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THE EFFECT OF INCOME ON THE MARKET FOR CARBOHYDRATES IN SOUTH AFRICA

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Abstract

Despite the importance of the carbohydrate market as a source of staple food for the majority of the South African population, very little statistical information is available on the subject as a basis for policy formulation. Research centred on the white maize industry. Results show that regional differences within the market for maize are of cardinal importance, making country-wide generalisations dangerous and a regional marketing strategy imperative. One of the most significant results for the strategic marketing of maize meal is that a single population estimate for income elasticity is inadequate, especially when 94% of maize meal is consumed by a single consumer group - the Black population. Indications are that for Blacks in South Africa, maize is a normal good if seen in a national context. Consequently, as incomes fall or as relative prices rise, less maize is consumed. This is supported by urban price elasticities. It is proposed that this could have had a substantial effect on maize consumption in the past and have important implications for the marketing of staple food in a new South Africa.

Uittreksel Die effek van inkome op die koolhidraatmark in Suid Afrika

Ten spyte van die belangrikheid van die koolhidraatmark as bron van stapelvoedsel vir die meerderheid van die Suid-Afrikaanse bevolking, is data wat as basis vir beleidsformulering kan dien beperk. Hierdie studie is toegespits op die witmieliemark. Die resultate toon dat belangrike streeksverskille in die mieliemark voorkom. Landwyse veralgemening is gevaarlik en dit is van kardinale belang dat streeksverskille in bemarkingsstrategieë in ag geneem moet word. Een van die mees betekenisvolle bevindings uit 'n strategiese bemarkingssoepunt, is dat 'n enkele skatting van inkome-elasticiteit vir die totale bevolking onvoelende is - veral as een verbruikersgroep, naamlik die swart bevolkingsgroep, verantwoordelik is vir 94 persent van mieliemeelverbruik. Aanduidings is dat, gesien in 'n nasionale konteks, mielies 'n normale produk vir Swartes in Suid-Afrika is. Dit impliseer dat minder mielies verbruik word namate inkome afneem, of relatiewe pryse toeneem. Laasgenoemde word deur stedelike pryselastisiteite ondersteun. Daar word aangedui dat hierdie aspek 'n belangrike invloed op mieliEVERBRUIK in die verlede kon gehad het. Dit hou belangrike implikasies vir die bemarking van stapelvoedsel in 'n nuwe Suid-Afrika in.

1. Introduction

South Africa may truly be called "a world in one country", not only with respect to the diversity of its geographical beauty, but also in the variety of its population groups and their cultural differences. The four major race groups (Black, Indian, Coloured and White) differ in terms of language, location and eating habits. The Black population alone has four main linguistic groupings, the Nguni, the Sotho, the Venda and Shangaan-Tsonga, with a number of subdivisions in each group. Amongst the Blacks, these groups can and often do, vary widely. Van Wyk (1989) notes the additional aspects of demographic and welfare differences within groups. Regional differences are therefore common in the market for maize products.

Blacks constituted 74,1 per cent of the total populous in 1985, with Whites at 14,7 per cent, Coloureds 8,6 per cent and Indians 2,6 per cent. In sheer numbers alone Blacks tend to be the most important consumer group. White maize meal is one of the major staple foods of the Black population. It is estimated that Blacks consume 94 per cent of total white maize products produced in the RSA and are therefore the primary target market (Elliott, 1991). Despite the importance of the carbohydrate market as a source of staple food for the majority of the South African population, very little statistical information is available on the subject as a basis for policy formulation.

Disparities in the Black population groups on a regional basis precludes any effective regional marketing strategy based on a single country-wide estimate of elasticity. In the market for

maize and maize products this is especially true. Regional differences were therefore analysed for all of the major carbohydrates.

Data procured from surveys conducted by the Bureau of Market Research pertaining to 15 000 black households were utilised in cross-sectional analyses. The main objectives were to estimate income elasticities of demand, to determine whether or not maize meal is an inferior, superior or a normal good (on a regional basis) and to make strategic marketing and policy proposals.

2. Income elasticities

Total income was calculated so as to include income from employment, income from pensions, income from farming, contributions from migrant workers and income from other sources. Regression techniques were applied to gain estimates of Black population income elasticity (IE) on a regional basis. The equation was of the form :

$$\text{Log } Q_p = \text{Log } Y + \epsilon$$

where : Q = Quantity of the product consumed
 Y^P = Total income
 ϵ = Error or disturbance term

Per capita data for consumption and income were not seen to yield widely differing results and were therefore not used. All data pertain to the household unit. Estimates of income elasticity could be gained directly from coefficients, without further calculation.

3. Income elasticity for carbohydrate products in urban and rural areas

Bureau of Market Research (BMR) data were combined for 1975 and 1985 respectively and analysed as two separate metropolitan units, in order to estimate how the income elasticities have changed over time. A similar exercise was conducted for rural regions. Results of the most recent surveys are shown in Table 1.

Table 1: Urban and rural income elasticities for Blacks

Product:	Urban 1985	Rural 1988
Maize meal	0,0610 (P=0,001)	0,1961 (P=0,0001)
Maize products	0,0474 (P=0,0092)	0,1471 (P=0,0001)
Bread	0,1111 (P=0,0001)	0,2310 (P=0,0001)
Potatoes	0,1357 (P=0,0001)	0,1597 (P=0,0001)
Rice	0,1567 (P=0,0001)	0,1565 (P=0,0001)
Instant cereals	0,2105 (P=0,0441)	0,3224 (P=0,0001)
Pasta	-0,0297 (P=0,6653)	0,0871 (P=0,1668)

Footnote: P < 0,01 Highly Significant

It is apparent from Table 1 that with the exception of pasta which yielded statistically insignificant results, all of the major carbohydrates had positive income elasticities.

Urban income elasticities for maize meal are fairly consistent over time, with an IE of 0,0799 in 1975 and 0,0610 in 1985, whilst those for maize products are 0,0904 (1975) and 0,0474 (1985). IEs for maize in general are low, positive and highly significant. According to BMR data sources the urban per capita consumption of both maize meal and maize products is increasing. This fits in well with the urban IE results obtained under the conditions of positive per capita growth of Black disposable income (Bureau of Market Research, 1989). Urban results indicate that maize is a normal good.

Bread had an IE of 0,1111 for Blacks in the major metropolitan areas (p=0,0001), indicating that a 10 per cent increase in income would result in an 11 per cent increase in bread consumption.

Estimates of rural income elasticities for Blacks indicate that maize meal and maize products also have positive income elasticities. Since the rural region is the most important market for maize, it is expected that this market will have the dominant effect in the next few years. Rural per capita consumption is on the decline for maize meal but is increasing for maize products. Calculated IEs for maize meal and maize products for Blacks in 1988 were 0,1961 and 0,1471 respectively. Such results, in conjunction with an increase in per capita incomes, lend support to the increase in per capita consumption of maize products but not to the decline in per capita consumption of maize meal. As was the case for urban areas, rural regions show that maize is a normal good.

In rural areas, bread had a greater IE than that of urban regions and could possibly be seen as being more of a luxury in the more remote regions. The IE of bread was positive (0,2310) and highly significant, as was that of instant cereals. Potatoes and rice were also seen to have a positive IE, but these were more in line with that of maize.

The rural and urban regional results do not correspond with those obtained by Nieuwoudt (1990), Van Zyl (1986, 1990) and Cadiz (1984), all of whom found that maize was an inferior good. Nieuwoudt estimated an IE for Blacks for maize at -0,153. Cadiz (1984) estimated the income elasticity for maize at -0,383 using country-wide time series data and at +0,529 using cross-sectional data for the Pietermaritzburg region.

The latter estimate made by Cadiz was thought to be unreasonable since only the R0 - R2 500 income groups were included. In similar analyses to Cadiz, Van Zyl (1986) estimated an IE for maize for human consumption at -0,299 for all population groups country-wide. However, the following should be borne in mind when interpreting these results:

- The elasticities calculated differ in terms of regions and population groups considered (in the case of Van Zyl and Cadiz). The estimates presented in this research pertain to only the Black population group.
- Nieuwoudt's estimate for Blacks takes into account only three regions, namely Durban, Johannesburg, East and West Rand, for which the IE for maize was negative.
- The estimate made by Van Zyl, includes other population groups who are not major consumers. Such an estimate, whilst valid for the country as a whole, is not necessarily applicable to Blacks. Furthermore, income elasticities are expected to vary depending upon which level of the marketing chain they are measured. Consumer demand for maize meal has tended to shift toward the more refined product. As the product becomes more refined, the quantity of waste material generated increases, leaving a smaller quantity of maize meal per ton of raw maize processed. Measuring income elasticities at the unprocessed or wholesale stage is expected to give different results. Van Zyl used the wholesale level, whilst the estimates in this research are for the end user and the final maize product.
- The BMR rural area data used in this study pertained only to the homelands. There is a section of the South African rural population therefore that is not accounted for, which could have an additional effect. On the other hand urban regions are well represented.
- Incomes within the Black population group tend to be highly skewed, with a small proportion earning the majority of the income. Global income figures will therefore tend to distort income elasticity estimates.
- Cadiz has estimated the only IE that is truly comparable, and that was for Pietermaritzburg Blacks. It is unfortunate that the sample used was limited to the R0 - R2 500 income group, which will explain why his estimate is higher than that secured in this research for Pietermaritzburg.
- BMR data are also analysed for the household unit and as such could also help to explain differences in results. In terms of a Black household, maize meal/products are highly likely to be normal goods.

Results are interesting and thought provoking. One conclusion that may be drawn is that generalisations based on a few regions or a country-wide basis may not be a true reflection of the situation amongst a specific group like urban Blacks.

Support for these findings are given by Huang *et al.* (1991), who examined the market for rice in Asia. They note that measurement of income is problematic and in low income countries the income elasticity estimates tend to be underestimated. Expressed differently, although it is well documented that income elasticities for staple foods decline as income increases (Alderman, 1986; Bouis, 1989), what is important is the level of income at which elasticities are estimated. Blacks in South Africa may be classified as being in a low income category. If one has a growing family and limited means, the chances are that an increase in income will result in an increase in staple diet consumption.

4. Regional breakdown of metropolitan area elasticities

Metropolitan Black income elasticities for carbohydrates are presented on a provincial basis in Table 2.

Table 2: Metropolitan income elasticities for Blacks in 1985

Product :	PWV	OFS	CAPE	NATAL
Maize meal	-0,0253 (0,5106)	0,0947 (0,0098)	0,0793 (0,1804)	-0,0204 (0,5343)
Maize products	-0,0264 (0,4987)	0,1119 (0,0048)	0,0299 (0,5973)	-0,0338 (0,3417)
Bread	0,1059 (0,0004)	0,1552 (0,0010)	-0,0232 (0,6358)	0,0502 (0,1867)
Potatoes	0,1802 (0,0001)	0,1902 (0,0001)	0,2023 (0,0001)	0,0207 (0,4559)
Rice	0,1295 (0,0027)	0,1215 (0,0088)	0,1516 (0,0154)	0,1044 (0,0001)
Instant cereals	0,3772 (0,2003)	0,1385 (0,3916)	0,2174 (0,5922)	0,0029 (0,9888)
Pasta	-0,1056 (0,4181)	-0,0111 (0,9338)	-0,3825 (0,2290)	-0,2367 (0,3502)

Footnote: P < 0,01 Highly Significant (indicated in brackets)

Regional differences in the market for carbohydrates are indicated. Furthermore the table shows that the global urban IE estimates shown in Table 1 are misleading once a regional analysis is undertaken. Maize meal for example is a normal good in the Orange Free State metropolitan region, whilst being statistically insignificant in the Cape, PWV and Natal urban areas. Similar results were obtained for rural areas indicating a single IE estimate to be misleading.

5. Policy implications

Of the maize meal produced in the RSA 94 per cent is consumed by the Black population group. To base income and price elasticity estimates on the total South African population is therefore erroneous. Past income and findings on price elasticities of demand may therefore be questioned.

Indications are that maize meal is a normal product for the country as a whole and as such will perform more favourably in future under a positive economic scenario than one of poor growth. Certain other specific areas such as the PWV region, do however indicate the reverse to be true, i.e. that maize meal is an inferior good. This highlights the point about regional differences and sweeping generalisations being dangerous.

Price and income changes are causally related in terms of the reactions of an individual. For example, a substantial price in-

crease on a normal product which forms a reasonably large portion of the household's budget is equivalent to a reduction in income, with a corresponding reduction in consumption. In other words, if market expansion was a priority before 1987, the policy for pricing white maize was contrary to this end. Although the Maize Board is not the only link in the marketing chain, it is important to take note of such findings. The question then arises as to how many other industries reliant on the Black market have been following an incorrect pricing policy based on global elasticity estimates.

In conclusion, country-wide generalisations are dangerous. It is therefore also dangerous to base policy on generalisations. A regional policy approach is deemed necessary for the marketing of white maize.

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