowa correspond to a large extent with that reported by Nieuwoudt & Vink (1989) for KwaZulu, whose study served as basis for the analyses and discussions. Increased real earnings will change consumption patterns as the demand for staple foods is expected to increase less than the demand for more luxury

goods such as clothing. The demand for goods produced by the household is expected to increase less than the demand for purchased goods.

An increase in price of staple foods such as maize will have a negative (positive) income effect on deficit (surplus) producers. The price elasticities of the ordinary demand for staple foods for deficit and surplus food producers are estimated respectively as -0,653 and -0,004 when allowance is made for income effects. The ordinary demand for own production is expected to be more elastic (inelastic) for a deficit (surplus) producer. As the majority of producers are deficit farmers, increased maize and other staple prices are expected to reduce consumption significantly.

A discriminant analysis of surplus versus deficit producers indicates that surplus production was associated with households who use chemical insecticides, intercrop larger areas, plough smaller areas and have more adult females in the household. These factors are also related to purchasing inputs on credit from the co-op, participating in the FSP programme and receiving higher wage remittances. These financial measures are dimensions of the income or liquidity impact on food production. As earnings from agriculture are a relatively small share of total rural earnings, income effects from non-agricultural earnings such as wage remittances are important. The results also indicate that input subsidies on credit and support services will increase surplus production.

Finally, the study accentuates the similarities between the effects of increased earnings from agriculture in Lebowa and effects elsewhere in South Africa, e.g. KwaZulu.

##### References

- BARNUM, HN & SQUIRE, L. (1979). A Model of an Agricultural Household, Theory and Evidence. World Bank Staff Occasional Papers No 2. Baltimore: John Hopkins University Press.
- HYMER, S & RESNICK, S. (1969). A Model of an Agrarian Economy with Nonagricultural Activities. The American Economic Review, Vol 59, No 4:493-506.
- NIEUWOUDT, WL & VINK, N. (1989). The effects of increased earnings from traditional agriculture in Southern Africa. The South African Journal of Economics, Vol 57, No 3: 257-269.
- SINGH, I, SQUIRE, L. & STRAUSS J. (1986). Agricultural Household Models: Extensions, Applications and Policy. Baltimore: John Hopkins University Press.
- VAN ZYL, J & COETZEE, GK. (1990). Food security and structural adjustment: Empirical evidence on the food price dilemma in South Africa. Development Southern Africa, Vol 7, No 1: 105-116.
- WOLD, H & JUREEN, L. (1962). Demand Analysis. New York: John Wiley and Sons.