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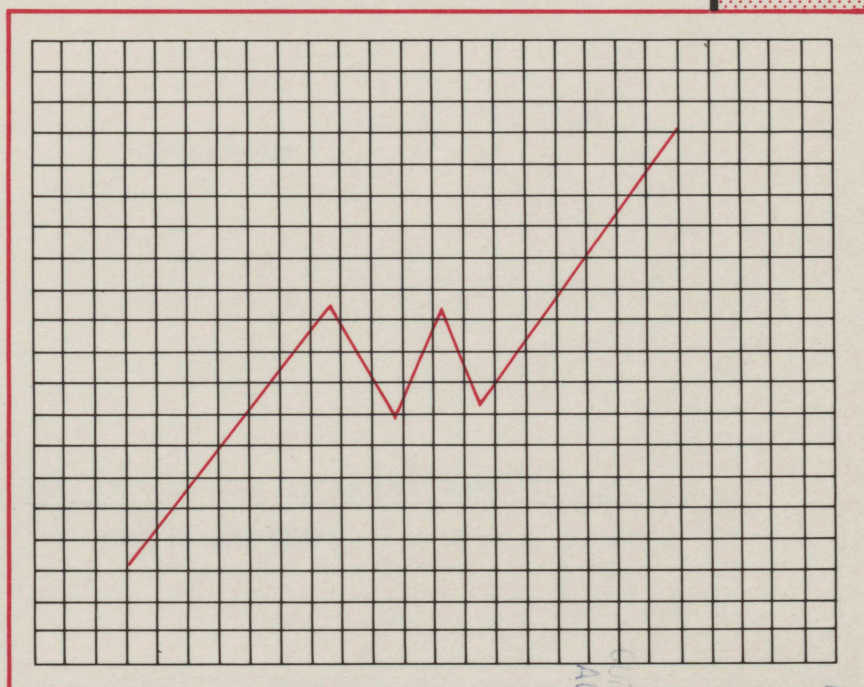
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THE ROLE OF THE MAIZE INDUSTRY IN THE SOUTH AFRICAN ECONOMY

by J. VAN ZYL and H.J.G. NEL*

ABSTRACT

The role of the maize industry is discussed with reference to employment, foreign exchange earnings, food production, input provision, market segment and contribution to GDP. The impact of changes in the maize industry is quantified by means of input-output analysis and dynamic multipliers. The impact of the maize industry is insignificant relative to the total economy with regard to contribution to GDP, market for other products and input provision. Employment is the terrain of the most important impact of the maize industry.

INTRODUCTION

Maize has been the most important field crop in the RSA throughout the past three decades. On average it has yielded over 15 per cent of the gross value of all agricultural products and covered about 40 per cent of the cultivated area. In view of this an analysis of the role of the maize industry in the South African economy would clearly be valuable.

It is customary to view the contribution of a sector to a country's economy in the light of a number of distinctive, yet inter-related aspects (Brand, 1961; Groenewald, 1986). These aspects include the provision of employment, the earning of foreign exchange, food supply (supplier of inputs) for other sectors, the creation of a market for the products of other sectors and the contribution to the gross domestic product (GDP).

These aspects will be discussed in the following pages, after which the impact of changes within the maize industry will be discussed. In this analysis particular attention is given to the following three aspects: (i) Changes in production in the maize industry; (ii) the effect of changes in maize prices on the total economy and on various individual sectors within the economy; and (iii) sectoral multipliers. The impact of these changes is also discussed with reference to various scenarios relating to production and the prices of substitute and complementary products. The study is limited to the macro-economic effects of potential changes within the maize industry and is not aimed at the position of individual producers or at socio-economic and strategic aspects.

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EMPLOYMENT

The maize industry is an integral part of the agricultural sector and cannot easily be distinguished from other farming enterprises on the production side. The maize industry and the agricultural sector as a whole will both be discussed with regard to the above aspect.

The total numbers of economically active persons in 1970 and 1980 are compared in Table 1 with numbers in the maize industry, the remainder of agriculture and other sectors.

TABLE 1 - The total number of economically active persons in 1970 and 1980

Industrial sector	1970		1980	
	Number 1 000	% of total	Number 1 000	% of total
Maize industry	163	2,0	102	1,2
Remainder of agriculture	2 320	28,6	1 204	13,9
Manufacturing	681	8,4	836	9,6
Mining	1 026	12,6	1 464	16,8
Community services	1 596	19,7	2 006	23,1
Other	2 328	28,7	3 078	35,4
Total	8 114	100,0	8 690	100,0

Source: Derived from figures by the Central Statistical Service (1986) and unpublished data provided by the Directorate of Agricultural Economic Trends (1987)

Although the maize industry provides employment for only a small and shrinking percentage of the economically active population, it should be borne in mind that the absolute numbers, and also the number of dependants on maize farms, amount to large figures (De Klerk, 1984). Table 2

TABLE 2 - Number of farm labourers involved in maize production, their earnings and number of dependants, 1975-1985

Year	Number of labourers 1 000	Remuneration R million	Number of dependants 1 000
1975	115,5	66,9	496,7
1976	108,2	67,1	*
1977	109,8	71,5	*
1978	105,4	70,3	*
1979	100,3	85,5	*
1980	101,5	92,8	496,4
1981	99,7	111,6	*
1982	82,5	113,9	*
1983	72,7	104,8	*
1984	80,1	115,5	*
1985	73,1	127,7	327,8

* Not available

Source: Derived from unpublished data provided by the Directorate of Agricultural Production Economics (1987)

gives estimates of the number of farm workers involved in maize production, their earnings and the total number of people dependent on their earnings. On this basis it may be deduced that about half a million people are directly dependent on maize production. Indirect influences through forward and backward linkage increase this number considerably.

In a study of structural trends in South African maize production, Van Zyl, Vink & Fényes (1987) concluded that labour cannot be viewed in isolation from other production factors. They then identified the following changes and trends since the Second World War:

- The number of farm workers per farm unit and per 1 000 ha under cultivation increased between 1945 and 1970, but decreased significantly from 1970 to 1985.
- Both real cash and *in natura* remuneration increase over the years. Real cash remuneration increased more rapidly than real *in natura* remuneration, however.
- Since 1945 labour costs have increased at a lower rate than real gross farm income, farming expenditure and machinery costs. Real labour costs increased from 1945 to 1970, but decreased from 1970 to 1985.
- The productivity of labour increased at a higher rate than that of machinery, but at a lower rate than real total remuneration per farm labourer.

According to Van Zyl *et al.* (1987) it would appear that there were two structural trends in South African maize cultivation. During the period 1945 to 1970 there was a big expansion in the cultivated area as a result of the replacement of draught oxen by tractors; it was possible to manage larger areas and more labour was required. There was a big demand for labour for the harvesting of maize. This problem was relieved by the introduction and acceptance of the mechanised harvesting process. These trends in mechanisation were reinforced by a policy aimed at reducing the cost of capital, which resulted in the demand for labour in the maize industry dropping from 1970 onwards.

THE EARNING OF FOREIGN EXCHANGE

It appears from the classification by Brand (1969), Kindleberger (1962) and Lindert & Kindleberger (1982) that maize exports played a leading part in the economic development of the Republic of South Africa up to 1981. Since then the profitability of maize production declined sharply owing to a variety of factors, including the drought and macro-economic variables (Van Zyl, Van der Vyver & Groenewald, 1987; Groenewald, 1985; 1982), so that maize exports have at most played a balancing role in economic development since 1981.

Table 3 shows the maize and total agricultural exports during the period 1975 to 1984 (export figures since 1985 are confidential and are not available for publication).

TABLE 3 - Maize and total agricultural exports, 1975-1984

Year	Total agricultural exports	Maize exports	Maize exports as a % of total agriculture
	R million		
1975	1 249,0	302,5	24,2
1976	1 237,4	236,5	19,1
1977	1 337,5	190,1	14,2
1978	1 543,8	282,1	18,3
1979	1 692,3	223,8	20,7
1980	2 052,5	425,1	20,7
1981	2 045,9	589,8	28,8
1982	2 063,3	577,8	28,0
1983	1 727,8	206,2	11,9
1984	1 842,3	7,5	0,4

Source: Directorate of Agricultural Economic Trends (1986)

SUPPLIER OF FOOD

In order to analyse the role of maize as a supplier of food it is necessary to distinguish between white and yellow maize. Yellow maize is used almost exclusively for stock feed, whereas white maize is mainly processed into a range of maize products for human consumption. The demand for white maize is therefore affected by different factors from those affecting the demand for yellow maize. In this respect white and yellow maize should be regarded as two entirely different products, although they are largely substitutes from the supply point of view. On the demand side both products are used as industrial inputs, since relatively little maize is consumed directly as whole maize. It is important to note that the demand for yellow maize is a derived demand: in the first place it depends on the demand for animal products and on the basis of this on the demand for stock feeds.

The human and animal consumption of maize together comprise over 95 per cent of the total consumption of maize. Animal consumption shows a tendency to increase over the years in relation to human consumption. Total as well as human and animal consumption of maize are increasing with time. The total *per capita* consumption is increasing more slowly than the *per capita* animal consumption of maize. The *per capita* human consumption of maize is decreasing with time. A significant four-year cycle, which corresponds to that for pigs and chickens, may be observed in the animal consumption of maize (Van Zyl, 1986b).

The average price elasticity of the demand for maize for animal consumption was estimated at between -1,56 and -1,29 with the aid of actual data (Van Zyl, 1986a). Using logarithmic transformations, constant price elasticities of between -1,84 and -2,20 were calculated. The demand for maize for animal consumption therefore appears to be relatively elastic. The constant cross-elasticity between hay prices and the animal consumption of maize was calculated at between 0,43 and 0,48 and 0,43, respectively, using logarithmic and actual data. Meat prices, poultry prices and the prices of poultry products and feed mixtures are positively related to

the animal consumption of maize (Van Zyl, 1986a).

The average price elasticity of the demand for maize for human consumption was calculated at -0,15 using actual data, and a constant elasticity of -0,10 was obtained with logarithmically transformed data (Van Zyl, 1986a). Cross-elasticities for bread prices of between 0,20 and 0,28 were calculated. Negative income elasticities of between -0,24 and -0,30 were obtained. This implies that the demand for maize for human consumption was relatively inelastic in respect of disposable income. This negative sign points to an inferior product; the quantity demanded is dropping as incomes rise.

If one takes into account the fact that the demand for maize for animal consumption is increasing with time relative to the demand for maize for human consumption, one could conclude that the total demand for maize will probably become relatively more elastic in time. It is also apparent that as incomes rise the demand for maize for human consumption is decreasing, but that the demand for maize for animal consumption is rising. More red meat, poultry products and dairy products are therefore probably being purchased. The large income differences between individuals, the non-uniform change in income with time and the determined efforts to narrow the wage gap between population groups therefore imply that the *per capita* animal consumption of maize will probably increase, whereas the *per capita* human consumption of maize will probably drop.

The above trends probably imply great potential advantages for maize as a supplier of food (Groenewald, 1987). In the USA, for instance, the demand for animal products (meat, eggs and dairy products) is so high that the *per capita* demand for grain products for stock feeds is between four and five times higher than the total *per capita* demand for grain products in many other countries (Power and Holenstein, 1979).

SUPPLY OF RAW MATERIALS TO AND CREATION OF A MARKET FOR OTHER SECTORS

The outputs (forward linkages) and inputs (backward linkages) of the maize industry at constant 1985

TABLE 4 - Forward linkages of the maize industry at constant 1985 prices

Sector	Year			
	1985	1981	1978	1975
	R million			
Maize	69,5	60,7	60,3	56,1
Remainder of agriculture	32,1	88,1	60,5	64,7
Milling industry	943,2	980,6	999,2	1 047,4
Intermediate output	1 044,8	1 129,4	1 120,0	1 168,2
Consumer spending	245,2	227,6	253,0	268,2
Stock changes	230,2	538,9	95,2	-101,1
Exports	87,5	1 015,7	608,8	720,8
Imports	-10,4	11,9	-	-
Final demand	552,5	1 770,3	957,0	887,9
Total output	1 597,3	2 899,7	2 077,0	2 056,1

Source: Derived from unpublished data provided by the Directorate of Agricultural Economic Trends (1987)

TABLE 5 - Backward linkages of the maize industry at constant 1985 prices

Sector	Year			
	1985	1981	1978	1975
	R million			
Agriculture and forestry	69,5	60,9	60,3	56,1
Fertilisers and pests	321,8	407,6	270,3	265,1
Chemical and petrol	182,0	183,3	97,0	79,6
Rubber products	12,9	15,0	10,9	9,2
Agricultural equipment	45,1	52,7	35,1	
Motor vehicle spares	31,3	34,6	30,5	48,3
Trade and repairs	129,4	162,0	120,8	82,7
Transport and storage	58,8	77,4	50,1	48,0
Other	39,6	20,6	35,2	44,6
Intermediate inputs	890,5	1 014,1	714,8	668,7
Employee remuneration	127,7	186,6	174,3	227,7
Gross operating surplus	527,2	1 662,3	1 128,4	1 195,1
Indirect taxation	6,9	20,2	21,3	6,5
Total inputs	1 597,3	2 899,7	2 077,0	2 056,1

Source: Derived from unpublished data provided by the Directorate of Agricultural Economic Trends (1987)

prices are shown in Tables 4 and 5 respectively.

Tables 4 and 5 clearly show that the drought experienced since 1982 had an adverse effect on both the maize industry's demand for inputs and the final demand. Exports and the gross operating surplus were the hardest hit.

Although these forward and backward linkages of the maize industry may not have had a major share in the secondary and tertiary sectors in the RSA as a whole, their influence should nevertheless be taken into account. For example, the total inputs/outputs of the maize industry as a percentage of those for agriculture as a whole were 14,7, 20,6, 17,2 and 16,0 per cent in 1985, 1981, 1978 and 1975 respectively.

CONTRIBUTION TO THE GROSS DOMESTIC PRODUCT (GDP)

The contribution of the maize industry to the GDP of the RSA is shown in Table 6 at prevailing prices.

TABLE 6 - GDP of the maize industry at prevailing prices, 1975-1985

Year	GDP			Maize as a % of total economy	Maize as a % of total agricul- tural sector
	Total SA economy	Total agricultu- ral sector	Maize in- dustry		
	R million				
1975	25 864	2 129	351	1,4	16,5
1976	28 996	2 237	304	1,0	13,6
1977	31 983	2 532	447	1,4	17,7
1978	36 517	2 722	455	1,2	16,7
1979	43 221	2 885	452	1,0	15,7
1980	57 963	4 035	814	1,4	20,2
1981	65 909	4 746	994	1,5	20,9
1982	73 357	4 571	522	0,7	11,4
1983	82 849	3 668	23	0,1	0,6
1984	97 369	5 093	288	0,3	5,7
1985	109 604	5 844	572	0,5	9,8

Source: Derived from unpublished data supplied by the Directorate of Agricultural Economic Trends (1987)

Table 6 again emphasises the adverse effect of the drought experienced since 1982. However, the relatively small contribution of the maize industry to the GDP of the RSA does not reflect the actual role of the industry in terms of food production, exports and job opportunities, which was discussed above.

IMPACT OF CHANGE WITHIN THE MAIZE INDUSTRY ON THE ECONOMY AS A WHOLE

Introduction

Natural disasters (drought, cold, hail), changes in demand patterns, technology and general economic and agricultural policy affect the maize industry and therefore also the total national economy through its linkages with the agricultural sector (Van Zyl, Nel & Groenewald, 1987). The aim of this section is to quantify the impact of possible changes within the maize industry on the remainder of the economy. These changes may be the result of any of the above-mentioned factors and could therefore imply an increase or a decrease. Production changes, price changes and sectoral multipliers are discussed. After that two scenarios where maize is scaled down and replaced by beef cattle and woolled sheep respectively, are sketched and analysed.

Input-output analysis (Leontief, 1936; Lombard & Stadler, 1978; Yan, 1969) provides a detailed picture of the economic structure of a country; it can also be used to quantify important economic relationships in such a way that they are compatible with macro-analysis by means of economic models. Because input-output analyses are eminently suited to analyses of this type they were also used in this study to determine the impact of change in maize production and maize prices. The formal mathematical form and certain applications, assumptions and restrictions of the input-output table have already been comprehensively discussed (Van Zyl *et al.*, 1987) and will not be discussed in detail again at this point. It is important, however, to note that all results are subject to such assumptions and limitations and therefore have to be interpreted in this context.

TABLE 7 - Impact (direct and total) of a 10 per cent change in production in the maize industry on the South African economy according to the production structures of 1975, 1978, 1981 and 1985

Sector	1985		1981		1978		1975	
	Direct impact	Total impact	Direct impact	Total impact	Direct impact	Total impact	Direct impact	Total impact
		%		%		%		%
Maize industry	10,00	10,46	10,00	10,22	10,00	10,13	10,00	10,28
Remainder of agriculture	-	0,01	-	0,01	-	0,01	-	0,01
Mining (excluding gold and coal)	-	0,26	-	0,18	-	0,19	-	0,22
Fertilisers and pesticides	-	2,57	-	1,24	-	1,52	-	1,60
Agricultural machinery	-	1,48	-	0,61	-	1,20	-	1,10
Motor vehicles	-	0,14	-	0,06	-	0,10	-	0,06
Transport (railways excluded)	-	0,11	-	0,12	-	0,09	-	0,09
Wholesale and retail trade	-	0,17	-	0,11	-	0,15	-	0,12
Transport (railways) and storage	-	0,13	-	0,09	-	0,09	-	0,10
Other sectors	-	<0,10	-	<0,09	-	<0,09	-	<0,09
Total economy	0,10	0,22	0,09	0,17	0,12	0,21	0,12	0,22

Results

Production changes

In order to determine the effect of production changes within the maize industry on the economy as a whole and on its subsectors, the output of the maize industry was changed by 10 per cent. This change was then simulated throughout the economic system (based on the production structure in a specific year). The results are given in Table 7. (The direct impact indicates the first round change, and the overall impact also includes the multiplier effect).

Table 7 shows that the percentage impact of a 10 per cent change in maize production on the South African economy and its subsectors would at first sight appear to be very small. However, a change of this kind would be relatively larger in absolute value, especially if one takes into account that the total GDP of the RSA amounted to R109 604 million in 1985.

Given the linearity of the model (Harrington, Schluter & O'Brien, 1986), it may be calculated from Table 7 that the impact of the 1983 drought (with a decrease in maize production of 72,2 per cent as against production in 1981) on the economy as a whole as represented by the 1981 production structure was as follows:

- Direct decrease in total production: 6,50%
- Total decrease in total production: 12,27%

The extent of the production change (72,2 per cent) could however result in a linear model overestimating changes to the rest of the economy (Yan, 1969; Harrington *et al.*, 1986). Furthermore, the model only shows the eventual impact; in practice it would take a number of years before this was felt.

It is also important to note that, excluding the maize industry, the fertiliser and pesticide sectors and the agricultural mechanisation sector showed the biggest changes in response to changes in maize production. The strong forward and backward linkages of the maize industry with other sectors in the South African economy is also confirmed by the total impact, which is about twice as great as the direct impact on the economy as a whole.

Price changes

The effect of a price change in the maize industry on prices in other sectors of the economy was determined by changing maize prices in the input-output table by 10 per cent and simulating this change throughout the economic system. In this way the effect of maize price changes on inflation and on the prices of other individual sectors of the economy was determined. Both first round and multiplier effects were calculated. The results are shown in Table 8.

It is apparent from Table 8 that prices in the grain and stock feed processing industry would be most affected by changes in maize prices. Another interesting aspect is that there would be an eventual change of only about 0,3 per cent in consumer prices if the maize price were to change by 10 per cent. This change would not take place immediately - it would take a while for it to come into effect.

Sectoral multipliers

The consequences of policy that affects the levels of capital, employment, income and final demand in a sector may be evaluated by the calculation and utilisation of sectoral multipliers (Mullins & Scheepers, 1980).

Van Zyl *et al.* (1987) have already shown that according to the 1985 production structure agriculture has the biggest employment/production multiplier of a series of selected sectors, whereas the income/production multiplier is the second lowest. This indicates that a production increase in agriculture creates the most employment opportunities throughout the economy when production increases, but that such an increase in production results in a relatively small increase in income. Van Zyl *et al.* (1987) also came to the conclusion that, viewed in the light of the relative scarcity of capital in the RSA, and especially the high priority that employment should receive in the economic development policy, the agricultural sector

will still be expected in the foreseeable future to make important contributions to employment. In view of this finding it is therefore important that the maize industry's relative position within agriculture as a whole should be analysed.

Table 9 shows the relevant sectoral multipliers for agriculture as a whole, for the maize industry, for the meat industry and for the woolled sheep industry respectively according to the 1978, 1981 and 1985 production structures.

It appears from Table 9 that the maize industry has experienced a sharp decline in the Δ income/ Δ production and Δ income/ Δ capital multipliers since 1981. The result of this is that both the beef cattle and the woolled sheep industries and agriculture as a whole will show a bigger income per additional unit of capital invested than the maize industry (according to the 1985 production structure). However, the maize industry creates more job opportunities per additional capital invested than any of the selected sectors. If employment is a policy goal one could fruitfully look to the maize industry. Additional capital investment in this industry would render the best results relative to the other selected industries, with regard to employment throughout the economy.

Scenarios

Current problems in the maize industry make it necessary for the industry to undergo sweeping structural changes (Viljoen, 1987). Such changes in the maize industry will necessarily also have an effect on the rest of the agricultural sector and on the economy of the RSA as a whole. The effect of structural changes in the maize industry on other sectors of the economy can be determined with the aid of the respective multipliers and input-output tables.

In this section the effect of structural changes in the maize industry will be sketched on the basis of two hypothetical scenarios. In both scenarios it is accepted that maize production will be reduced by 25

TABLE 8 - The impact of a price change of 10 per cent in the maize industry on prices in selected individual sectors, the production price and the consumer price

Sector	Impact ¹	1985		Impact ¹	1981		Impact ¹	1978		Impact ¹	1975	
		Sectors ²	Household ³		Sectors ²	Household ³		Sectors ²	Household ³		Sectors ²	Household ³
		%			%			%			%	
Maize industry	10,00	10,45	10,54	10,00	10,21	10,31	10,00	10,30	10,41	10,00	10,28	10,38
Remainder of agriculture	-	0,23	0,30	-	0,29	0,40	-	0,32	0,44	-	0,28	0,40
Meat, dairy and fish processing	-	0,17	0,27	-	0,21	0,34	-	0,26	0,41	-	0,22	0,37
Grain and stock feed processing	-	2,10	2,20	-	2,02	2,14	-	2,77	2,19	-	2,69	2,89
Other food processing	-	0,43	0,57	-	0,40	0,56	-	0,55	0,75	-	0,53	0,72
Liquor industry	-	0,14	0,28	-	0,17	0,34	-	0,25	0,45	-	0,21	0,40
Tobacco products	-	0,03	0,10	-	0,10	0,24	-	0,12	0,28	-	0,12	0,28
Wool-scouring	-	0,06	0,19	-	0,07	0,21	-	0,12	0,29	-	0,11	0,26
Leather and leather products	-	0,05	0,14	-	0,09	0,26	-	0,06	0,27	-	0,06	0,27
Other sectors	-	<0,04	<0,21	-	<0,06	<0,24	-	<0,08	<0,27	-	<0,05	<0,30
Consumer price	0,04	0,18	0,32	0,03	0,17	0,33	0,04	0,19	0,37	0,05	0,19	0,36
Production price	0,01	0,15	0,29	0,00	0,21	0,37	0,01	0,23	0,41	0,01	0,22	0,42

¹Impact = Origin of price change

²Sectors = Price result after each sector has recovered the change

³Household = The same as sector, but includes household

TABLE 9 - Sectoral multipliers (direct + indirect effect) of the agricultural sector and selected subsectors according to the 1978, 1981 and 1985 production structures

Year	Sector	Δ Capital	Δ Employment	Δ Income	Δ Final demand	Δ Income	Δ Employment
		Δ Production (per unit)	Δ Production (labour per R million)	Δ Production (per unit)	Δ Production (per unit)	Δ Capital (per unit)	Δ Capital (labour per R million)
1978	Total agriculture	2,4	244,1	0,90	1,6	0,38	101,7
	Maize industry	2,2	249,8	0,86	1,7	0,39	113,5
	Beef cattle industry	2,4	163,2	0,93	1,5	0,39	68,0
	Woolled sheep industry	2,5	189,7	0,91	1,8	0,36	75,9
1981	Total agriculture	2,1	136,8	0,87	1,6	0,41	65,1
	Maize industry	2,0	145,3	0,78	1,6	0,39	72,7
	Beef cattle industry	2,2	92,6	0,96	1,5	0,43	42,1
	Woolled sheep industry	2,5	105,1	0,90	1,8	0,36	42,0
1985	Total agriculture	2,8	100,9	0,88	1,6	0,31	36,0
	Maize industry	2,6	105,4	0,71	1,7	0,27	40,5
	Beef cattle industry	2,5	59,3	0,95	1,5	0,38	23,7
	Woolled sheep industry	2,8	66,7	0,95	1,8	0,34	23,8

per cent in order to eliminate export losses (a reduction which is advocated by NAMPO at present - Viljoen, 1987). In the *first* scenario the maize fields that have been withdrawn are used for beef cattle production on artificial pastures and in the *second* scenario they are used for woolled sheep production on artificial pastures. A further assumption, namely that beef production and woolled sheep production will increase by 18 and 26 per cent respectively in response to this 25 per cent reduction in maize production, is also made. This estimate appears to be fairly realistic if the agricultural potential of the Highveld Region in terms of dryland crop cultivation and livestock production (Scheepers, Smit & Ludick, 1984) and the present extent of the beef cattle and woolled sheep industries (Directorate of Agricultural Economic Trends, 1986) are taken into account. The overall effect (direct and indirect) is shown in Table 10 (1985 production structure). The increase in beef cattle and woolled sheep production respectively, cannot be effected over a single year. The results shown in Table 10 represent the end result after a number of years.

It is apparent from Table 10 that the hypothetical structural changes would hit the fertiliser and agricultural machinery industries hardest (maize industry excluded). It is also apparent that the grain processors and medicine manufacturers would derive special benefit from such structural changes. The total production of the RSA would drop by 0,15 and 0,42 per cent respectively with scenario 1 and scenario 2. In 1985 a decline of this magnitude would have meant that the GDP would have been R164,4 million and R460,3 million lower respectively.

Conclusion

The percentage contribution of the maize industry to the South African economy is relatively small and is frequently insignificant, especially from the point of view of the maize industry as a market, a supplier of

inputs and its contribution to the GDP. On the other hand the maize industry plays a fairly important role in respect of employment, food production and the earning of foreign exchange.

In view of the above it is logical that the percentage impact of a change in the maize industry on the economy as a whole would appear relatively small. If one takes into account the fact that the total GDP in 1985 was R109 604 million, the impact in absolute terms is relatively larger. Of the individual sectors the fertiliser and farm machinery industries are most affected by such a change. The strong forward and backward linkages of the maize industry with other sectors are confirmed by the

TABLE 10 - Total impact (direct and indirect) of the hypothetical structural changes on production in selected sectors of the South African economy (1985 production structure)

Sector	Scenario 1 Percentage de- crease (total effect)	Scenario 2 Percentage de- crease (total effect)
	%	
Maize industry	21,41	25,58
Beef cattle industry	- 22,02	0,05
Woolled sheep industry	0,15	- 26,03
Remainder of agriculture	- 0,77	- 0,10
Mining (coal and gold excluded)	0,56	0,65
Grain processing	- 3,61	- 0,57
Paper containers	- 0,15	- 0,03
Fertilisers	5,24	6,27
Medicines	- 1,41	- 1,01
Agricultural machinery	2,71	3,69
Wholesale, retail and motor trades	0,04	0,31
Transport and storage	0,11	0,29
Other sectors	<0,15	<0,13
Total	0,15	0,42

total impact of a change in the maize industry on the South African economy as a whole, which is more than twice as great as the direct impact.

A change of 10 per cent in the maize price would result in the consumer prices and producer prices changing by 0,32 and 0,29 per cent respectively (1985 production structure). Of the individual sectors, the grain and stock feed processing industries would be most affected by such a change. If employment is a policy goal, one could fruitfully look to the maize industry. Additional capital investment in the maize industry produces more job opportunities throughout the economy than investment in any of the selected sectors.

If maize production were to be replaced by woolled sheep or beef cattle on artificial pastures the output of the South African economy as a whole would drop. With a 25 per cent decrease the GDP in 1985 would have been R460,3 million and R164,4 million lower, respectively.

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