THE ANALYSIS OF CONSUMER DEMAND FOR FOOD IN SOUTH AFRICA USING AN ALMOST IDEAL DEMAND SYSTEM: SOME PRELIMINARY RESULTS [*]

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Abstract

This paper examines consumer demand for food in South Africa. An Almost Ideal Demand System that incorporates socio-economic and demographic factors is specified and estimated using cross-sectional data of 1993 Integrated Household Survey. By utilising a two-stage budgeting procedure, a complete food demand system was estimated. The results indicate that, for food groups (meat and fish, grains, dairy products, fruits, vegetables and other foods), demand is generally price elastic. Meat and fish, grains and dairy products are luxury products, while fruits, vegetables and other foods are necessities. For food commodities, the results indicate that the demand with respect to own-price is generally elastic. The results suggest that, for an increase in income, food expenditure on meat and fish and grains would increase while that on dairy products, vegetables and other foods would decrease. The implications of the empirical results are discussed.

Key words: South Africa, Almost Ideal Demand System, Household Demand

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The analysis of consumer demand for food in South Africa using a modified almost ideal demand system

1. Introduction

South Africa is an upper-middle-income country. Despite its wealth, the experience of the majority of South African households is either one of outright poverty, or of continued vulnerability to becoming poor. Furthermore, the distribution of income and wealth in South Africa is perhaps the most unequal in the world (May, 1999). Since the return to democracy in 1994, South Africa has undergone dramatic economic, social and political transition. The importance of reducing poverty and inequality has been on the forefront of policies implemented by the new government. The Government of South Africa has adopted market-oriented food policies and have liberalised trade. Coupled with this is the prevalence of trade in the international commodity markets that has reached new heights. Global trade agreements that reduce tariffs and non-tariff barriers have spurred the growth in trade in agricultural products. These policy reforms are likely to impact on household food consumption patterns.

While a number of studies have examined the impact or potential impact of government policy on agricultural production and productivity, very little is known about the effects of these reforms on household food demand in South Africa. The Government of South Africa's gradual and continuing progression towards a liberalised economy underscores the need to characterise the demand for food in South Africa. The study is based on national household survey conducted in South Africa in 1993. While limited to the period before major reforms, the study will provide a glimpse into nationwide household food consumption pattern in South Africa. The consumption patterns of this study may well reflect general consumption behaviour of households in South Africa.

Rapid advances in demand analysis have sparked an interest in methods of determining consumer demand for food and non-food items. The most commonly used technique is the application of the duality theory in the specification of direct utility functions, indirect utility functions and cost functions. Duality theory allows systems of demand equations to be derived from these dual representations via differentiation, according to Roy's Identity or Sheppard Lemma. Major contributions to the theoretical development of functional forms include Diewert (1974) who specified consumer behaviour to be characterised by a Generalised Leontief functional form and Christensen *et. al*. (1975) who specified it to be characterised by a Translog functional form. If the demand system is properly specified and estimated, the results will generate unique estimates of own-price and cross-price elasticities and expenditure elasticities that approximate the consumer behaviour and satisfy all the regularity conditions of utility maximisation.

Deaton and Muellbauer's (1980) Almost Ideal Demand System (AIDS) have renewed an interest in demand analysis. The variants of the AIDS model have been shown to be consistent with the maximisation of a utility function subject to budget constraints, generating systems of equations satisfying regularity conditions of consumption theory. Since then, a number of studies, for example, Alessie and Kapteyn (1991), Mergos and Donatos (1989), Ray (1983) and Blanciforti and Green (1983) have provided a dynamic generalisation of the Almost Ideal Demand System in order to account for socio-demographic factors and allow for habit formation. These studies found significant effects of habit formation and demographic effects on food consumption behaviour.

For empirical implementation of such a model, restrictions need to be imposed on the structure of consumer preferences. The study by Blackorby *et al*. (1978), where they propose a separable structure for consumer preferences of large demand systems, provides a promising approach to explaining South African household consumption of food. The seminal article by Gorman (1959) has shown that a simplified two-stage budgeting process is possible under two alternative conditions: homothetic weak separability of the direct utility function and strong separability of the direct utility function with group subutility functions. This suggests that separable restriction on consumer preferences enables a consumer's expenditure allocation problem to satisfy a multistage budgeting rule (Moschini, 2000).

The purpose of this article is to examine food consumption patterns in South Africa. This article extends the AIDS model by specifying and estimating a flexible two-stage budgeting demand system with separability restriction imposed. By incorporating socio-demographic variables in the analysis of household consumption patterns, provides a means for accounting for differences in the consumption behaviour of households with different socio-demographic characteristics. In this paper, a cross-sectional time series data from the Project for Statistics on Living Standards and Development (PSLSD) undertaken by the Southern Africa Labour and Development Research Unit (SALDRU) are employed to estimate the complete system of budget share equations for household consumption of food.

The outline of the article is as follows. The model and estimation method is described. In addition, a brief overview of the method for incorporating socio-demographic variables into the demand system, the estimation method and the derivation of elasticity estimates is given in Section 2. Section 3 presents a description of data employed in the analyses. The empirical results of the application of the dynamic system to integrated household survey data for South Africa are reported and discussed in Section 4. Section 5 contains some concluding remarks and suggestions for future research.

2. Model

2.1 *Separability and Demand System*

The estimation of large demand systems to investigate the patterns of consumption of households is notoriously difficult. One means of making progress is to assume *a priori* a separable structure on consumers' preferences, the most common assumption being that of weak separability. To recap, following Moschini *et al.*, (1994), let $q=(q_1, \ldots, q_n)$ denote the vector of consumer goods, $p=(p_1, \ldots, p_n)$ denote the corresponding normal price vector and x denote total expenditures on the n goods. Now, assume the set of indices of the n goods to be $I=\{1, \ldots, n\}$, such that the goods consumed can be ordered in S separable groups defined by the mutually exclusive partition $I=\{I_1, \ldots, I_s\}$ of the set I. The assumption of separability is a necessary and sufficient condition for deriving an n-budgeting demand system. Now, if the utility function U(q) is separable in partition I, then the utility function can be written, following Moschini *et al*. (1994), as

$$U(q)=U^0.[U^1(q^1),U^2(q^2),\ldots,U^s(q^s)] \tag{1}$$

where $U^s(.)$ is a set of sub-utility functions that depend on a subset q^s of goods whose indices are I_s (s=1, …, S), and where $U^s(.)$ satisfies the conditions of a utility function, that is, strong monotonicity, strict quasi-concavity and differentiability.

If the utility function is separable, it is possible to partition the goods consumed by households into N sub-groups (N>2). This is refereed to an n-stage budgeting procedure. In order to allocate expenditure optimally within the sub-groups, the consumer needs to know the level of expenditure on all goods in the sub-groups and the price of goods in the sub-groups. This approach suggests that goods can be divided into a number of "separate" groups, where a change in price of a good in one group affects the demand for all goods in another group in the same manner (Edgerton *et al*., 1996).

Within the specific field of an n-stage budgeting analysis, the reliance on weak separability assumption which enables the decomposition of consumer's total expenditure on broad groups and then followed by allocation on commodities within each group is subject to several practical problems. The n-stage budgeting procedure requires that we have *a priori* knowledge about the way the consumer divides goods into groups in order to decompose total expenditure. To avoid the difficulty of accounting for durability of goods consumed by households, this study considers only food items. In the first stage, food consumed by households is divided into six broad groups, namely, meat and fish, grains, fruits, vegetables, dairy products and other foods. In the second-stage, these food groups are divided into subgroups with a total of twenty-six commodities. The separability condition imposed on the demand system implies that a change in the price of a commodity will affect all commodities within the group as well as the price of commodities of other subgroups through the group expenditures (Deaton and Muellbauer, 1980, pp. 127-133).

2.2 *An Application to South Africa Food Demand*

To apply the separability assumption to the estimation of a demand system requires the specification of a functional form of the demand system. Assume a consumer who maximises his or her utility given a linear budget constraint. The consumer's cost function (or expenditure function) consistent with utility maximisation behaviour can be written as

$$\log C(p,u) = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_k \sum_j \alpha_{kj} \log p_k . \log p_j + U_0^b \prod_k p_k^{b_k} \tag{2}$$

where C(p, u) is the cost function for utility u, p is a price vector and x is quantity of goods consumed, and where C(u, p) is concave in p, non-decreasing in p, homogeneous of degree 1 in p and increasing in u.

Invoking the Sheppard Lemma, the consumer's budget share function derived from minimising Equation (2) with respect to price p, yields Deaton and Muellbauer's (1980) Almost Ideal Demand System can be specified as

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left\{\frac{x}{P}\right\} \tag{3}$$

where P is a price index defined by

$$\log P = \alpha_0 + \sum_j \alpha_j \log p_j + \frac{1}{2}\sum_i \sum_j \gamma_{ij} \log p_i \log p_j \quad (4)$$

where w_i is the budget share of good i, p_j is the price of good j, x is total expenditure.

The adding up conditions are given by

$$\sum_i^n \alpha_i = 1 \qquad \sum_i^n \gamma_{ij} = 0 \qquad \sum_i^n \beta_i = 0 \quad (5a)$$

whereas homogeneity requires that

$$\sum_j^n \gamma_{ij} = 0 \quad (5b)$$

and symmetry requires that

$$\sum_i^n \gamma_{ij} = \sum_j^n \gamma_{ji} \quad (5c)$$

Deaton and Muellbauer (1980) proposed the use of the Stone index as a linear approximation to avoid non-linear estimation. The P in Equation (4) is approximated by the expression

$$\log P^* = \sum_i^n w_i \log p_i \quad (6)$$

where the variables are as defined above.

The restrictions in Equations (5a)-(5c) make the equations linear in parameters and (transformed) data, and are considered highly flexible yet simple model within which to impose and test the restrictions of economic theory. The transformed model is referred to in the econometric literature as the Linear Approximate of Almost Ideal Demand System (LA/AIDS).

Under the hypothesis that socio-demographic factors influence food consumption assume that the LA/AIDS model provides a satisfactory approximation to the true demand system. Following Ray (1983), socio-demographic variables are characterised by allowing the intercept term to be a linear function of the socio-demographic factors. If the socio-demographic factors are denoted by z, the "socio-demographically flexible" Linear Approximate of the Almost Ideal Demand System (LA/AIDS) can be written as

$$w_i = \alpha_0 + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left\{\frac{x}{P}\right\} + \delta z \quad (7)$$

where the other variables and parameters are as defined above.

Now, invoking the weak separability assumption, let us assume the existence of a two-stage budgeting procedure for South African food demand system. Assume further that the first-stage comprises of groups of goods r=1,…,n, whilst in the second-stage the r-th group comprises of goods i=1,…,m_r. Given the allocation of goods between the broad groups, this implies that the second stage of the two-stage budgeting process follows all the regularity conditions of a utility function, but with total expenditure replaced by group expenditure (Edgerton *et al.*, 1996). The weak separability assumption imposed on the demand system implies that the marginal rate of substitution between any two goods, i and j, belonging to one group (r) is independent of the consumed quantities belonging to another group(s) (Edgerton et al. 1996).

Following Edgerton et al. (1996), the first-stage equation of the LA/AIDS model can be written as

$$w_r = \alpha_{(r)} + \sum_s \gamma_{(r)(s)} \log p_{(s)} + \beta_r \log\left\{\frac{x}{P}\right\} + \delta z + \varepsilon_{(r)} \tag{8}$$

while the *second-stage* equation is given by

$$w_{(r)i} = \alpha_{(r)i} + \sum_j \gamma_{(r)ij} \log p_{(r)j} + \beta_{(r)i} \log\left\{\frac{x_{(r)}}{P_{(r)}}\right\} + \delta z + \varepsilon_{(r)i} \tag{9}$$

where the variables and parameters are defined as above. The superscripts r and ri denote groups and sub-groups.

2.3 *Elasticity estimates*

In the context of the LA/AIDS, the expenditure elasticity can be written as

$$E_i = 1 + \frac{\beta_i}{w_i} \tag{10}$$

The Marshallian or uncompensated elasticity of good i with respect to the price of good j is given by

$$e_{ij} = \frac{\gamma_{ij} - \beta_i w_j}{w_i} - \delta_{ij} \tag{11}$$

where δ_{ij} is the Kronecker delta and where $\delta_{ij}=1$ for own-price elasticity and 0 for cross-price elasticity.

In the context of an n-stage budgeting procedure, following the parametisation of Edgerton *et* al. (1996), we denote the within group expenditure elasticity for the i-th good within the r-th group of goods as $E_{(r)i}$, the group expenditure elasticity for the r-th group of goods as E_r and the total expenditure elasticity for the i-th good within the r-th group of goods as E_i, with an equivalent definition for the budget shares, w. Invoking the rules of calculus, the total own-price and cross-price elasticities and total expenditure elasticties can be derived.

Total expenditure elasticity of an *n*-stage budgeting procedure can be expressed, following Edgerton *et al*. (1996), as

$$E_i = E_{(r)} \cdot E_{(r)i} \tag{12}$$

The total Marshallian own-price and cross-price elasticities are given by

$$\begin{aligned} e_{ij} &= \delta_{rs}\, e_{(r)ij} + \mathrm{E}_{(r)i}\, w_{(s)j}\, (\delta_{rs} + e_{(r)(s)}) \\ &= \delta_{rs}\, \tilde{e}_{(r)ij} + \mathrm{E}_{(r)i}\, w_{(s)j}\, e_{(r)(s)} \end{aligned} \tag{13}$$

where δ_{rs} is the Kronecker delta and where $\delta_{rs} = 1$ for own-price elasticity and 0 for cross-price elasticity.

2.4 Estimation method

The Linear Approximate of the Almost Ideal Demand System (LA/AIDS) was estimated using non-linear seemingly unrelated regression method using SHAZAM version 8.0. A common problem associated with complete demand systems is the endogeneity of prices. The endogeneity of price arises from demand system being derived from simultaneous supply and demand models. In developing countries, most governments regulate food prices. In South Africa, for example, the Government intervenes in the foreign exchange market to stabilise exchange rate variability, which in turn influences domestic food prices. Furthermore, the liberalised trade economy also opens domestic food prices to be influenced by world market prices. In this study, therefore, domestic food prices are assumed to be exogenous in the demand system.

It is important to note that socio-demographic effects on food consumption is not the focus of this study, therefore, the elasticity estimates of demand for food commodities with respect to socio-demographic factors are not discussed here.

3. Data Sources and Description

The household expenditure and consumption data on food items and socio-demographic characteristics used in this study is part of a nationwide survey on Project for Statistics on Living Standards and Development (PSLSD). The Southern Africa Labour and Development Research Unit (SALDRU) at the School of Economics, University of Cape Town, South Africa (PSLSD, 1994) conducted the survey. The survey was conducted in the nine months prior to the country's first democratic election in 1994. A total of 9,000 households were drawn from a carefully selected sample. In this study, due to incomplete data in some of the variables 4,353 observations were used in the final analysis.

Household size is linearly decomposed into the following age/sex categories: boys of age 6 or less (BOY1), girls of age 6 or less (GIRL1), boys ages 7-17 (BOY2), girls ages 7-17 (GIRL2), adult males ages 18-64 (ADM), adult females ages 18-59 (ADF), elderly males ages 65 and above (ELDM), elderly females ages 60 and above (ELDF). Additional household characteristics included two continuous variables, namely, age of head of household (AGE) and age of head of household squared (AGESQ). Discrete 0-1 variables are used to model the consumption impacts of education of head of households (EDU1 for head of household with primary education, EDU2 for head of household with secondary education, EDU3 for head of household with tertiary education). Another discrete variable included in the model is the race of head of households (RACE is 1 for household that is black, 2 for household that is Indian, 3 for household that is Coloured, and 4 for household that is White). Residence is included in the model as a discrete variable (METRO1 is urban, METRO2 is Peri-urban and METRO3 is Rural). The Provincial effects on consumption of food are modelled by incorporating discrete 0-1 variables for the provinces into the model. The race categories are hypothesised to reflect quality effects and potential price discrimination impacts on food consumption. Given that the impacts of race on food consumption are likely offsetting (Cox and Wohlgenant, 1986), the signs on these categories are indeterminate.

In this study, the explanatory variables were grouped into two classes, namely, the household expenditure and price data on food items and household socio-demographic characteristics. Seventy-two percent of the respondents were of black origin, 17% were White, 8% were Indians and 3% were Coloured. Despite this variation, this distribution by race seems representative of South Africa population. Forty-four percent of households live in urban areas, 24% live in peri-urban areas and 32% of respondents live in rural areas. Average monthly income of head of household is R1282.60. The average age of head of household is 47 while the average household size is 4.47. Most head of households interviewed are males (71%). The average number of years of education of respondents is 5.33, implying primary level of education. Twenty-four percent of households have no education, 44% have primary education, 24% have secondary education and 8% have tertiary education. Twenty-six percent of households have boys age 0-6, while 41% of households have boys age 7-17. Twenty percent of households have girls age 0-6, while 45% have girls age 7-17. Seventy-five percent of households have adult males ages 18-64 and 10% elderly males over 64 years, while 75% of households have females ages 18-60 and 22% of females ages over 60 years.

The expenditure on food groups employed in the study include:

Meat and fish: The sum of expenditure series on beef/mutton/pork, chicken, fresh fish and tinned fish.

Grains: The sum of expenditure series on maize, mealie meal, rice, bread, wheat and breakfast cereals

Dairy Products: The sum of expenditure series on cheese, butter/ghee/margarine/ other fats, fresh milk/sour milk/yoghurt, baby formula/milk powder.

Fruits: The sum of expenditure series on bananas, apples and citrus fruit.

Vegetables: The sum of expenditure series on dried peas/lentils/beans, potatoes, tomatoes, sweet potatoes, pumpkin/squash and other vegetables.

Other foods: The sum of expenditure series on other food items and includes vegetable oil, jam, sugar and soft drinks.

There are difficulties associated with estimating demand systems with missing prices. Two popular and computationally simple solutions to this problem are: (a) to discard all incomplete observations and estimate population parameters using the remaining observations; and (b) to use zero-order methods which substitute 'appropriate' sample means for the missing values (Cox and Wohlgenant, 1986). This study adopts the second approach whereby the missing prices were substituted for by cluster prices of the food item. The use of the cluster prices implies that non-consuming households or households with no prices for a commodity face average commodity price for that cluster.

There are six commodity groups for the first stage of the demand system analysis: meat and fish (MF), grains (GRA), dairy products (DP), fruits (FRU), vegetables (VEG) and other foods (OF). The second stage consists of five commodities in the meat and fish group: beef/mutton/pork (BMP), chicken (CHI), eggs (EGGS), fresh fish (FF) and tinned fish (TF). There are six commodities in the grains group: maize (MAI), mealie meal (MM), rice (RICE), bread (BRE), wheat (WHE), and breakfast cereal (BC), while dairy products consists of four commodities: butter/ghee/other fats (BGOF), cheese (CHE), fresh milk/sour milk/yoghurt (FSMY), and baby formula/milk powder (BFMP). Fruits consist of three commodities: banana (BAN), apples (APP) and citrus fruits (CF). Vegetables consist of six commodities: dry peas/lentils (DPL), potatoes (POT), tomatoes (TOM), sweet potatoes (SP), pumpkin (PUM), and other vegetables (OV). Other foods consist of four commodities: vegetable oil (VO), jam (JAM), sugar (SUG), and soft drinks (SD). In total, there are twenty-eight commodities.

4. Empirical Results and Discussion

4.1 *Broad food group elasticities*

The results of the first-stage commodity groups are reported in Table 1. The Marshallian own-price elasticities in Table 1 are all negative, as expected. The estimated expenditure elasticities for food groups are significant for all items at the 95% confidence level. Table 1 shows that the expenditure elasticities of meat and fish, grains and dairy products have expenditure higher than one, while fruits, vegetables and other foods have inelastic expenditure elasticities. The results indicate that meat and fish, grains and dairy products are luxury products. Fruits, vegetables and other foods are necessities in South African diet.

Table 1: Marshallian own-price and expenditure elasticities and marginal expenditure shares: broad food groups evaluated at mean value

	MF	GRA	DP	FRU	VEG	OF	EXP	EXP. SHARE	MARGINAL EXP. SHARE
MF	-1.25	0.39	0.00	-0.14	-0.07	0.00	1.06	0.34	0.36
GRA	0.48	-1.94	0.17	0.09	0.18	0.15	1.11	0.27	0.30
DP	0.00	0.55	-1.39	-0.20	0.00	0.00	1.08	0.09	0.09
FRU	-0.84	0.52	-0.31	-0.29	0.00	0.00	0.89	0.05	0.05
VEG	-0.15	0.42	0.00	0.00	-1.37	0.00	0.95	0.13	0.12
OF	0.00	0.00	0.00	0.00	0.00	-0.92	0.63	0.12	0.08

Note: MF denotes meat and fish, GRA denotes grains, DP denotes dairy products, FRU denotes fruits, VEG denotes vegetables, and OF denotes other foods.

The Marshallian cross-price elasticities reported in Table 1 are inelastic. Table 1 shows that the demand for other foods with respect to the price of meat and fish, grains, dairy products, fruits and vegetables are zero, implying that the demand for other foods is unresponsive to changes in the price of these food groups. The cross elasticities indicate that meat and fish and grains are substitutes, while meat and fish and fruits, and meat and fish and vegetables are complements. Grains and fruits, and grains and vegetables are substitutes.

In order to determine future household expenditure on food, we derive marginal expenditure shares following the approach proposed by Powell (1974). The marginal expenditure share is derived as the product of expenditure elasticity and the expenditure shares for that food group. The estimated marginal expenditure shares are reported in Table 1. The results indicate that for any increase in future incomes, households are likely to allocate the largest percentage of their food expenditure on meats and fish and grains. This finding is consistent with household behaviour in South Africa, where most households consume mainly meat and fish and grains (particularly rice). The findings also indicate that households would spend small amounts of their food expenditure on fruits, dairy products, other foods and vegetables.

4.2 *Total elasticities*

The results of the second-stage commodity groups are reported in Table 2.Table 2 reports the estimated total Marshallian own-price elasticities, expenditure elasticities and marginal expenditure shares of commodities. The total own-price elasticities of commodities are generally greater than one, implying that the demand for food commodities in South African household diet is price-dependent. The total expenditure elasticities for chicken, tinned fish and fresh fish are less than one; therefore these commodities are necessities, while beef/mutton/pork and eggs are luxury goods. Chicken and tinned fish are the most inelastic, reflecting its stable status in meat and fish consumed by households in South Africa. For grains, expenditure elasticity of rice is less than one confirming the staple status of rice in the household diet in South Africa. Butter, cheese and baby formula is also considered a necessity, while fresh milk/sour milk/yoghurt is a luxury good. It is important to note that although fresh milk/sour milk/yoghurt are luxury goods, one would expect fresh milk to be a necessity. This suggests that the aggregation of these products may have masked the effects of own-price on individual commodities. With the exception of banana, which is a necessity among fruits consumed by households, apples and citrus fruits are luxury products, as expected. For vegetables, dry peas/lentils/beans, tomatoes and pumpkin are necessities while potatoes, sweet potatoes and other vegetables are luxury goods. Although dry peas/lentils/beans are necessities in South African diet, suggesting a potential market for export of pulses, the own-price elasticity of demand for these commodities is greater than one, implying that households respond quite substantially to changes in the price of dry peas/lentils/beans. All other foods- vegetable oil, jam, sugar- are necessities except for soft drink, which is a luxury good, as expected.

The marginal expenditure shares of individual commodities are reported in Table 2. The results indicate that, for any increase in future incomes, for meat and fish, households are likely to allocate the largest percentage of their food expenditure on eggs, followed by beef/mutton/pork, chicken, fresh fish and tinned fish, in that order. For grains, households would spend a large proportion of their food expenditure on mealie meal, followed by bread, wheat, maize, rice and breakfast cereals, in that order, for an increase in future income. For dairy products, households would spend a large proportion of their expenditure on fresh milk/sour milk/yoghurt, followed by cheese, butter/ghee/other fats and baby formula/milk powder.

Table 2: Estimated total Marshillian own-price elasticities, expenditure elasticities and marginal expenditure shares within groups, evaluated at the mean

Commodity	Own-price elasticity	Expenditure elasticity	Expenditure share	Marginal expenditure share
			Meat and Fish	
Beef*	-1.07	1.09	0.34	0.37
Chicken	-1.01	0.21	0.23	0.05
Eggs	-1.72	1.80	0.33	0.59
Fresh fish	-0.78	0.89	0.04	0.04
Tinned fish	-0.94	0.17	0.06	0.01
			Grains	
Maize	-1.74	1.39	0.06	0.09
Mealie meal	-2.41	1.71	0.30	0.51
Rice	-0.10	0.46	0.16	0.07
Bread	-1.87	1.12	0.32	0.36
Wheat	-1.60	1.07	0.10	0.11
Breakfast cereal	-0.86	0.23	0.06	0.02
			Dairy products	
Butter*	-0.48	0.21	0.27	0.06
Cheese	-0.02	0.90	0.11	0.10
Fresh milk*	-1.20	1.89	0.48	0.91
Baby formula*	-0.65	0.12	0.14	0.02
Banana	-0.72	0.47	0.31	0.15
Apples	-0.75	1.12	0.42	0.47
Citrus fruits	-0.98	1.01	0.27	0.27
			Vegetables	
Dry Peas*	-1.37	0.27	0.12	0.03
Potatoes	-1.25	1.31	0.35	0.46
Tomatoes	-0.98	0.42	0.16	0.07
Sweet Potatoes	-1.10	1.05	0.07	0.07
Pumpkin*	-0.85	0.79	0.08	0.06
Other vegetables	-1.12	1.15	0.22	0.25
			Other foods	
Vegetable oil	-1.24	0.40	0.20	0.08
Jam	-2.15	0.37	0.08	0.03
Sugar	-1.28	0.40	0.45	0.18
Soft drink	-1.22	1.26	0.27	0.34

Note: Commodities with asterisks indicates more than one food item.

The results reported in Table 2 also indicate that, for an increase in income, households would allocate their expenditure on fruits to buy apples, followed by citrus fruits and banana, in that order. Households would allocate the money spent on vegetables on buying potatoes, followed by other vegetables, sweet potatoes, tomatoes, pumpkin and dry peas/lentils, in that order, for a given increase in incomes. For other foods, an increase in household income would lead to an increase in expenditure on soft drinks, followed by sugar, vegetable oil and jam, in that order.

5. Concluding Remarks

This paper develops an almost ideal demand system to examine food demand in South Africa. Six broad food group expenditure share equations were estimated in the first-stage and a total of twenty-eight commodities expenditure share equations were estimated in the second-stage. The three main conclusions of this study are summarised.

First, for food groups, the estimates of expenditure elasticities indicate that, for food groups, meats and fish, grains and dairy products are luxury products while fruits, vegetables and other foods are necessities. The demand for food groups are generally price elastic, except for other foods for which the demand is price inelastic and fruits for which demand is unresponsive to changes in own-price. Substitution appears to exist between food groups.

Second, for individual commodities, the estimates of expenditure elasticities indicate that chicken, fresh fish, tinned fish, rice, wheat, breakfast cereal, butter/ghee/other fats, cheese, baby formula/milk powder, banana, dry peas/lentils, tomato, pumpkin, vegetable oil, jam and sugar are necessities in household diet. The other commodities are luxuries. Nearly half of the demand for commodities is price elastic. The own-price elasticity of demand for food commodities are generally negative and greater than zero, implying that a change in own-price would lead to a more than proportionate change in the demand for that commodity.

Lastly, the marginal expenditure share estimates suggest that as future income increases, the consumption patterns of households are likely to change quite dramatically. The results suggest that, overall, as income increases, more will be allocated to meat and fish, grains, dairy products and less to fruits, vegetables and other foods. For example, the results suggest that as future income increases, this would lead to a greater proportion of income being spent on meat and fish. In terms of individual commodities within the meat and fish group, more income will be allocated to purchase beef/mutton/pork and eggs and less on chicken, fresh fish and tinned fish.

These results should be interpreted with some care. First because this study assumes that government intervenes in the food economy to regulate prices as a result the food prices are exogenous. There is mounting pressure on the South Africa government to liberalise trade. A longer-term analysis will involve testing for separability restrictions imposed on the demand system and exogeneity of prices. As well is to examine the impact of socio-demographic factors on household food demand in South Africa.

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