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The demand for dairy products in Malawi

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Abstract

In this paper a multi-stage almost ideal demand system with censoring was estimated to assess Malawians' demand for six dairy products (viz. fresh milk, powdered milk, margarine and butter, chambiko, yogurt and cheese). We found that the consumption of dairy products depended on whether the household was rural or urban, the region of the country (viz. North, Centre, South) and the household poverty status. The results also show that the demand for fresh and powdered milk, butter and margarine, cheese and yogurt was price inelastic, although the demand for chambiko was price elastic. Fresh milk and powdered milk were found to be gross substitutes and the consumption of milk was found to increase with household income.

Key words: dairy products, censored unconditional demand system, Malawi

1. Introduction

The consumption of dairy products has been proven to be beneficial for health. Dairy products are an important source of key nutrients, including high quality protein, energy, and many essential minerals and vitamins. These nutrients have been found to be vital for building healthy bones and reducing the risk of gum disease. Furthermore, several epidemiological studies have found an inverse association between the intake of dairy products and hypertension, stroke and colorectal cancer (Alvarez-León *et al*. 2006). As a result of these factors, the guidelines of the World Health Organization (WHO) recommend a minimum daily intake of dairy products for the overall health of the population (200 kg of milk/capita/year) (Banda 2008).

The most recent figures from FAOSTAT (the Statistics Division of the Food and Agriculture Organization) regarding the world annual per capita consumption of milk show that it was about 108 kg/capita/year in 2007 (FAO 2014). This number, however, hides a wide variation among countries. For instance, Finland is at the top of the list with an average of 361 kg/capita/year, whilst the last position is occupied by Congo, with a consumption of 1.28 kg/capita/year. Malawi, the focus of this study, is among the countries with the lowest consumption of milk and dairy products in the world, estimated at 4 to 6 kg/capita/year (Tebug *et al*. 2012). Note that this is lower than the African average of 15 kg/capita/year, and significantly lower than the WHO recommended intake.

Whilst the Malawian Government has expressed an interest to expand the demand for dairy products, their policy is focused mostly on the supply side and is engaged, with the help of donors such as the USA, Japan and Belgium, in expanding the production of domestic milk. However, it is

important to mention that domestic produce competes with imported dairy products. In 2010, following a significant drop in the international price of milk and subsequent pressure of non-governmental organisations (NGOs), the Malawian Government decided to increase the levy on imported milk products from 20% to 30% to counterbalance the lower import prices (Voluntary Service Overseas (VSO) 2011). Note that, whilst helping domestic producers, the effect of the levy is likely to harm consumers, as they face higher prices. The evaluation of the effect of higher prices for dairy products on consumers requires detailed knowledge of demand price elasticities, which are currently unavailable. The purpose of this paper is to fill this gap by estimating the demand for dairy products in Malawi using data from the third Integrated Household Survey (IHS3) (National Statistical Office 2012) conducted in Malawi between March 2010 and March 2011.

The structure of the paper is as follows: the next section presents an overview of demand estimates for Malawi and other African countries. This is followed by an empirical section, which describes the data and methodology used in the analysis. Next, the main findings are reported and discussed, whilst the final section presents the conclusions.

2. Literature review

With regard to comparable studies on the demand for dairy products in Malawi, to our knowledge the closest paper is the one by Ecker and Qaim (2011). They estimated the demand for food products in Malawi by considering dairy products as an aggregated category and using data from the 2004/2005 second integrated household survey (IHS2). Compared with Ecker and Qaim (2011), our paper stands out by using more recent data (i.e. from the third integrated household survey) and estimating a disaggregated demand for dairy products (viz. fresh milk, powdered milk, margarine and butter, chambiko, yogurt and cheese).

This paper aims to contribute not only to the literature on dairy demand in Malawi, but also to that on the demand for dairy products in African countries, which is limited. In this regard, it is illustrative to review some of the results for other African countries. Jansen (1992) estimated the consumption (not a demand system) of dairy products in Nigeria using data from the Nigerian household survey. He reported that the per capita consumption of dairy products was twice that of sub-Saharan Africa. He also found that the consumption of dairy products differed significantly between rural and urban households and between ethnic groups.

Mdoe and Wiggins (1996) estimated the demand for dairy products in Tanzania, regressing the income against the quantity of milk consumed per household. They found that, among dairy products, the consumption of fresh and sour milk was the highest. They also found that the average consumption of all dairy products was 142 kg/person/year in urban areas, and 45 kg/person/year in rural areas. The price elasticities of demand for milk were inelastic, being more inelastic in rural areas, viz. -0.19 compared to -0.32 in urban areas. The income elasticity of demand for milk was found to be greater than unity (1.14) in the rural areas, but lower than unity (0.91) in the urban areas, indicating that milk was a necessity good in urban areas, whilst it was a luxury good in rural areas. They also found that fresh and sour milk were the main dairy products to be consumed, and that the consumption of milk in rural areas represented more than 50% of the total consumption.

Agbola (2003) investigated food demand patterns in South Africa, using a dataset from the 1993 Integrated National Household Survey and estimating the linear version of the almost ideal demand system (AIDS). He found that the demand for grains, meat, dairy products and vegetables was price elastic (i.e. the own-price elasticities were -1.73, -1.27, -1.24 and -1.31 respectively). He also found that the income elasticities of meat (1.03) and grains (1.25) were greater than 1, implying that these foods were luxury products. Nonetheless, the income elasticities for dairy products (0.90), fruit

(0.72) and vegetables (0.91) were lower than 1, implying that these food products were necessity products.

Balagtas *et al.* (2006) estimated an AIDS model to assess the demand for imported dairy products in Cote d'Ivoire. They found that the demand for imported powdered milk was inelastic (i.e. the own-price elasticity was equal to -0.54), whilst it was elastic for imported fluid milk, yogurt and cream (i.e. the own-price elasticities were equal to -1.39, -1.22 and -1.16 respectively). They also found that dairy products produced domestically from imported powdered milk could substitute the imported dairy products.

The aforementioned studies showed discrepancies between African countries in terms of the effect of prices and income changes on the demand for dairy products.

3. Data

To estimate the demand for dairy products in Malawi, we used data from the third Integrated Household Survey (IHS3) conducted by the National Statistical Office of Malawi in the period from March 2010 to March 2011 (National Statistical Office 2012). The sample, comprising 12 271 households, was statistically designed to be representative at the national, district, urban and rural levels. The IHS3 consists of four questionnaires: the household questionnaire, the agriculture questionnaire, the fishery questionnaire and the community questionnaire (World Bank 2011).

The data on household food consumption were collected as part of the household questionnaire. This questionnaire collects information on all food products consumed by the household in the seven days preceding the administration of the questionnaire. As the data were based on household recollection, all the issues about accuracy mentioned in Ecker and Qaim (2011) also apply to this study.

In the household questionnaire, food products are classified according to their sources, such as purchased, own production or whether they were gifts. It was not possible to differentiate between domestic and imported products; however, note that powdered milk is fully imported. In addition to information on food consumption, the household questionnaire also collects information on the socio-demographic and economic characteristics of individuals living in the household, such as gender, age, relationship to the household head, education, and income. The descriptive statistics of the data corresponding to the six dairy products considered in the present study (viz. fresh milk, powdered milk, butter and margarine, chambiko, cheese and yogurt) are displayed in Table 1. It should be noted that the data have high dispersion, particularly regarding the consumption of fresh milk.

Table 1. Weekly consumption (kg/person) and conditional expenditure shares of dairy products

Dairy products	Observations	Mean	Std. Dev	Shares
Fresh milk	12 271	0.619	14.415	0.32
Powdered milk	12 271	0.123	5.507	0.38
Butter and margarine	12 271	0.105	5.332	0.22
Cheese	12 271	0.009	0.936	0.01
Chambiko	12 271	0.204	9.539	0.03
Yogurt	12 271	0.161	7.560	0.05

Source: Own calculations, based on data from the IHS3, National Statistical Office of Malawi.

4. Methods

A three-stage AIDS model with censoring was used. We opted for the use of the AIDS model for this work because, as pointed out by Deaton and Muellbauer (1980), it is derived from a formal economic model of consumer behaviour (viz. PIGLOG class, which is the logarithm of the cost/expenditure function); it gives an arbitrary first-order approximation of any demand system; it satisfies the axioms of choice exactly; it aggregates perfectly across consumers without invoking parallel linear Engel curves; it has a functional form, which is consistent with known household budget data; and the homogeneity and symmetry restrictions are easily tested and imposed. Furthermore, the use of the AIDS model also facilitates the comparison of our results with those reported in other papers for which the AIDS model was used to estimate the demand for dairy products in other African countries (Agbola 2003; Balagtas *et al*. 2006).

In the AIDS model, the budget share of good i, in time t, is given by:

$$w_{it} = a_i + \sum_{j=1}^{n} \gamma_{ij} lnp_{jt} + \beta_i ln\left(\frac{x_t}{p_t}\right) \quad (1)$$

where p_{jt} is the price of commodity j, x_t is total expenditure, and p_t is a price index defined by:

$$lnp_t = a_0 + \sum_{k=1}^{n} \alpha_k lnp_k + \frac{1}{2}\sum_{j=1}^{n} \sum_{k=1}^{n} \gamma_{jk} lnp_{jt}\, lnp_{kt} \quad (2)$$

Adding up, the homogeneity of degree zero in prices and total expenditure, and the Slutsky symmetry, imply the following restrictions on the parameters:

$$\sum_i \alpha_i = 1 \qquad \sum_i \beta_i = 0 \qquad \sum_i \gamma_{ij} = 0 \text{ (adding up)} \quad (3)$$

$$\sum_j \gamma_{ij} = 0 \quad \forall i \text{ (homogeneity)} \quad (4)$$

$$\gamma_{ij} = \gamma_{ji}, \qquad \forall i, j \text{ (symmetry)} \quad (5)$$

Using a price index such as in (2) complicates the estimation of the AIDS system due to its non-linearity. To simplify this, the price index in (2) is replaced by Stone's price index (p^*), as in (6):

$$lnp_t^* = \sum_{k=1}^{n} w_{kt} lnp_{kt} \quad (6)$$

The estimation of disaggregated demand for food products using household survey data such as IHS3 is often complicated by the existence of observations with zero expenditure on different products. Expenditure is generally recorded as zero when the food product is not consumed during the recall period. There are, however, various ways to overcome the econometric problem created by the existence of zero observations. In this study, we used the approach proposed by Shonkwiler and Yen (1999) that consists of a two-step estimation of a censored system.

In the first step, a probit model was estimated to determine the probability that a given household would consume the food product in question. To do so, the dependent variable for each one of the six dairy products was modelled as a dichotomous choice problem: the variable took a value of 1 if the household reported consuming the product in the recalling period, otherwise the dependent variable was given a value of zero. To estimate the probit model, the household's socio-demographic characteristics were used as independent variables. Concretely, we used the following socio-demographic variables: the region (North, Central or South), the residential area (urban or

rural) and the poverty level (poor or non-poor), as well as the prices corresponding to the six dairy products considered in our analysis. After the estimation of the probit model, the normal probability density function (ϕ_{ih}) and the normal cumulative distribution function (Φ_{ih}) were estimated for each household.

In the second step, the probability density and the cumulative distribution function were incorporated into the budget share equations and the AIDS model was estimated using the iterative seemingly unrelated regression (ISUR). Thus, equation (1) is replaced by the following equation:

$$w_i^* = \Phi_{ih}\left[a_i + \sum_{j=1}^{n} \gamma_{ij} lnp_{jt} + \beta_i ln\left(\frac{x_t}{p_t}\right)\right] + \lambda_i \phi_{ih} \quad (7)$$

After the incorporation of the probability density and the cumulative distribution function, the right-hand side of equation (7) does not add up to unity across all the budget share equations, hence the commonly used procedure consisting of imposing the adding up restriction on the system of equations and dropping one equation is no longer appropriate. According to Yen *et al*. (2002), the censored demand system can be estimated correctly considering all the budget share equations.

The conditional price and expenditure elasticities are presented in Equations 8 to 12 (see Green & Alston 1990):

The expenditure elasticity:

$$E_i = 1 + \Phi_i \frac{\beta_i}{w_i} \quad (8)$$

The Marshallian own-price elasticity:

$$e_{ii} = \Phi_i \left(\frac{\gamma_{ij}}{w_i} - \beta_i\right) - 1 \quad (9)$$

The Marshallian cross-price elasticity:

$$e_{ii} = \Phi_i \left(\frac{\gamma_{ij} - \beta_i w_j}{w_i}\right) \quad (10)$$

The Hicksian own-price elasticity:

$$\tilde{e}_{ii} = e_{ii} + w_i E_i \quad (11)$$

The Hicksian cross-price elasticity:

$$\tilde{e}_{ij} = e_{ij} + w_j E_i \quad (12)$$

The number of parameters that need to be estimated in a demand system becomes very large when studying the demand for disaggregated food products. The usual way to reduce the number of parameters is to impose weak separability and two-stage budgeting assumptions. The former implies that goods can be divided into a number of separate groups, so that a change in the price of a good in one group affects the demand for all commodities in another group in the same manner. Multi-stage budgeting implies that the total expenditure is first allocated among aggregated categories, and that group expenditures subsequently are allocated between the goods in the group (Edgerton 1997).

In this study, the weak separability and two-stage budgeting were assumed. Thus, the aggregate expenditure was first allocated to five food categories (viz. staple foods, pulses, animal products, vegetables and fruits, and meal complements). In the second stage, the expenditure on animal products was allocated to five animal-food categories (viz. eggs, fish, dairy products, red meat and white meat). In the third stage, the expenditure on dairy products was allocated to six dairy products (viz. fresh milk, powdered milk, butter and margarine, chambiko, cheese and yogurt). The food categories/products considered in each of the three stages are shown in Figure 1.

Edgerton (1997) derived expressions for the unconditional expenditure and price elasticities based on the assumptions of weak separability and multi-stage budgeting. However, Carpentier and Guyomard (2001) showed that Edgerton's formulae violated the symmetry requirement (viz. $\gamma_{ij} = \gamma_{ji}$), and they proposed alternative expressions. The unconditional expenditure elasticity (E_i), the unconditional Marshalian price elasticities (E_{ij}) and the unconditional Hicksian price elasticity ($\tilde{E}_{ij}$) can be calculated using the following:

$$E_i = E_{(G)i}E_G \tag{13}$$

$$E_{ij} = E_{(G)ij} + w_{(H)j}\left(\frac{\delta_{GH}}{E_{(H)j}} + E_{GH}\right)E_{(G)i}E_{(H)j} + w_{(H)j}w_H E_G E_{(G)i}\left(E_{(H)i} - 1\right) \tag{14}$$

$$\tilde{E}_{ij} = \tilde{E}_{(G)ij} + w_{(H)j}\tilde{E}_{GH}E_{(G)i}E_{(H)i} \tag{15}$$

where $E_G, E_{GH}$and $\tilde{E}_{GH}$ are the expenditure elasticity of group G and the Marshallian and Hicksian elasticities of group H respectively. $E_{(G)i}$, $E_{(G)ij}$ and $\tilde{E}_{(G)ij}$ are the conditional expenditure elasticity and the conditional Marshallian and Hicksian elasticities of product i in group G with respect to the price of product j respectively. δ_{GH} is the Kronecker delta ($\delta_{GH} = 1$ for $G = H$, and zero otherwise); w_H is the share of group H in total expenditure, and $w_{(H)j}$ is the share of commodity i in group H. Finally, $E_{(G)ij}$ and $\tilde{E}_{(G)ij}$ are both zero when i and j belong to different groups. Levels of significance of the estimated elasticities were computed using bootstrapping as in Krinsky and Robb (1986). The econometric software used for the estimation was Shazam version 10.0 .

Since the focus of this paper is on the demand for dairy products, only the unconditional elasticities computed based on the estimates in the third stage are reported and discussed in the results section. The unconditional elasticities for the food products considered in the first two stages are available in Appendix 1 and Appendix 2.

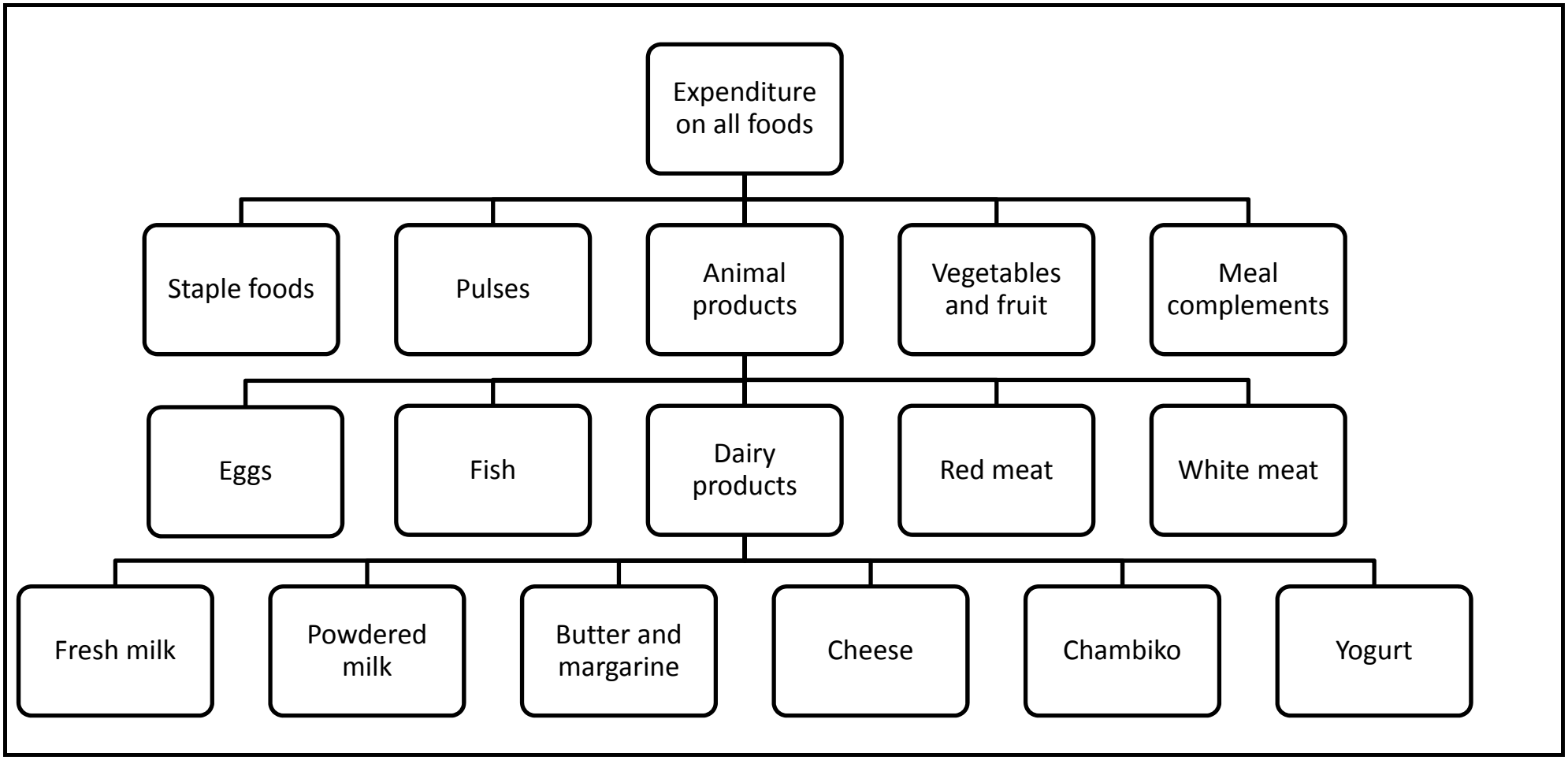

Figure 1. Partitioning of food groups in the three-stage model

5. Results and discussion

Before proceeding with the discussion of the unconditional elasticities for dairy products, it is useful to analyse the variation of dairy products consumption across households' socio-demographic characteristics.

Table 2 presents the results from the estimation of probit models that test the relationships between the probability of consuming each one of the six dairy products and the following dichotomous ("dummy") socio-demographic variables: (1) "Urban", which takes value 1 if the household is located in an urban area and value 0 if located in a rural area; (2) "North", which takes the value 1 if the household is located in the northern part of Malawi and 0 otherwise; (3) "Central", which takes the value 1 if the household is located in the central part of Malawi and 0 otherwise; (4) "South", which takes the value 1 if the household is located in the southern part of Malawi and 0 otherwise; and (5) "Non-poor", which takes the value 1 if the household is considered to be above the poverty line and the value 0 if the household is considered to be under the of poverty line[1]. To avoid the "dummy trap" problem, variable "Central" was dropped during the estimation of the six probit models.

The results presented in Table 2 show that the households residing in urban areas had a higher probability of consuming fresh milk, powdered milk, butter and margarine and yogurt than households living in rural areas. However, they were less likely than those in rural areas to consume chambiko. In addition, it was found that Malawians living in the North had a higher probability of consuming fresh milk and chambiko and a lower probability of consuming yogurt than Malawians living in the rest of the country. Furthermore, the results showed that Malawians living in the South had a higher probability of consuming yogurt, but a lower probability of consuming fresh and powdered milk than Malawians living in the North and Centre of the country. Finally, it was found that non-poor households had a higher probability of consuming fresh and powdered milk than poor households. However, the probability of consuming butter and margarine, chambiko, cheese and yogurt was not significantly different between poor and non-poor households. To sum up, Malawians' consumption of dairy products seems to vary in terms of the region, residential area and level of poverty.

Regarding the unconditional elasticities for dairy products, Table 3 shows the computed Marshallian price[2] and expenditure elasticities, as well as their level of significance. The results show that all own-price elasticities had the right sign and were significant. This implies that the six dairy products are normal goods, hence, their consumption decreases when their prices increase.

[1] According to the Malawian National Statistical Office, the poverty line is defined as the subsistence minimum expressed in Malawi Kwacha based on the cost-of-basic-needs methodology. It comprises two major components: food and non-food. The food poverty line represents the cost of a food bundle that provides the necessary energy requirements per person per day. In the case of the IHS3, first, the daily calorie requirement was set at 2 400 kilocalories per person. Second, the price per calorie was estimated from the population in the 5th and 6th deciles of the consumption aggregate distribution. Last, the food poverty line was calculated as the daily requirement of calories per person multiplied by the price per calorie. The non-food poverty line represents an allowance for basic non-food needs. It is estimated as the average non-food consumption of the population whose food consumption is close to the food poverty line. The total poverty line is simply the sum of the food and non-food poverty lines. Individuals who reside in households with consumption lower than the poverty line (MK 37 001.68) are then labelled "poor". Otherwise, they are considered non-poor.

[2] This paper reports only the Marshallian price elasticities due to the fact that they provide the full effect of changes in prices. Hicksian elasticities were also computed and they are available from the authors upon request.

Table 2. Effect of socio-economic variables on the probability of buying dairy products

	Probit model estimations											
Variables	Fresh milk		Powdered milk		Butter and margarine		Cheese		Chambiko		Yogurt	
Urban	0.422	*	0.325	*	0.595	*	6.490		-0.260	*	1.209	*
North	0.530	*	-0.102		-0.307		-0.811		1.554	*	-0.458	*
Central	-0.100	*	-0.211	*	0.001		4.210		0.106		0.253	*
Non-poor	0.794	*	0.663	*	3.476		3.568		-0.090		1.420	
Likelihood ratio test	2 756.99		4 875.79		4 974.65		258		1 000.67		474.53	
P-value	0.00		0.00		0.00		0.00		0.00		0.00	

Source: Own calculations based on data from the IHS3, National Statistical Office of Malawi
Note: *: statistically significant at the 5% level

Table 3. Unconditional Marshallian elasticities

Products	Fresh milk		Powdered milk		Butter and margarine		Cheese		Chambiko		Yogurt		Expenditure elasticities	
Fresh milk	-0.848	*	0.122	*	0.075	*	-0.018	*	-0.053	*	0.081	*	1.456	*
Powdered milk	0.058	*	-0.786	*	-0.013	*	-0.031	*	0.121	*	-0.034	*	1.120	*
Butter and margarine	0.031	*	-0.049	*	-0.737	*	-0.014	*	0.068	*	-0.006	*	0.965	*
Cheese	0.028	*	0.029	*	0.069	*	-0.829	*	0.148	*	-0.117	*	1.232	*
Chambiko	-0.059	*	0.253	*	0.105	*	0.072	*	-1.266	*	0.101	*	0.328	*
Yogurt	0.276	*	0.223	*	0.204	*	-0.045	*	0.151	*	-0.838	*	2.627	*

Source: Own calculations based on data from the IHS3, National Statistical Office of Malawi
Note: *: statistically significant at 5% level

In addition, we found that the demand for fresh milk, powdered milk, butter and margarine, cheese and yogurt was inelastic (i.e. own-price elasticities were -0.84, -0.78, -0.73, -0.82 and -0.83 respectively), which implies that a 1% increase in the prices of these dairy products would lead to a decrease in consumption of less than 1%. The results show that the demand for chambiko was elastic (viz. -1.26), which implies that a 1% increase in the price of chambiko would lead to a decrease in chambiko consumption of 1.26%.

Regarding cross-price elasticities, Table 3 shows that fresh and powdered milk were gross substitutes. Thus, an increase of 1% in the price of powdered milk would increase the consumption of fresh milk by 0.12%. This is an interesting result because it shows that: 1) cheap powdered milk can have some negative effect on the demand for domestic fresh milk (at least in urban areas, where consumption of powdered milk is greater); and 2) an increase in the levy on imported powdered milk has two effects: first, it can improve the competitiveness of locally produced milk and, second, it may have an impact on affordability as it increases the price (moreover, it may increase the expenditure on powdered milk for those consumers with inelastic demand for powdered milk).

The expenditure elasticities reported in Table 3 show that the consumption of milk in Malawi increases with income. An increase of 1% in the expenditure on foods increases fresh milk demand by 1.45% and that of powdered milk by 1.12%. While these figures appear relatively high, hence indicating the need for further work, they may imply that policies that positively affect the income of poor people may boost their demand for dairy products.

6. Conclusion

In this paper, the demand of Malawian households for six dairy products was analysed using data from the most recent integrated household survey conducted in Malawi. We estimated a three-stage AIDS model with censoring to compute unconditional own and cross-price elasticities, as well as expenditure elasticities for six dairy products (viz. fresh milk, powdered milk, butter and margarine, chambiko, cheese and yogurt).

We found that all dairy products were price inelastic, except for chambiko. The own-price elasticities showed that dairy products were normal goods. In addition, we found that the consumption of milk in Malawi increased with income, hence showing that policies aiming to improve the income of poor people may also increase their demand for dairy products. Regarding cross-price elasticities, powdered milk (imported) was found to be a gross substitute for fresh milk (domestically produced).

Although the results show that keeping the prices relatively low or subsidising consumers can expand the consumption of milk, a more sustainable way of securing lower prices would be by expanding the domestic supply of milk and monitoring the marketing margins along the supply chain.

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Appendix 1: Unconditional Marshallian elasticities for food categories considered in the first stage of AIDS's estimation

Products	Price elasticities												Expenditure elasticities	
	Staple foods		Pulses		Animal Products		Vegetables and Fruits		Meal complements					
Staple foods	-0.791	*	-0.046	*	-0.120	*	-0.057	*	-0.044	*			1.058	*
Pulses	-0.113	*	-0.781	*	-0.060	*	0.023	*	0.098	*			0.832	*
Animal products	-0.077	*	-0.020	*	-0.765	*	0.011	*	0.064	*			0.785	*
Vegetables and Fruits	-0.138	*	-0.015	*	-0.076	*	-0.940	*	-0.034	*			1.205	*
Meal complements	-0.049	*	0.020	*	0.012	*	0.007		-1.009	*			1.019	*

Source: Own calculations, based on data from the IHS3, National Statistical Office of Malawi.
Note: * Statistically significant at 5 per cent level.

Appendix 2: Unconditional Marshallian elasticities for food categories considered in the second stage of AIDS's estimation

Products	Price elasticities												Expenditure elasticities	
	Eggs		Fish		Dairy products		Red meat		White meat					
Eggs	-0.211	*	0.070	*	-0.090	*	-0.168	*	-0.334	*			0.638	*
Fish	-0.015	*	-0.874	*	-0.013	*	-0.242	*	0.032	*			1.088	*
Dairy products	-0.053	*	-0.034	*	-0.854	*	-0.254	*	-0.080	*			1.283	*
Red meat	-0.010	*	-0.308	*	0.081	*	-1.518	*	-0.160	*			2.651	*
White meat	-0.111	*	0.088	*	-0.044	*	-0.289	*	-0.682	*			1.002	*

Source: Own calculations, based on data from the IHS3, National Statistical Office of Malawi.
Note: * Statistically significant at 5 per cent level.