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**An Evaluation of the Influences on
Price and Production in the Maize
Market following Liberalisation**

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ABSTRACT

In 1996 the maize market was liberalised and the maize marketing board was abolished. This has meant that prices and production decisions now respond to market forces. At the same time there has been a restructuring of agents at different levels of the maize supply chain and there are relatively high levels of concentration. Maize is of particular importance given its nature as a staple for the majority of the population. The paper provides an overview of the maize supply-chain and assesses the evolution of production and distribution arrangements at different levels, from farmers through to maize millers since liberalisation. It assesses concentration at the levels of production, storage and milling of maize. It examines trade flows and the relationships with domestic demand and supply. Based on this, the research evaluates the determinants of prices and assesses possible competition concerns, before making brief recommendations.

1. INTRODUCTION

The last few months have seen food prices in South Africa soar to alarming heights. The food price index rose by 11.4% in December 2001 compared with an increase of only 3% for non-food prices (Naledi, 2002). A case in point is the increase in the price of maize, which has amounted to an astounding 212% in just over one year. If we look at the maize producer price over the past two years, a ton of maize which cost R668 in 2000 would have set you back R2500 in January 2002. More significantly, the producer price increased from R1200 per ton in September 2001 to R2500 in January 2002, amounting to an increase of 108% in just four months. These increases are a cause for concern for a number of reasons. The major concern is the influence price increases have on the plight of the urban and rural poor. It has been estimated that the ultra poor households in South Africa spend about 16% of their monthly income on maize alone (Naledi, 2002). Other concerns that have been raised include the increased possibility of market manipulation as well as collusion within the price setting mechanisms. The issue of speculation and its link to price volatility has also been raised as a concern.

In the past, the maize market was controlled by the Maize Board, which apart from regulating the market also set a uniform maize price. In 1996 the maize market was liberalised and the Maize Board was abolished. One of the most important consequences of the abolition of the Maize Board is that prices are now allowed to fluctuate according to both local and international conditions. Another significant change that has taken place since liberalisation has been the restructuring of the main agents, with each level of the maize supply chain, thereby impacting on the levels of concentration in the market.

The high increase in the level of maize prices experienced in the past few months raises a few questions, the most obvious one being if this price increase has been a fair reflection of normal inflationary factors. If the price increase cannot be explained by the pure economic theory of supply and demand, then what other factors may be influencing price determination and why? Could these factors also be responsible for the highly volatile nature of the maize price? Are these factors all 'above board' or could we be in a situation where the workings of the maize market have been manipulated by individuals or groups of people who are extracting supernormal profits

The main objective of this paper will be to evaluate the forces behind the volatility of price and production levels in the maize market as well as to assess possible competition concerns within the market as a whole. The paper will start by providing an overview of the maize supply-chain from the level of farming through to that of milling. It will then assess how production and distribution arrangements at the different levels have evolved since liberalisation. Furthermore, the paper will examine the nature of trade flows and their relationship with domestic supply and demand in the maize market. Issues of concentration and market power at the levels of production, storage and milling of maize will also be assessed.

2. THEORETICAL UNDERPINNINGS OF THE MAIZE MARKET

In order to be able to analyse the workings of the maize market and draw conclusions from this analysis, we need to build a theoretical framework from which to work. This section will briefly discuss economic theories of price policy, value chain analysis, pareto inferior trade as well as theories of competition. The theory behind the rationale for government marketing policies, which involves issues of elasticity, supply response lags and price volatility, will also be looked at.

2.1 Price Policy, Welfare Effects and Marketing Policy

In general, the analysis of most policies has real and valuation dimensions. Real dimensions involve the need to estimate the physical resources and volume changes which might be associated with a policy intervention. For example, a proposed policy to raise the market price of maize will impact on the volume of maize produced, the quantity sold on the market, the demand by farmers for variable inputs used in maize production as well as the demand by consumers for maize flour. The valuation dimension is concerned with the assessment of social welfare changes. In the case of maize, the price rise will cause a change in the aggregate value for marketed maize as well as for those variable inputs which are purchased. These changes translate to social welfare gains or losses for different participants in the maize market. Farmers will experience a welfare gain from the rise in the price while consumers will experience a welfare loss (Ellis, 1992).

Farm output prices generally have three main functions in an economic system, namely to allocate farm resources, distribute incomes and encourage or retard investment and capital formation in agriculture. The resource allocation function of farm prices can be understood through the use of neoclassical production economics. An increase in the general level of output prices, all things equal, will increase returns to all inputs in production, in turn encouraging higher use of variable inputs, as well as providing higher returns to the fixed inputs of land, capital and family labour. Generally speaking, a change in the relative price level of one output against another will result in substitution between outputs as farmers adjust to the changing relative profitability of different outputs. In terms of income distribution, the implication, especially for staple foods is that high farm prices will increase producer incomes while at the same time, lowering the real incomes of consumers. The investment role of farm output prices is more evident in the long-run. Changes in farm prices relative to those in other sectors will increase or decrease the rate of return to capital in agriculture and either encourage or discourage investment in various ways (Ellis, 1992).

A number of different criteria may be used to determine price levels. One of these which is relevant to our research is the border price criterion. The border price criterion is based on the idea that world prices represent a country's short run opportunity cost. Based on this premise, it is then possible to social welfare and economic efficiency effects (Ellis, 1992).

The term *border price* is generally used to define the world price for exports and imports converted into domestic currency at the official exchange rate. This border

price usually needs to be adjusted in order to make it comparable to domestic prices. By subtracting marketing and transport costs from the border price, you obtain *export parity* and *import parity* prices for export and import commodities respectively. Export parity and import parity prices provide an unambiguous guide to opportunity costs provided that the commodity is definitively either in excess supply or excess demand. If the product is in excess supply, then the export parity price represents the opportunity cost of an additional unit being supplied to the local market. Similarly, if the product is in excess demand, the import parity price represents the opportunity cost of an additional unit being supplied to the local market (Ellis, 1992).

Problems arise however when the commodity is in self-sufficient supply or when, as in the case of crops, there may be exports in good years and imports in bad years. In this case the gap between import parity and export parity prices may be very large, resulting in world prices not being able to provide a precise guide for appropriate domestic price levels. It is important to note that one of the factors that are able to change this disparity between export parity and import parity prices is changes in trade patterns (Ellis, 1992).

It is not essential to strictly adhere to the short run level of world market prices. World prices for many agricultural commodities are inherently volatile and such price instability, especially for staple food grains, would not be optimal for producers and consumers. It would also have a destabilising influence on the general macro-economy. In practice the border price criterion provides more of a point of reference for determining appropriate price levels rather than a definitive guide to such price levels. However, when government controls such as taxes, subsidies, price-floors and fixed prices are abandoned, the border prices become the main arbiters of the domestic price level, and a consequence of this is that the destabilising effects of world price fluctuations continuously impact on the domestic economy (Ellis, 1992).

Farm products operating in a free market are notorious for their volatile prices. This volatility in price changes occurs mainly because of two factors. The first is the variability in natural conditions such as the weather, diseases and pests. The second reason is the lag between planting decisions and the harvesting of the crop. As a result of this natural instability of agricultural markets, government intervention is regularly practised in both industrialised and developing countries (Ellis, 1992).

Another rationale for government intervention is to stabilise farm-gate prices. Private traders often take advantage of initial food shortages by buying up grain and hoarding it for speculative purposes. This behaviour results in the exacerbation of food shortages as well as an increase in price instability. State intervention in the form of floor and ceiling prices as well as buffer stocks is designed to limit any instability that might occur as a result of the behaviour of private traders. The extent to which the state is able to intervene also has important implications for national food security in that private traders are not able to hoard food for the purpose of market speculation (Ellis, 1992).

Government marketing policies have a number of objectives, some of which are relevant to the maize market and will be briefly discussed. One of the rationales for marketing policies is that they protect both farmers and consumers from rent-seeking

traders. The logic behind this is that under a system of private trade, there will always be the 'greedy' middle man who will use speculation to extract profits using his position as the link between scattered and ill-informed producers and price-taking consumers. It follows that the marketing margin (the difference between the price consumers pay for a commodity and the price producers sell it for) will be smaller in a state-run marketing system than under private trade (Ellis, 1992).

It can be shown that in the case where risk markets are incomplete, free trade may turn out to be Pareto inferior to no trade (Newbery and Stiglitz, 1984). This model starts off by assuming that there are two countries, both of which grow a risky crop as well as a safe crop. In this case, a risky crop is one that is more affected by the weather. In the absence of trade, the price increases whenever output falls, and these price variations provide perfect income insurance for farmers. In the presence of free trade, the variations in the output of the risky crop offset each other resulting in a stabilised price which leads to increased risk for farmers. The model assumes that consumers have unit price elasticity and spend a constant amount on both crops. Keeping this in mind, we can see that when trading between the two countries is opened up, the mean income obtained by the farmers will remain constant due to the consumer characteristic of unit price elasticity, while the riskiness they face will increase. From this point of view we can see that the welfare of the farmers decreases in the presence of free trade.

Looking at it from the point of view of the consumer, we can see that they also experience a loss of welfare. As a result of the increased riskiness of the risky crop under free trade, farmers shift their production to the safe crop, thereby inducing an increase in the average price of the risky crop. This increase in the price contributes in making consumers worse off under free trade than under autarky. Since in this model, the end result is that both producers and consumers are worse off under free trade, it follows that free trade is Pareto inferior to autarky. This result however, is quite general and relies on a number of critical assumptions. One of these assumptions is that neither producers nor consumers can buy adequate insurance for the risk which is, in this case, brought about by bad weather negatively affecting the production of the risky crop (Newbery and Stiglitz, 1984).

An ideal way to counter this Pareto inferior trade would be to allow free trade but also to introduce complete insurance against the weather for producers of the risky good. Although complete insurance would eliminate this Pareto inferiority, in practice it is not likely to be provided due to reasons of moral hazard under asymmetric information. The Newbery-Stiglitz model is relevant to issues in the maize market because it highlights the fact that, due to maize being a risky crop, free trade may not be the most efficient way of managing the maize market (Heffernan and Sinclair, 1990).

There are however, cases where high trade restrictions may have adverse effects on the economy of a country. An example of this is Ghana where high taxes were imposed on its main export crop, cocoa. These high taxes discouraged the production of cocoa while the production of other crops was negatively affected by the unfavourable exchange rate. Ghana's neighbour, the Ivory Coast on the other hand chose to follow a more open trade strategy with the result that they were able to

increase their share in cocoa exports as well as develop new primary exports (Meier, 1995).

2.2 Value Chain Analysis

To sufficiently understand the processes that take place in the maize market, we need to differentiate between the different levels in the production of maize, from farming right through to the milling of maize meal. The economic theory underlying this process of the production of maize is that of the value chain. In its most simple definition, a value chain describes the range of activities that need to be undertaken to bring a product or service from inception, through various levels of production, to final use and disposal by consumers. This definition focuses on the inter-linkages between the different stages in the supply chain of a product. This concept of the value chain is complemented by that of the value system which basically refers to the inter-links between various value chains. One of the reasons why value chain analysis is so important, especially with regards to the working of the South African maize market, is that it offers an explanation of the distribution of benefits that accrue to those participating in the global economy. The importance of this is that it helps in identifying policies which can be implemented by individual producers as well as countries, in order to increase their gains from participating in the global economy (Kaplinsky and Morris, 2000).

Another aspect of value chain analysis which is relevant to the evaluation of the maize market is that of governance. Governance in this context refers to ensuring that interactions between firms along a value chain show some reflection of organisation rather than being simply random. Power asymmetry is central to the value chain in that there are key actors in the chain who assume responsibility for the inter-firm division of labour as well as for the capacities of particular participants to upgrade their activities (Kaplinsky and Morris, 2000). Building on this concept of governance, a distinction can be made between two types of value chains. In buyer-driven chains, which are characteristic of labour-intensive industries, the critical governing role is played by a buyer. Producer-driven chains on the other hand, refer to chains where the key producers in a chain (who generally command the vital technologies) play the role of co-ordinating the various links within the chain (Kaplinsky, 2000). Raikes and Gibbon (2000) contend that most agricultural goods, especially food are becoming increasingly buyer-dominated, characterised by horizontal concentration in trading as well as a shift in control downstream from wholesaling to retail.

2.3 Competition Policy

A substantial part of this paper will be devoted to looking at issues of competition within the maize market, especially in terms of concentration as well as market dominance. It will therefore be helpful to firstly discuss some of the theory behind competition.

One of the main indicators of the level of competition in an industry or market is the presence or absence of dominant firms. According to Vickers and Hay (1987), market dominance defines the power a single firm or group of firms has over the supply of goods and services in one or more markets. The traditional analysis of how firms

exercise their market dominance focuses on the pricing and output decisions a dominant firm makes in a homogenous good market. This analysis shows how a profit-maximising firm with market power will restrict the amount of output produced in order to be able to charge a price above marginal cost. As a result of this there is a distortion in the resource allocation, and welfare loss which is usually measured in terms of consumer and producer surplus, occurs (Vickers and Hay, 1987).

Firms can only exercise market power once they have acquired it. It is therefore important to look at how this market power is achieved in the first place. There are a variety of ways to acquire market power and this paper will concentrate on a few of them. In the first instance, market power can be granted by a public authority, as is common for firms in the utility industries or those with natural monopolies. Firms such as these are often in public ownership and generally operate under economic, financial and other criteria which are not as stringent as that of private firms. Market power can also be obtained through collusion, looked at as multifirm dominance. This dominance can be gained through the explicit or implicit co-operation between firms and more specifically through the co-ordination of their strategies and the free flow of information between these firms. Co-operation between firms is generally deemed to be acceptable if it is for the sole purpose of research and development, although firms often use issues of risk reduction and forward planning as other acceptable motives for collusion. Another way of obtaining market power is by predatory behaviour. Predatory behaviour is often carried out by firms already in the market with the aim of driving existing competitors from the market, but more importantly of deterring potential rivals from entering the market (Vickers and Hay, 1987).

Apart from market dominance, the extent to which there is concentration in the market is significant for competition analysis. Concentration is generally defined as the combined market share of the leading firms, usually based on the top four firms. What concentration really does is show the degree of oligopoly in a market. Oligopolists in a specific market relate to each other in different way. They will either co-ordinate their activities closely so as to form a virtual monopoly, compete fiercely or fluctuate somewhere in the middle. It is often argued that depending on the behaviour of oligopolists, their combined market share can simply become a diluted version of the dominance that a monopolist exerts. Although the calculation of concentration has had limited success in determining actual profit ratios, it still remains useful as a means of conveying the main shape of an industry (Shepherd, 1997).

The theories that have been introduced in this section all play an important part in understanding how the South African maize market works. After a brief overview of the South African supply chain in section 3, we draw on the theories to interpret the recent South African experience (in section 4 to 9).

3. OVERVIEW OF THE MAIZE SUPPLY CHAIN IN SOUTH AFRICA

Extensive work has been done on the maize market in South Africa and this section will look at and draw heavily from the recent work by Vink and Kirsten (2002), Naledi (2002), Amin and Bernstein (1996) as well as by Borat and Poswell (2002). This review of existing literature will serve in providing an overview of the maize supply chain as well as recent trends in the production and pricing of maize in South Africa.

There are two types of maize variations available: white maize and yellow maize. In South Africa, most consumers prefer white maize for eating purposes while yellow maize is mostly used in chicken and livestock feed. While the international market for yellow maize is quite large as most of the largest maize exporting countries export this variety, the market for white maize is generally thin as most countries use the maize they produce for their own domestic consumption. Maize can also be categorised according to its quality level. There are three gradings used for maize: special, super and sifted, with special maize being of the highest quality and sifted maize of the lowest quality.

In South Africa, maize is mostly farmed in Gauteng, Mpumalanga, North-West Province and the Free State. The silo and milling companies also tend to be situated in these areas.

The maize market generally operates on four levels. The first level is that of the maize farmers who plant the crop, harvest it and then sell it to the silo owners. Maize is then kept in the silos until it is distributed to the milling companies who then sell the maize meal to retailers. The exact number of maize farmers in South Africa is unknown. However, it is generally accepted that there has been a decline in the number of commercial farmers in recent years with smaller farmers going under (Naledi, 2002). This decline, which is related to a corresponding decrease in agricultural investment, has caused concentration among maize farmers to increase.

There are 235 silos in South Africa concentrated in the hands of 22 owners. Most of these silos are owned by the former grain co-operatives that have evolved into large, diversified companies. There are three main companies who between them control 72 percent of the market (Naledi, 2002). These are OTK, NWK and the Senwes Group (SWK).

The main milling companies in South Africa are Tiger Oats Limited, Premier Group Limited, Pride Milling Company and NTK. Other firms that own a large number of milling companies are OTK and Senwes. Millers are to a large extent organised under the National Chamber of Milling.

Since the Marketing of Agricultural Products Act was passed in 1996, grain has been traded in a free market where prices are set according to forces of supply and demand. The South African Futures Exchange (SAFEX), which was established in 1996, has an Agricultural Markets Division that sets the benchmark for spot prices that traders

can ask for or offer in the daily trading of maize. Traders can also invest in futures contracts or options based on their expectation of future maize prices. These investment instruments are mainly used to hedge or insure against price risk. SAFEX prices are generally determined through the views of different market participants about the future direction of the maize price.

There are a number of factors of supply and demand that have an effect on futures prices. These include short-term conditions such as the weather as well as long-term factors, which may include technology, government policy, trade agreements as well as changes in consumer preferences. As mentioned earlier the border price criterion, more commonly known as the import/export parity calculation is used to calculate the range of prices at which farmers can sell their crop locally or internationally. The import parity price in this case will be the price that grain millers will pay to buy imported maize, while the export parity price will be the price that the farmer can get if he sells his crop on the world market. The domestic price of maize will fluctuate between these two levels with the import parity price being the maximum point and the export parity price being the minimum point. *The actual level of the domestic price will however depend on the local supply and demand conditions.* In cases of a domestic maize shortage, prices will tend upwards towards import parity while they will fall towards export parity when there is a domestic surplus of maize.

4. TRADE FLOWS AND THE RELATIONSHIP WITH SUPPLY AND DEMAND

This section examines what has happened to the supply and demand of maize in the local market under conditions of free trade and slightly more restrictive conditions. The reaction of local supply and demand to trade flows is important in helping to evaluate the experience of maize markets under different trade conditions. With regard to the maize market, it follows that trade flows that least affect price stability will be the most acceptable to operate under.

Trade restrictions can be applied to the price of maize or the quantity of maize to be traded with the effect of driving a wedge between world and domestic prices. In the case of imports, restrictions can be imposed either through introducing import tax on foreign maize or through import quotas limiting the amount of maize that can be imported. Both these measures will result in the domestic price of maize being lower than the world price. Likewise, similar restrictions on the export of maize produced domestically will also result in lower domestic maize prices relative to world prices (Meier, 1995). In cases where extreme forms of trade restrictions exist, the market will virtually be closed to international trade. The demand for maize will essentially stay constant as it is assumed that consumer preferences are fairly stable over time. The supply of maize will be provided solely by domestic producers. Although this import substitution strategy might work for other commodities, it presents some problems when it comes to the maize market. Maize is essentially a risky crop and a shortage in supply due to drought for example, could have serious consequences for issues of food security.

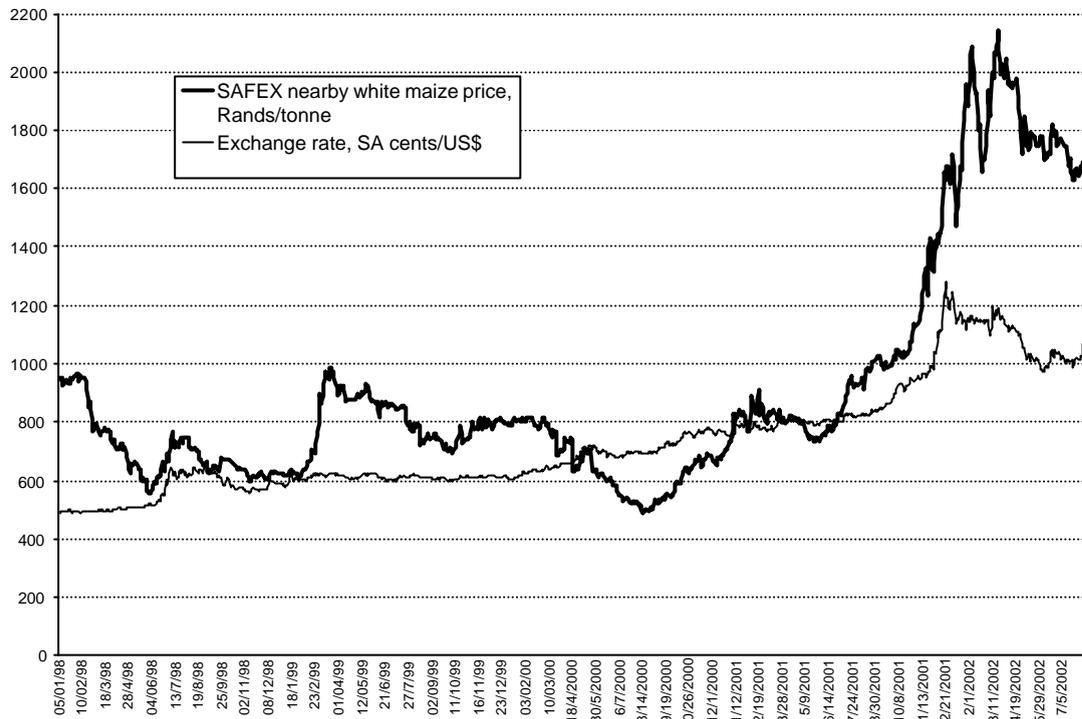
In an open market with little or no restrictions farmers, traders and processors will behave as rational players in a competitive market. They will therefore bid their prices according to the prevailing import and export parity prices. One result of operating in a free market is that the total demand for a commodity will not only consist of local demand but also of export demand from importing countries. In the case of maize in South Africa these countries will include Zambia, Malawi and Zimbabwe. When these countries experience shortages, they will in turn demand more maize from South Africa. This will have the effect of shifting the demand curve to the right, putting upward pressure on the maize price. With the introduction of transport and tariff costs when maize is exported to the Southern African region, the gap between export and import parity prices will be large. At the point where this regional demand is higher than local supply, additional maize has to be imported from outside the region. The level of the import parity price will determine the price this maize will be bought for at that moment (Vink and Kirsten, 2002). It is clear to see therefore from this free trade scenario that if trade flows are unrestricted the domestic market price is opened up to volatility caused by shortages or surpluses in regional markets.

5. DETERMINING MAIZE PRICES AND PRODUCTION LEVELS

Maize prices have been highly volatile (figure 1) with changes of more than 50% in a few months not uncommon. Although volatile, the maize prices from 1998 until around December 2001 are all within a range of between R500 and R1000 a ton. In December 2001 however the maize price shot up to levels of R2200 a ton within five months. There are a few factors that could explain this increase. These include the world price of maize, the exchange rate and the relative size of the domestic maize crop as well as the availability of maize in the Southern African region. These factors will now be evaluated.

As can be seen in Figure 1, there has been a relationship between the maize price and the rand-dollar exchange rate. In mid-1998 and again at the end of 2001, sharp depreciation has coincided with maize price increases. Work by Vink and Kirsten (2002) on the elasticity of maize prices in relation to the current real exchange rate finds that a 1% increase in the exchange rate will result in the real white maize price, as determined by SAFEX increasing by 1.16%. This high elasticity could however have been exacerbated by the fact that the maize market is more sensitive to exchange rate depreciation when there is a crop shortage in the region, as was the case in the 2001/2002 season (Vink and Kirsten, 2002).

Figure 1: South African white maize prices and US\$ exchange rate



Source: South African Futures Exchange

Crop shortages caused mainly by drought are another factor that may cause a hike in the price of maize. Supply contractions, given relatively constant demand will lead to higher prices, especially if both demand and supply are relatively price inelastic. However, production has been relatively stable since 1995/96, when South Africa suffered a serious drought (Table 1). And, looking at the trade flows, the last time South Africa experienced a trade deficit in maize was in the 1995/96 season. Despite some reduction in supply in 2000/2001, South Africa maintained a sizeable trade surplus in 2000/2001 and again in 2001/2002. A deficit in the trade flow therefore can not be used as a reason to explain the increase in the price of maize.

Table 1: Maize Production and Trade Figures (tonnes)

Period	Total Production	SA-exports white maize	SA-imports white maize	Net trade white maize	Total-SA maize exports	Total-SA maize imports	Net trade total maize
1994/95	4 836 000	1 889 000	0	1 889 000	4 629 000	0	4 629 000
1995/96	9 694 000	332 000	747 000	- 415 000	88 000	1 119 000	- 232 000
1996/97	9 582 000	1 394 000	88 000	1 306 000	2 526 000	139 000	238 000
1997/98	7 082 000	1 119 000	5 000	1 114 000	1 921 000	109 000	1 812 000
1998/1999	6 716 000	1 108 000	0	1 108 000	1 388 000	98 000	1 290 000
1999/00	10 142 000	594 000	0	594 000	652 000	569 000	83 000
2000/01	7 225 000	861 000	0	861 000	1 488 000	0	1 488 000
2001/02		812 000	47 000	765 000	1 335 000	395 000	940 000

Source: South African Grain Information Services

5.1 Export and Import Parity Prices

There is a very significant difference between export and import parity prices. For example, in August 2002, the import parity price was R 1665.59 while the export parity price was R 994.23 (Tables 2 and 3). This implies a substantial difference of R671.26.

Table 2: Export-parity price calculation

Futures prices	USA No3 Maize (Gulf) (9 August 2002)
FOB Gulf value (\$/t)	\$105.78
Plus: US\$10 (\$/t)*	\$10.00
SA fob price (\$/t)	\$115.78
Exchange rate (R/US\$)	10.4275
USA No3Y Maize (fob) Gulf (R/t)	R1207.3
<i>Marketing costs:</i>	
Financing costs (@ 16%) (R/t)	R15.88
Transport costs: Randfontein to Durban (R/t)	R135
Loading costs: Durban Harbour (R/t)	R62.19
Export realisation (R/t)	R994.23

Source: South African Grain Information Services

Table 3: Import-parity price calculation

Futures prices	USA No3 Maize (Gulf) (9 August 2002)
FOB Gulf value (\$/t)	\$105.78
Freight rate (\$/t)	\$19
Insurance (\$/t)	\$0.32
Total cost , ins., freight (\$/t)	\$125.1
Converted to R/t	R1304.48
Financing costs (R/t) (@16%)	R17.15
Discharging costs: Durban (R/t)	R71.56
Import tariff (2001/05/18) (R/t)	R137.4
Total import cost (Durban) (R/t)	R1530.59
Transport costs to Randfontein (R/t)	R135
Delivered price (R/t)	R1665.59

Source: South African Grain Information Service

South African prices and export parity prices have been closely linked from 1997 until 2000 (see Bhorat and Poswell, 2002). The rise in the price of South African maize has been due to a shift from export parity in 2000 to levels greater than import parity price at the end of 2001 (Figure 2).

Figure 2: Comparison of SAFEX price with Import and Export Parity Prices



Source: South African Grain Information Services

If it can be shown that the maize price at one point was trading at or above the import parity price, then this would imply that those involved at the silo level of the supply chain were able to keep this amount of over R600 per ton as economic profit. In December 2001 we see that the price of maize is higher than the import parity price. According to the border price criterion which was explained in the literature review, the domestic price of a commodity should always be between the export and import parity price. This indicates that there are deviations in the pricing of maize, which cannot be explained away by the normal factors that influence maize prices. This provides a very strong case for the suspicion that collusion is taking place in some levels of the maize market.

6. CONCENTRATION AND MARKET POWER IN THE MAIZE MARKET

6.1 Concentration in Different Levels of the Supply Chain

In the overview of the supply chain, we saw that the maize market is highly concentrated, especially at the silo level. As mentioned before, concentration levels are important in that they are an indicator of the degree of oligopoly in the market and also because they may serve as a sign of anti-competitive practices. This section will cover aspects of concentration at the level of farms, millers as well as silos.

6.1.1 Farmers

Since the deregulation of the maize market, there has been a substantial decline in the number of farmers. Although the exact number of farmers involved in maize is not

available, a reasonable estimate can be made by taking into account the fact that the Department of Agriculture sends out 3800 crop estimate questionnaires to maize farmers. As mentioned beforehand, from the mid-1990s there has been a substantial decline in the number of operational farms. According to Bernstein (1996), the total number of white-owned farms declined from approximately 104 000 in 1960 to 70 000 in the early 1980s and 59 000 in the late 1980s. There was a stage in the mid-1980s where forty percent of gross farm income was generated by only 6 percent of white farms. This increasing concentration is mainly associated with the growing differentiation in commercial farming, which has resulted in larger farms becoming highly organized and successful at the expense of smaller farmers, which have gone under. The result of all of this has been that since the 1980s the concentration of farmers in the maize market has increased. This has important implications in terms of the bargaining power these farmers hold when it comes to negotiating prices for their crops (Naledi, 2002)

6.1.2 Silo Owners

Ownership in the silo sector is split among 22 owners. The top three companies who between themselves control 72% of the market are OTK, NWK and the Senwes Group (SWK).

OTK has been in operation for 77 years. It was originally known as the Oostelike Traansvaalse Landbou Ko-operatiewe Vereeniging and was established with the main aim of handling grain produced by its members. The company listed on the Johannesburg Stock Exchange in November 1996 under the name OTK Holdings Limited. This is a vertically integrated group, which undertakes activities in the three main sectors:

- 1) Agricultural produce handling
- 2) Storage
- 3) Agricultural produce processing

OTK mainly operates in Mpumalanga, KwaZulu-Natal, Gauteng and Limpopo (OTK, 2002). OTK currently controls 28 percent of the market (Naledi, 2002).

De Centraal Westelike Co-operatiewe Landbou Vereeniging was founded in Klerksdorp in 1909. With the deregulation of the maize market, the co-operative changed its business form and started operating as Senwes Limited in April 1997. Senwes' main activities include grain industry, retail and mechanization sectors as well as interests in other agri-industries. They mainly operate the Free State, North West, Northern Cape and Gauteng Provinces (Senwes, 2002). Senwes currently controls 30 percent of the market (Naledi, 2002).

NWK Grain Services owns 42 depots situated throughout their service area, which is mainly the North-West Province. These depots have a grain silo capacity of 2.7 million tones. The services that NWK offer are the handling and storage of grain, the sorting of grain, the issuing of silo certificates as well as the sale grain bags (NWK, 2002). NWK controls 14 percent of the market (Naledi, 2002).

6.1.3 Milling Companies

The main owners of milling companies in South Africa are Tiger Oats Limited, Premier Group Limited, Pride Milling Company and NTK (Mc Gregor, 2002). Other firms that own a large number of milling companies are OTK and Senwes. There are 17 companies that have membership in the National Chamber of Milling, which represents the main milling companies (National Chamber of Milling, 2002). According to the 1996 Manufacturing Census released by StatSA the concentration ratio of the largest four firms is 42.5% of the total market. In addition, Bernstein (1996) reports that according to Dor (1992), Premier Milling accounted for 20% of all maize meal while Tiger Foods accounted for 25% of maize meal and 50% of animal feeds. It is not clear whether these figures are still accurate today, ten years down the line.

There seems to be a high degree of concentration in all the levels of the maize market, but more especially when it comes to silo ownership. As mentioned before, grain silo ownership is highly concentrated with three companies, OTK, NTK and Senwes owning 72 percent of all silos. Due to the decline in agricultural investment as well as the increased commercialization of farming the market is starting to consist of fewer and fewer large farmers who are becoming increasingly profitable. Milling companies on average are not as concentrated as silos and tend to derive most of their profits from the simultaneous milling of wheat. In other words, milling maize tends to be a 'high volume- low profit' business while wheat milling is a 'low volume-high profit' business (Naledi, 2002).

These high levels of concentration, especially at the level of the silos raise concerns of excessive market power in the maize market. Of more concern however is the degree of vertical integration that is taking place in the market. The amount of vertical integration that takes place is also another potential issue in terms of anti-competitiveness and will be discussed at a later stage.

6.2 The Extent of Market Power in the Maize Market

The South African Competition Act of 1998 defines market power as "the power of a firm to control prices, to exclude competition or to behave to an appreciable extent independently of its competitors, customers or suppliers (Competition Act, Act no. 89 of 1998, 1. (1). (Xiii)). To determine whether any firms hold market power in the maize market, we therefore have to see if any of them contain characteristics described in the definition.

A recent trend in the agricultural sector has been increasing economies of scale. As has been mentioned before, the number of farms in South Africa has been drastically declining since the early 1980s. At the same time, the amount of silo owners has also been declining. The buying up of small farms and silos has led to a situation where oligopoly conditions exist in the maize market. The existence of oligopolists is usually a precondition for collusion and we can see that this may be the case in the South African maize market.

A recent development in the maize market has been the organizing of producers into associations that reflect their interests. Examples of these are GrainSA for farmers and the South African Chamber of Milling for millers (Naledi, 2002). Although issues of research and development may be dealt with in such interest groups, it is quite reasonable to expect that there is a lot of other information exchanged between members. In an industry such as this, where for example all milling companies stand to benefit from the farmers obtaining low prices for their crop, there is also a motive for members of interest groups to come together and devise strategies to maximize their revenue potential, either by making sure that prices stay down or are pushed up.

6.2.1 Vertical Integration

The big 3 silo owners, especially the three market leaders, obviously have a lot of market power; due to the high concentration in the market and the level of vertical integration that takes place. Vertical integration basically describes a situation where a firm has its interests diversified into related activities. It is basically a linkage between producers and distributors to final consumers. An example of vertical integration in the South African maize market for example, would be the fact that Metro, a large food wholesale company which supplies most black retailers, is owned by Premier Group Limited, one of the corporate giants of milling (Bernstein, 1996). Backward integration into production of the input ensures supplies and reduces the cost of coordinating activities at different stages of production. This puts potential new entrants at a cost disadvantage and increases their sunk costs.

While receiving grain deliveries, handling and storing them as well as distributing them for further use are the main activities of the silo companies, they are also involved in other activities concerning the operation of the maize market. In the past, these companies had the responsibility of distributing Land Bank loans to farmers. These loans were for the purpose of financing the purchase of inputs needed for production – seeds, pesticides, machinery, equipment and fertilizers. Although the Land Bank no longer provides these loans to them, they have secured other sources of finance and still act as creditors to farmers. One of the conditions of these loans is often that farmers have to carry out repayments in the form of crops in lieu of cash. This leads to a situation where the companies who are the main suppliers of production inputs are also the main receivers of the resulting output. Because these silo companies provide inputs to a large number of farmers they are able to purchase these inputs in bulk and therefore save on the input costs. It is debatable how much of the discount is passed on to the farmers and how much is retained by the silo firms for themselves (Amin and Bernstein, 1996). In addition to supplying production inputs, the silo companies, more specifically OTK, NWK and Senwes also own large farms as well as milling companies. For example, in 2002, OTK Holdings owns at least 5 milling companies (Mc Gregor, 2002).

6.2.2 Manipulation of Crop Estimates

The ability to access and manipulate information is an important determinant of how much market power a firm or sub-sector holds. An area of contention in the maize market is the estimation of crop sizes by the Crop Estimates Committee (CEC) (Naledi, 2002). The CEC consists of representatives from the National Department of

Agriculture, Provincial Departments of Agriculture, the Agricultural Research Council (ARC), Statsa, the National Agricultural Marketing Council as well as a private consultant. It sends out questionnaires to a sample of farmers, the results of which are used along with other information to estimate future crop sizes (Agricultural Research Council, 2002). This does not seem to sit well with the National Chamber of Milling (NCM), which recently raised concerns about possible 'market manipulation' related to crop estimation. According to the NCM, research has been carried out by the ARC that proves that the white maize crop is always underestimated. Furthermore, the NCM claims that for every 1 percent underestimation in the maize crop, there is a 0.71 percent increase in the price of maize (Naledi, 2002). If these allegations are true, they prove that to some extent, maize farmers also exert some market power in terms of determining prices.

6.3 Competition Policy Concerns

The last section looked at what the extent of market power in the maize market is. However the mere presence of market power does not constitute an argument for unfair competition practices. According to the Competition Act this will only be the case in three situations:

- 1) Restrictive horizontal practices
- 2) Restrictive vertical practices
- 3) Abuse of a dominant position

The issue of pricing is also important in determining whether there are unfair competition practices being carried out. Therefore, what follows is an assessment of whether any of these factors exist in the maize market.

6.3.1 Issues of Pricing

Import parity prices have always been considered as the 'iceberg prices' (Parr, 2002). Domestic producers can only raise prices up to just below the import parity price (IPP). If prices are equal to the import parity price or above it, then consumers will switch to imports. Under situations where there is a domestic surplus of maize, only firms that are colluding or monopolistic firms can charge prices higher than the IPP. This practice is prohibited by the Competition Act of 1998 (Section 4 (1) (b) (i) and section 8(a)) under both circumstances. However, with the recent decline of the rand, the scope for the application of IPP policies has increased. The result of this is that there may be companies taking advantage of this without being detected by the Competition Commission (Parr, 2002). This may have been happening in the maize market. Figure 2 clearly shows that in December 2001, there was a period where the SAFEX spot price was higher than the IPP. This is of great concern and should be looked into by the Competition Commission.

6.3.2 Restrictive Horizontal Practices

Has there been any deliberate action on the part of maize farmers to underestimate future crop sizes, and by so doing contribute to the setting of higher prices for maize? This is of course based on the basic microeconomic premise that when supply is low, then there is likely to be excess demand which will push up the equilibrium price. Furthermore, do maize farmers intentionally ration the amount of crop that they plant

in retaliation for obtaining unsatisfactory prices for the previous year's crop as is alleged to have been the case in the 2001/2002 planting season (Naledi, 2002)? Because the maize price is set independently by SAFEX and also takes into account other factors besides the crop estimates, it seems that there is not enough conclusive proof to be able to categorically state that maize farmers are engaging in unfair competition practices.

6.3.3 Restrictive Vertical Practices

In-depth investigations should be carried out regarding the operation of silo owning companies. If it can be proved that agreements exist between silo companies and their subsidiaries concerning the prices of purchases made by either company, then this could well be a valid case of unfair competition practices. Recent profits reported by OTK, NWK and Senwes are well above the average profit rates of the industry. OTK for example, reported an increase of 26.5% (OTK, 2002). Questions should be asked about why their profits are so high.

6.3.4 Abuse of Dominant Position

The Competition Act gives one of the definitions of a dominant firm as a firm that controls less than 35% of the market but has market power (Competition Act of 1998 2(7) (c)). In my opinion, this then qualifies the three main silo companies as dominant firms. Concerns have been raised about these companies engaging in oligopoly pricing. These have been given impetus by the government beginning background work on an Agricultural Warehouse Act (Naledi, 2002).

7. CONCLUSIONS AND SOME POLICY IMPLICATIONS

From the analysis above, it is evident that there have been many factors that have had a negative influence on the maize price in recent times. These include the sudden depreciation of the Rand against the Dollar and other currencies; the drought in most of Southern Africa, most significantly in Zambia, Malawi and Zimbabwe; as well as the low yield of crops in Zimbabwe caused by the political instability there. Looking at the trends maize prices have followed in the past few years, the evidence seems to contradict the assertion that the price increase to a very large extent has been due to factors of supply and demand, both locally and internationally.

This means that we cannot ignore the high levels of concentration that are present at all levels of production in the maize filière. The trend towards increased concentration as well as increased co-operation between competitors may lead to a situation where anti-competitive practices such as collusion are taking place. In fact, there is ample evidence to suggest that this is happening already, especially at the level of silo ownership. As has been mentioned earlier, background work has been started on an Agricultural Warehouse Act and my recommendation would be that this piece of legislation be followed through as soon as possible.

One of the many proposals that have been advanced by interest groups in the wake of the maize meal price crisis has been that the government should consider 're-regulating' the maize market. These groups maintain that the crisis is a result of the maize market being ruled by free market forces without any government intervention especially in the area of price stabilization. Do these groups raise a valid point? Have the costs of deregulation outweighed the benefits?

Up until the end of apartheid, all major agricultural commodities were subject to different types of control under the Marketing Act. As South Africa made the transition towards democracy, there was a vigorous campaign for the deregulation of agricultural markets. Because regulation had historically been introduced to support white farmers, calls for deregulation were seen as attempting to redress the wrongs of the past. The rationale behind this campaign was that the restructuring of agricultural markets would bring about improved efficiency and equity. As the World Bank put it, the 'guiding principle is political and economic liberalization: the road to freedom and prosperity in South Africa is charted through deregulation' (Bernstein, 1996). In 1996 the Marketing of Agricultural Products Act was passed and the path towards deregulation began.

Six years down the line, deregulation seems to have worked in terms of increased production efficiency. The Total Factor Productivity Ratio, which is a measure of the efficiency with which resources are being used in the sector, has increased. The agricultural sector has also become less capital intensive, resulting in an increase in profits. In terms of foreign trade, although agricultural trade has not been growing as fast as total imports and exports, there has been a rapid increase in the trading of agricultural commodities, especially imports (Vink and Kirsten, 2002). The level of food inflation has generally fallen partly because the deregulation of agricultural commodities has meant that prices cannot be kept at artificially high levels (Bhorat and Poswell, 2002). It may seem therefore that those who campaigned for deregulation have been proven right.

On the other hand, there is a growing consensus that the negative trends that exist in agriculture at the moment are related to the freeing up of agricultural markets. The process of liberalization over the past few years has exposed the vulnerability of farmers in dealing with international competition. Small farmers have been unable to adjust to policy and market changes and have had to leave the industry (Naledi, 2002). The link between exposure to world markets and the exchange rate has also had severe effects on the price of maize. This was highlighted during the currency crisis of 2001 where the Rand price of maize and wheat jumped up to alarming heights as a direct result of being linked to dollar dominated prices on the world market (Bhorat and Poswell, 2002). Lack of government intervention in the maize market has also given way to the possible manipulation of sales and prices through concentration of market shares, collusion among major stakeholders. Without the state's intervention, these anti-competitive practices are not regulated in any way (Bernstein, 1996).

The case for 're-regulating' the maize market seems to be getting stronger as the negative trends in agriculture persist. Although there is proof that the deregulation of the maize market has had its benefits, especially in terms of the increasing Total Factor Productivity ratio, recent events have exposed how vulnerable deregulation can

cause the domestic market to be in relation to international trends. In my opinion, government intervention should be re-introduced to a certain degree especially in terms of trying to ensure price stability and more importantly, in ensuring that possible anti-competitive practices are closely monitored.

The issue of how prices are set in the maize market has been a topical issue recently and it seems as if this has been for a good reason. However, amidst the whole speculation and academic debate of whether maize pricing is unfair or not or whether there is collusion or not, there is one essential element that remains and that should not be forgotten. Maize is the staple food for the vast majority of South Africans, most of them living below the poverty line. This issue is not only about the theory behind the volatility of the maize price, but is also about the livelihood of many South Africans who have to struggle daily to feed themselves and their dependants.

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