Prospects For Rural Growth? Measuring Growth Linkages in a South African Smallholder Farming Area

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Summary

This paper addresses the possible impact of rising smallholder incomes on local non-agricultural development in a case study area located in the Eastern Cape province of South Africa. It determines how increased rural incomes are spent on a mix of goods and services, and debates the implications of these spending patterns for growth in rural areas through the alleviation of demand constraints. These results make it possible to identify areas of intervention necessary for sustaining growth originating from stimulus to tradable agriculture from economic reforms. This paper thus contributes to an emerging literature on the possible impact of promoting smallholder agriculture in South Africa on rural livelihoods.

Key words – rural, growth linkages, multipliers, smallholder, South Africa, Africa

1. Introduction

The current process of political change in South Africa has called attention to the key issue of integration of previously marginalized Africans into the economy. Official figures show that Africans presently constitute about 77 per cent of the South African

population, of which approximately 40 per cent of this group resides in the rural areas. It is among the 40 per cent of rural Africans that over 70 per cent of South Africa's poor are found. Some (see for example Lipton & Lipton, 1993; Lipton, *et al.*, 1996) have attributed this phenomenon largely to the past policy of racial oppression, which saw Africans restricted to a mere 14 per cent of the land, and effectively created an increasingly declining intensity of labor use in agriculture. Against this background, a hotly debated issue in South Africa is how to create livelihoods for this group of people, the majority of whom are affected by a national unemployment rate of over 30 per cent. Related to this is the question of what role agriculture (particularly smallholder agriculture) could play in meeting such an objective.

One of the direct results of the past discriminatory policies in South Africa is that not much research has effort has been directed towards the area of economics of African agriculture. As a result little is known about it. There is also a serious lack of studies into the potential and options for African farming. Latest groundbreaking research have concluded that, although small farms may produce at least as much output per hectare as big ones, will create few livelihoods (Eckert, 1996; de Klerk, 1996b; Kirsten, 1996; Lyne & Ortmann, 1996). Such findings, however, according to Michael Lipton, Ellis & Merle Lipton. (1996) were modeled on smallholder farm choices under the past discriminatory institutional environment. Admittedly, it has been a particularly challenging research task to determine how small farmers might behave after the discriminatory institutions have been taken care of.

2. Current issues for agricultural research in South Africa

Evidence from elsewhere in the world and most particularly from elsewhere in Africa overwhelmingly demonstrates that small-scale agriculture has been the principal motor of development in rural areas, and that small-scale agricultural units have achieved higher returns to land and capital over time than large-scale agricultural operations (Delgado, 1997). Various studies have also shown that non-agricultural employment opportunities in rural areas depend upon vibrant growth in local farm incomes. Without purchasing power generated within local areas themselves, employment in the non-tradable sectors, such as services, will be totally dependent on the maintenance of a steady flow of remittances from outside local areas, without which these industries will die off. Employment policy in South Africa—as elsewhere--that addresses the rural poor must be informed by detailed information on the competitiveness and overall employment impact of smallholder agriculture. In this context, two issues that must be explored are the capacity of smallholder farmers to produce agricultural or livestock items competitively vis-à-vis alternative sources of supply in given markets, and the impact of the resulting increases in incomes on local production of non-farm items. The first issue has not been sufficiently explored in empirical research except in a recent study by Ngqangweni (2000) based in the Eastern Cape province, where he showed that indeed small to medium-scale were at least as privately and socially efficient as their large-scale counterparts. Based on such findings, it can now be argued that promoting smallholder agriculture in certain commodities would at least not waste resources, save the country foreign exchange and could promote local economic activity.

The second main issue is the impact of increases in agricultural incomes on overall local employment in rural areas. It requires showing that many non-agricultural activities in poor South African rural areas are dependent for their viability on an external source of income, either from remittances and pensions, or from sales of agricultural and livestock items to cities and more prosperous areas. In that sense, additional agricultural income from sales outside local areas has a multiplied effect on total local income because it is re-spent on local non-agricultural items and services. It has been shown extensively elsewhere in Africa and Asia that increasing small-farm agricultural production under agricultural intensification can boost regional employment by creating a market for local goods and services that would not otherwise have been sold because of transport costs and differences in quality and tastes. If local production is responsive to this new local demand, the total amount of employment created indirectly through additional sales of non-agricultural goods and services can be twice the direct impact of the original influx of smallholder revenue (Delgado, Hopkins & Kelly with others, 1998).

This paper specifically addresses the second issue - the possible impact of rising smallholder incomes on local non-agricultural development. The objective of the paper is to present results of a study conducted in 1998/1999 to determine how increased rural incomes are spent on a mix of agricultural and non-agricultural goods and services in a smallholder farming area of South Africa. It also debates the implications of these expenditure patterns for the potential to stimulate growth in rural areas through the alleviation of demand constraints. From these results it should be possible to identify areas of intervention necessary to sustain growth originating from stimulus to tradable agriculture from economic reforms.

This paper is divided into seven sections. The next section gives a brief background of the study area and the survey process. Section four introduces the conceptual framework for this paper by discussing the theory and reviewing some of the empirical studies on growth linkages in the developing world, while Section five discusses the measurement of household expenditure patterns and the derivation of growth linkages for the study area. Section six presents the results of the growth linkages and their implications for overall rural economic growth in South Africa. Section seven concludes the paper and discusses possible policy implications of the findings.

3. The study area

The Eastern Cape province, in which this study is based, is the second largest in terms of surface area, of the nine South African provinces. Physically, the province has been often referred to as an area of contrasts. It borders with the warm Indian Ocean responsible for the sub-tropical coastal belt climate in the east and the Karoo semi-desert in the west. The land area of the Eastern Cape incorporates that of Ciskei and Transkei, two homelands that formed part of the old demarcations before the national democratic elections in 1994.

The province is divided into three main regions namely eastern, western and central. This study was conducted in two villages in Middledrift district, which is one of the over forty municipal districts in central region the largest of the three regions. The two villages surveyed differ in a number of areas with respect to land use,

infrastructure and general socio-economic characteristics. The first village, Ann Shaw bears features that are attributed to a "small town" while the second one, KwaNdindwa is regarded as a remote rural location. The fully electrified Ann Shaw town is situated two kilometers from the main tar road while the same road is approximately 20 kilometers from the KwaNdindwa village, which is without electricity. The central business area of Middledrift district, which is two kilometers away from Ann Shaw, has a post-office with public telephone facilities, a supermarket and a number of food and agricultural input stores. KwaNdindwa inhabitants on the other hand have to travel at least 20 kilometers on poor dirt roads to get access to comparable facilities. According to the survey data for this study, an average household in Ann Shaw boasts R3, 808.30 (US $476) worth of household assets such as televisions, radios and refrigerators compared to R1,544.00 (US $193) for in an average household in KwaNdindwa. This indicates as significant difference in life style between the two villages. Table 1 below gives a summary list of some commercial enterprises in the two sample sites.

Table 1: Listing of formal and informal commercial enterprises in KwaNdindwa and Ann Shaw, Middledrift, South Africa

Small Town Ann Shaw	Rural KwaNdindwa
Formal activities:	Formal activities:
• General dealer (food, clothing, butchery)	• General dealer
• Supermarket	• Brick maker
• Fast food restaurant	• Small grocery store
• Small café	
• Brick maker	Informal activities:
	• Paraffin, sweets, cigarette hawker
Informal activities:	• Fresh vegetable hawker
• Shebeen (liquor hawker)	• Handicraft hawker

• Fruit and vegetable hawker	• Fresh-cut pork hawker • Home-sewn clothing hawker • Shebeen (liquor hawker) • Livestock (cattle, sheep & goats) seller

Source: Ngqangweni (1998).

In other respects, however, the two villages share some common features. Maize, vegetables and livestock are the main agricultural commodities produced throughout Middledrift district. On average a household has access to 0.08 hectares of cropland per capita, which comprise a small backyard vegetable plot and a larger crop field situated a distance away from the main dwelling.

The total sample was divided equally between the two villages in order that any sharp contrasts between the two may be adequately captured. Of particular interest are the sizes of household lands. On average the small town sample households possess larger cropland than their rural counterparts. This could be attributed to the apparently relatively larger main field areas at Ann Shaw (not shown in the table) as compared to those of KwaNdindwa. A final area of interest is total expenditure per capita in the two areas. Figures in the table show an apparently higher purchasing power for Ann Shaw, which could be attributed to its close proximity to the market.

The sampling unit for this study was taken as the "household". This was defined as the family head, his/her spouse, children, grandchildren and any other relatives, workers who normally live in the house and share the same meals and have rights to the same cropland. Those members of the household who work but visit the family on weekends or month-ends were also included in this definition. The respondent

was male or female household head, or an adult familiar with the household's farming and other income-generating activities and their consumption.

Table 2: Selected characteristics of the Middledrift samples, 1998

Characteristics	Overall sample	Small town Ann Shaw	Rural KwaNdindwa
Number of sample households	100.00	50.00	50.00
Weighted average HH size	6.10 (2.76)[a]	5.79 (2.81)	6.41 (2.70)
Number of children[b] per capita	0.07 (0.09)	0.06 (0.09)	0.08 (0.09)
Number of youths[c] per capita	0.20 (0.17)	0.19 (0.16)	0.21 (0.19)
Number of adult women / capita	0.56 (0.21)	0.56 (0.24)	0.56 (0.19)
Size of HH garden[d] (m^2)	509.67 (526.87)	193.68 (297.52)	825.66 (518.23)
HH garden size per capita (m^2)	91.63 (108.19)	35.51 (62.39)	147.76 (115.46)
Total HH cropland[e] (ha)	0.32 (0.49)	0.53 (0.60)	0.11 (0.18)
Total HH cropland / capita (ha)	0.07 (0.15)	0.13 (0.19)	0.02 (0.02)
Total expenditure per capital yr (R)	1427.12 (1170.94)	1722.39 (1378.80)	1132.18 (831.13)

Source: Calculated from Ngqangweni (1998).

Notes:

[a] Figures in parentheses represent standard deviations from the mean values given above them.

[b] Children one to five years old.

[c] Youths 6 to 15 years old.

[d] Refers to a small backyard plot of land normally used to grow vegetables.

[e] Refers to the total area of cropland comprising the backyard plot and the main fields.

4. Theory and empirical studies on growth linkages

At the backdrop of the success of the "high-payoff input" model and the Green Revolution technology in Asia during the 1960s and 1970s, Mellor (1966) and Adelman & Morris (1973) argued a case for strong consumption linkages from agriculture. According to Delgado, Hopkins & Kelly, with others (1998), in a closed economy consumption linkages are generated as a result of new spending on tradable items which in turn creates new demand for items for which there was previously insufficient local demand. If there are underused resources in the local economy as a result of insufficient demand for what they can produce, then the new consumption adds to total production of these previously demand-constrained items.

Based on findings from their Asian work, Mellor & Lele (1973) (cited by Haggblade, Hazell & Brown, 1989), put emphasis on the significance of agricultural consumption linkages, concluding that middle-sized peasant farmers spend more of their incremental income on labor-intensive and rurally produced goods than their large-scale and urban counterparts. Such spending generates new demand "multipliers". These multipliers indicate how much extra net income could be generated in rural areas from new production of non-tradable goods and services arising from new household income gained from tradable sectors (Delgado, *et al.*, 1998).

Delgado, *et al.* (1998), provide a comprehensive review of the literature on empirical estimation of growth multipliers. They cite Peter Hazell and Steven Haggblade as the key contributors to the quantification and modeling of production and consumption multipliers (Haggblade, *et al.*, 1989 and Haggblade, Hammer & Hazell, 1991).

Rangarajan (1982) examined historical data and estimated both production and consumption linkages in India. He discovered that the 'agriculture-to-industry' production multipliers were weaker at 13 percent. Consumption linkages on the other hand were quite significant. Bell & Hazell (1980) and Bell, Hazell & Slade (1982) use a semi-input-output model to estimate the effect of technological change on irrigation in Malaysia. Hazell (1984) (cited by Delgado, *et al.,* 1998), simplifies the analysis in his measurement of a multiplier effect on income of an exogenous shock to agriculture. Such a shock could come from a technological change or outside investment. Assuming that the amount of intermediate inputs used per unit of tradable output does not change as a result of the initial increase in tradable output, the multiplier (M) is measured as:

$$M = \frac{1 - a_{nn} + a_{nt}\left(v_n / v_t\right)}{1 - a_{nn} - \beta_n v_n (1 - s)},$$

Where:

v_n = a constant with a value equal to $1-a_{tn}-a_{nn}$; the share of value added in gross output of the non-tradable sector;

v_t = similarly for tradables;

a_{nn}, $a_{tn,}$ = respectively, the share of non-tradable intermediate inputs in non-tradable and tradable output (between 0 and 1);

$ß_n$ = marginal propensity to consume non-tradables;

s = leakage; a constant proportion of total income (savings and tax rate).

Assuming that $a_{nn} = a_{nt} = a_n$ (intermediate demand for non-tradables) and $v_n = v_t = v$, the multiplier becomes:

$$M = \frac{1}{1 - a_n - \beta_n v(1 - s)}.$$

Hazell's simplified multiplier can be easily measured using values for the marginal budget share (MBS) for non-tradables in household expenditure ($ß_n$), the ratio of non-tradable intermediates to gross output in total production (a_n), and the ratio of value added to gross output in total production (v). By setting $ß_n = 0$, the effect of production linkages alone can be easily derived. A vital feature of the model is the assumption that the supply of non-tradables is perfectly price elastic, with output constrained by effective demand.

5. Measurement of growth linkages in Middledrift, South Africa

This study utilized data collected with the use of structured questionnaires over three rounds in 1998. A total of 100 randomly sampled households were interviewed in two villages of Middledrift district in the central Eastern Cape. The sample was subdivided such that 50 households were surveyed in each of the two chosen villages namely, rural KwaNdindwa and the relatively more "urbanized" village of Ann Shaw. The survey had two immediate main objectives. The first objective was to examine how increased rural incomes would be spent on a mix of tradable and non-tradable farm and non-farm good/ service categories. The second goal was to assess the potential for these expenditure patterns to generate growth multipliers in the rural

areas. The analysis estimated modified Working-Leser regressions (Hazell & Röell, 1983; Delgado *et al.*, 1998) to estimate marginal budget shares (MBS) for a typical rural household in each specified good/service category, based on mean values from the household survey. Growth multipliers were estimated expeditiously by ignoring the use of non-tradable inputs, leading to a very simple algorithm.

5.1 The household expenditure model

Average budget shares (ABS) represent the percentage of total household expenditure that goes to a given commodity or expenditure group. Marginal budget shares (MBS) are the percentages of the last increment of income spent on a given good or expenditure group. Dividing MBS by ABS gives income elasticity, that is, the responsiveness of expenditure on a given good or group of goods to increments in income.

It is hypothesized that the MBS for non-tradable goods are the principal factors driving the estimates of growth multipliers (Haggblade, *et al.*, 1991). These marginal budget shares depend on the pattern of rural consumption, which may differ by location and by income category (Delgado, *et al.*, 1998). Marginal budget shares were obtained by employing the modified Working-Leser model (Hazell & Röell, 1983) for each good category, adapted to cross-sectional household level data. This model entails using total expenditures as a proxy for income in order to estimate Engel functions. Marginal budget shares would then represent marginal propensities to consume, provided the total expenditures were a good proxy of household income

(Delgado, *et al.*, 1998). A modified Working-Leser model of the following form was employed for estimation:

The linear Engel curve is:

$$E_i = \alpha_i + \beta_i E \qquad (1)$$

The function above, however, does not permit the marginal budget share (β_i) to vary at all. A modified Working-Leser model was thus chosen:

$$S_i = \beta_i + \alpha_i / E + \gamma \log E \qquad (2)$$

To allow comparison of expenditure behavior of households with different incomes, allowance was made for differences in their other socio-economic characteristics. Engel functions of the following form were thus estimated:

$$E_i = \alpha_i + \beta_i E + \gamma_i E \log E + \Sigma_i (\mu_{ij} Z_j + \lambda_{ij} E.Z_j) \qquad (3)$$

Where E_i is expenditure on commodity *i*

E is total consumption expenditure

Z_j are household characteristic variables, and

$\alpha_i, \beta_i, \gamma_i, \mu_{ij}, \lambda_{ij}$ are constants

Instead of a restrictive linear Engel curve, this functional form allowed for non-linear relationships between consumption and income. It also controlled for household characteristics that may affect both the intercept and slope of the Engel function. The

model was estimated in share form in order to mitigate potential heteroskedasticity problems (Hazell & Röell, 1983). Dividing equation (1) by E gives,

$$S_i = \beta_i + \alpha_i / E + \gamma \log E + \Sigma_i (\mu_{ij} Z_j / E + \lambda_{ij} Z_j) \quad (4)$$

Where $S_i = E_i / E$ is the share of commodity i in total expenditure.
The marginal budget share (MBS_i), average budget share (ABS_i) and expenditure elasticity (ξ_i) for the ith commodity is:

$$MBS_i = \partial E_i / \partial E = \beta_i + \gamma_i (1 + \log E) + \Sigma_j \lambda_{ij} Z_j \quad (5)$$

$$ABS_i = S_i \quad (6)$$

$$\xi_i = MBS_i / ABS_i \quad (7)$$

For the average household, these equation terms are evaluated at the sample mean values for E and Z_j. But across expenditure groups (say upper and lower expenditure halves, as done in this study), then E and Z_j are assigned their mean values for relevant halves. These share equations were estimated by ordinary least squares (OLS).

5.2 Choice of explanatory variables

Table 3 below summarizes the independent variables selected for inclusion in the share equations for the two villages studied. The variables in Table 3 were included

on the basis that they logically explain the relationship between income and consumption of individual commodities. All these are self-explanatory. Many household characteristic variables were included to prevent bias in the estimator arising from omission of significant sources of inter-household variability in expenditure behavior.

Table 3: Independent variables included in the Middledrift regressions

Description	Name	Unit
Intercept	INTERCEPT	R
Reciprocal of total expenditure	1/E	R
Log of total expenditure	LOG_E	
Distance from nearest tar road	TARDIST	km
Distance from nearest tar road divided by total expenditure	TARDIST/E	
Size of household	HHSIZE	# of people
Size of household divided by total expenditure	HHSIZE/E	
Age of household head	AGEHEAD	years
Age of household head divided by total expenditure	AGEHEAD/E	
Value of household assets (e.g. TV, radio, refrigerator)	ASSETSR	R
Value of household assets divided by total expenditure	ASSETSR/E	
Number of babies (less that one year old) per capita	BABIES	# of people
Number of babies per capita divided by total expenditure	BABIES/E	
Number of children (one to five years old) per capita	CHILD	# of people
Number of children per capita divided by total expenditure	CHILD/E	
Number of youths (6 to 15 years old) per capita	YOUTH	# of people
Number of youths per capita divided by total expenditure	YOUTH/E	
Number of adult women per capita	WOMEN	# of people
Number of adult women per capita divided by total expenditure	WOMEN/E	

Hazell & Röell (1983) noted some disadvantages to estimation of the above share equations. First, R^2 coefficients are typically smaller. Second, the inclusion of many explanatory variables in the equation for every commodity or expenditure group wastes some degrees of freedom. This was particularly the case in the Middledrift regressions due to the small sample size. Third, the need to use the same functional

form in each equation cancels out a common approach of fitting several different functions for each commodity, and then choosing the one that fits best.

5.3 Household consumption and expenditure behaviour in Middledrift

Table 4 below summarises the consumption and expenditure behaviour of an average household in Middledrift, Eastern Cape.

Table 4: Consumption and expenditure behaviour of an average household in Middledrift, South Africa

Group	ABS	MBS	Elasticity
By commodity			
Food	0.36	0.33	0.94
Cleansing materials	0.07	-0.06	-0.85
Fuel and lighting	0.08	0.09	1.12
Clothing and footwear	0.04	-0.01	-0.40
Furniture	0.06	0.12	2.03
Housing and construction	0.02	0.05	2.18
Transportation	0.08	0.07	0.92
Liquor and tobacco	0.01	0.04	2.88
Medical	0.05	0.07	1.39
Educational	0.04	0.10	2.35
Entertainment	0.002	-0.01	-3.61
Communication	0.05	0.08	1.71
Family/social obligations	0.04	0.05	1.36
Agricultural	0.01	0.02	3.27
Other expenditure	0.09	0.05	0.50
By sector & tradability			
Farm tradable	0.19	0.18	0.94
Farm non-tradable	0.16	0.18	1.09
Non-farm tradable	0.35	0.32	0.92
Non-farm non-tradable	0.29	0.32	1.09

The sample was initially disaggregated into lower and upper expenditure halves, and rural and small town locations. The disaggregated results were found to be

statistically non-significant but such an effect had little bearing on the interpretation of the overall results as presented in Table 4.

Results in Table 4 reveal that households in Middledrift spend more on basic food than on any other good or service group. Up to a third of the total budget of the average household in Middledrift is spent on food. These include starches such as maize meal, samp (stamped maize) and rice and other grocery items such as fresh and sour milk, bread flour, vegetables, sugar, oils, and meat. Steyn (1988) found an even higher figure in the adjacent Peddie district. Along with transportation and other expenditure (church contributions, support for relatives, donations and pocket money), the expenditure elasticity of food in Middledrift is less than unity, suggesting that these items are necessities among Middledrift households.

The bottom section of Table 4 presents results on whether household income growth will stimulate production of farm or non-farm (demand-constrained) non-tradables. The results show that households in Middledrift allocate almost half of their budgets to non-tradable goods. Half of Middledrift incremental incomes are spent on non-tradables. The better part of these expenditures (64 percent) is on non-farm non-tradables. Non-farm non-tradables will become a more important part of their budgets as incomes increase. It appears that non-farm sectors such as transportation, liquor and tobacco, furniture, education, medical, communication, and family and social obligations will grow the most as rural incomes in Middledrift increase.

5.4 Treatment of household consumption and expenditure data

Characterization of expenditure goods and services according to sector and tradability is central in the interpretation of growth linkage results. In their linkages study in Niger, Delgado, *et al.* (1998) elaborate on this assertion. For example, treating a non-tradable good as tradable inevitably leads to an underestimation of the amount of additional growth that can be derived through linkage effects. This is taking into account the fact that tradables, by definition, are imports or exports. Therefore their additional demand leads to leakage of income from the region of concern rather than to stimulation of new local production.

In this study, the survey data were first aggregated and categorized into sixteen groups, then further aggregated into "farm tradable", "farm non-tradable", and "non-farm non-tradable". This was done in order to allow calculation of average budget shares and marginal budget shares by expenditure group and by sector and tradability group. Growth multipliers of sector and tradability groups would then be readily derived.

The sixteen categories into which the data was aggregated are: food, household cleansing materials, fuel and lighting, clothing and footwear, furniture, housing, transportation, liquor and tobacco, medical, educational, entertainment, insurance and savings, communication, family and social obligations, agricultural and other/miscellaneous expenditure. These were further aggregated into farm tradable, farm non-tradable, non-farm tradable, and non-farm non-tradable.

"Farm" goods were relatively simple to classify as these include those originating on farm, for example, horticultural, crop, and livestock items produced on the household land. "Non-farm" goods on the other hand include all the items originating off-farm and all consumption durables and non-durables.

Tradability was observed on the basis of local boundaries. The definition by Delgado, *et al.* (1998) of 'local' as radius of 100km around the household was adopted. Non-tradables were defined as those goods freely traded within the local area, but not outside it. Such factors as perishability and bulkiness were incorporated in determining whether or not a good was tradable in the local context. Derivation of marginal budget shares from household expenditure models requires the above classification exercise. Table 5 classifies goods/services according to whether they are tradable or non-tradable and whether they are farm or non-farm.

Table 5: Classification of good and services into farm and non-farm tradable and non-tradable categories in the Middledrift 'local' boundary area

Item	Classification
Farm goods	
Home-grown vegetables	Non-tradable
Home-consumed livestock and livestock products	Non-tradable
Non-farm goods and services	
Fuel (Batteries, candles, paraffin, electricity, matches)	Tradable
Household cleaning, laundry, toiletries, cosmetics, medicines	Tradable
Liquor and tobacco	Tradable
Magazines, newspapers, gambling	Tradable
Clothing	Tradable
Medical services	Non-tradable
Education (school fees, tuition, books and other expenses)	Non-tradable
Transport	
Service	Non-tradable
Fuel & repair expenses	Tradable
Communication services (telephone calls, postage)	Non-tradable
Other services (church contributions, donations)	Non-tradable
Housing expenses (building materials)	Tradable
Consumer durables	
Household furniture	Tradable
Jewellery	Tradable
Household appliances (TV, Radios, fridges, stoves)	Tradable
Blankets	Tradable
Dishes, containers	Tradable
Vehicle purchases	Tradable
Food	
Dairy products	
Fresh milk, sour milk, cheese, creamers, sterilized milk	Non-tradable
Maize and maize products	
Maize meal, samp, mealie-rice	Tradable
Cereals and cereal products	
Rice, flour, pasta, oats, breakfast cereals	Tradable
Prepared foods	
Potato chips, fried fish, fat cakes	Non-tradable
Fresh fruits and vegetables	Non-tradable
Canned fruits and vegetables	Tradable
Legumes	Tradable
Dry beans, peanuts, soya products, peanut butter	
Meat	
Pork, mutton, chicken, sausages, cooked meat	Non-tradable
Fresh fish	Non-tradable
Canned fish	Tradable
Fats and oils	
Margarine, cooking fat, butter	Non-tradable
Cooking oil	Tradable
Eggs	Non-tradable
Sugar	Tradable
Food seasoning items	Tradable
Sweets and chocolates	Tradable
Dessert items	Tradable
Canned food	Tradable

Item	Classification
Jam, syrup	Tradable
Soft drinks and beverages (tea, coffee, fizzy drinks)	Tradable
Home-made beverages (traditional beers)	Non-tradable
Baby foods	Tradable
Other food items	
Soups, sauces, vinegar, yeast	Tradable
Agricultural items purchased	
Fertiliser, veterinary supplies, seed, chemicals, equipment, implements	Tradable

5.5 The growth multiplier model

Growth multipliers are a measure of how much extra net income growth can be derived in the rural areas from stimulating production in the non-tradable sectors through new effective demand from a unit of new income from the tradable sectors. A multiplier is a numerical derivation from a regional model that typically incorporates household demands and intermediate demands between sectors. Conceptually, computing a multiplier requires a definition of what is inside the region of interest and what is outside, and spin-off effects are limited to those inside the zone. In Middledrift, the region of interest was restricted to local administrative boundaries. Definition of a region of interest makes possible the identification of consumption items that are tradables and non-tradables with respect to the region of interest.

For present purposes, a non-tradable is a good whose current local price is determined by local supply and demand, regardless of modest price movements outside the region of interest. Such goods are typically not traded with points outside the region of interest, and are not close substitutes in consumption with items that are. By definition, all services are non-tradables. Perishable prepared foods are often non-tradables in rural areas, though not in all places. Tradability or lack of it is a characteristic of the local market for a given item and not of the good. Tradables are

goods whose local free market price is determined primarily by factors outside the region of interest.

An important difference between tradables and non-tradables thus defined is that an increase in local consumer demand for tradables does not add further to local incomes. This is because the increased consumption is either imported to the region of interest, or local production destined for export is now diverted to local consumption. However, an increase in local consumer demand for non-tradables increases the demand for an item that cannot be imported and is not being exported (by definition). Provided that local resources are not fully employed and available for work, the new demand for non-tradables creates net additions to local employment and incomes. This illustrates a major assumption of linkage analysis, that the elasticity of supply of non-tradable items consumed locally is elastic (Delgado *et al.*, 1998). Failing this, increased demand for non-tradable consumer items stemming from increased incomes in the area of interest will just lead to inflation.

After subjective classification of local consumer items into tradables and non-tradables, this study aggregated the goods and services identified into four main categories: farm tradables, non-farm tradables, farm non-tradables and non-farm non-tradables (see Table 5 for a detailed classification).

Estimating the full regional multiplier requires including new demands for non-tradable inputs, in addition to new demands for non-tradable final goods. However, this greatly complicates the calculations. For simplicity, this study ignore non-tradable intermediate inputs, which will bias the results downwards by about 5 – 10

percent, based on simulations in other African countries (Delgado *et al.*, 1998). It also ignores the fact that the simple formulation in fact assumes that all additional demand for non-tradables goes fully into increased production (and none of it into increased relative prices for non-tradables, implying a perfectly elastic supply of non-tradables). This has been shown elsewhere to bias multiplier estimates upwards by 20 – 30 percent, which more than offsets the downward bias. On balance, the simple methodology may slightly overestimate true multipliers, but by no more than 20 percent.

The simple multiplier is easy to see if we start with the amount of spending left over from an income injection after spending on tradables (which, recall, do not add to net local employment) and savings are netted out: *(1 – MBS tradables – s)*, where "s" is the share of income saved. This is then repeated multiplicatively "t" times, where t is the number of times the income is re-spent in the local community. MBS-tradables and savings are leakages from the re-spending cycle and they would therefore reduce the multiplier. Since the parameters are both positive and less than unity, the multiplier is the solution to an infinite series:

$$Multiplier = (1 - MBStradables - s)^t$$

$$Multiplier = \frac{1}{(1-MBSnontratables)}$$

remembering that: *1 - MBS tradables = MBS nontradables*

The above formula is only appropriate if one ignores the fact that even tradables use non-tradable inputs. It therefore neglects the additions to local value added that stem from stimulation of the use of non-tradable inputs, resulting in an underestimate of the true multiplier.

6. Growth multipliers in Middledrift, South Africa

Table 6 summarizes the growth multipliers calculated for the Middledrift analysis.

Table 6: Estimated total extra income for R1 in extra income from production of tradables (in R)

Country/Region	Tradable sector	Farm non-tradable	Non-farm non-tradable	Total Multiplier
Middledrift, RSA	1.00	0.35	0.63	1.98

The figures in Table 6 show the total net additions to average household income in South African Rands that result from an initial shock of 1.00 in the local tradable farm or non-farm sectors. The sources of growth were decomposed into new spending on farm and non-farm demand constrained non-tradable goods. The sum of the three components makes up the total multiplier. The table shows a R1.00 increase in household incomes through an outside positive effect (for example, a policy change) affecting local tradables. It also shows that such an increase will lead to R0.35 of additional income from spending on farm non-tradables, and to R0.63 of additional

income from spending on non-farm non-tradables. This means a total multiplier of R1.98, of which R0.98 is the net extra growth from spending on demand-constrained items.

An important assumption underlying these results is that increased demand for non-tradable goods and services will be met by new production of these items. In other words, the supply response of non-tradables is assumed to be elastic. This is because, by definition, new demand for these items cannot be met from imports.

Table 6 illustrates two important facts. First, 'local' level linkages in South Africa seem to be generally comparable with those reported for Africa. This is consistent with previous studies done in Sub-Saharan Africa by Haggblade, *et al.* (1989), particularly in Zambia (Hazell & Hojjati, 1995), Nigeria (Hazell & Röell, 1983), and Burkina Faso (Reardon, Delgado & Matlon, 1992). To illustrate the comparison, Table 7 shows agricultural growth linkages reported for selected African and Asian countries.

Table 7: Agricultural growth multipliers in Africa and Asia

Country	Total Multiplier
Niger	1.77
Malawi	1.66
Nigeria	2.81
India	1.70
Malaysia	1.83

Source: Delgado, *et al.* (1998)

Second, overall multipliers from the non-farm sector in Middledrift are higher than those from the farm sector. In fact the farm sector multipliers constitute only 18

percent of the composition of the total multiplier compared to 32 percent of the non-farm sector. This is consistent with findings from work done elsewhere in Africa, which confirmed the notion that linkages were primarily the way in which agricultural growth stimulated non-agricultural growth. In other words, any amount of growth in agriculture, as meagre as it may be, will certainly result in multiplied growth in non-agricultural sectors.

6. Conclusions

This paper shows that increased rural incomes are spent on a mix of agricultural and non-agricultural goods and services based on survey work from the South African rural district of Middledrift. More specifically it debates the likely impact of these expenditure patterns on rural growth through exploration of a phenomenon called "linkages" measured through a multiplier. The multiplier is a predicted value, based on observed spending patterns, that measures how much will extra rural income will be spent on local goods that would not otherwise have a market outlet, and how much will leak outside local boundaries for goods that are imported to the region or would otherwise have been exported. The multiplier is important as it reveals growth potential in the rural areas that could be exploited through properly directed policy interventions. Once such potential is exploited it results in income growth through initial income injection into the rural areas plus net extra income growth from spending on non-tradable items.

This investigation found that there were indeed observable and significant growth multipliers in Middledrift. In fact, these were comparable to those measured in

countries like Malawi, Nigeria, Zambia and India. It could be argued that these countries could not be compared to South Africa since the rural smallholder sector is relatively more important in these countries than in South Africa. It could, however, also be argued that rural growth is as important in underdeveloped former homeland areas of South Africa such as Middledrift as it is in most of the developing world. Based on the multiplier concept, the importance of rural growth in Middledrift is strengthened by the fact there tends to be more non-tradable products. Spending on these products, by definition, results in growth in local incomes.

There are two conditions to ensuring sustainability of rural growth through multipliers. Firstly, there must be a sustainable source of the initial income shock from the production of tradable items which will act as the engine of growth. In Middledrift, it seems that the impressive level of spending on non-tradables, as evidenced by the size of the multipliers (1.98), has resulted from increased access to cash inflows from the cities in the form of wages and pensions which have received a boost at the onset of majority rule in South Africa. It is questionable whether such inflows could be relied upon in the long run in the face of high urban unemployment, relatively high wage rates and low labor productivity.

Tradable products on which local producers have a comparative are the mostly likely engines of more sustained rural growth. Growing and exporting a tradable agricultural good to outside the region brings in more income, without depressing local prices. Although these possibilities have not been sufficiently explored, a recent study showed that certain smallholder activities in the Eastern Cape (irrigated export citrus and livestock that supply coastal city markets, for instance) were both privately

and socially profitable under same cost assumptions as their large-scale counterparts (Ngqangweni, 2000; Ngqangweni, *et al.*, 2001). Improved incentives for production needs to be provided. More research needs to be devoted to finding out in what commodities smallholders have a comparative advantage so that policy should strengthen the environment under which they operate.

The second condition for sustained growth through taking advantage of the existence of multipliers is that the supply of non-tradable must be elastic. In other words, rural development programs should aim at enhancing the supply response of non-tradable products rather than focusing only on boosting purchasing power of rural people. Increased local demand for non-tradables should be translated to increased production of these items, otherwise rural income growth will not be sustained.

Based on the findings from this study, it is argued that policy in South Africa has a big role to play in supporting growth of activities in which smallholders have a comparative advantage. For one thing rural areas in the former homelands lack proper physical infrastructure. From a foreign traveler's point of view South Africa seems to boast good quality and far reaching roads and rail networks. Looking closer, however, former homeland rural areas are not properly served by such modern transport networks. More improved roads will open opportunities for market access for smallholder farmers. Although the immediate effect of improved roads is conversion of non-tradables to tradables, thereby reduction of the multiplier, the overall income gains will be much higher than in the absence of such infrastructural improvements.

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