Article

Markets, efficiency and public policy – an evaluation of recent influences on price in the maize market and government responses

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Introduction
Food prices in South Africa soared towards the end of 2001 and in early 2002. The food price index rose by 11.4 per cent in December 2001 compared with an increase of only 3 per cent for non-food prices (NALEDI 2002). In particular, the price of maize had increased by 212 per cent in just over a year, from R668 per ton in October 2000 to R1200 per ton in September 2001 and to R2500 per ton in January 2002.

These operations of the maize market, which was fully liberalised in 1993, have been hailed in some quarters as ‘an elegant example of the efficiency of the free-market system’. Aside from an ideological position on markets, economic efficiency needs to be critically evaluated in both social and private terms. Furthermore, while government regulation has been substantially reduced, concentration at different levels of maize supply and distribution suggests there is governance (or regulation) of the supply chain by private institutions.

In the past, the maize market was controlled by the Maize Board, which apart from regulating the market also set a uniform maize price. Between 1987 and 1993 the market was liberalised and the Maize Board, as it formerly operated, 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 within each level of the maize supply chain, thereby impacting on the levels of concentration in the market.
The effect of market outcomes on the livelihoods of the poor is significant. It has been estimated that ultra poor households in South Africa spend about 16 per cent of their monthly income on maize alone (NALEDI 2002). A household is defined as ultra-poor if its monthly adult equivalent expenditure is less than half the poverty line, which is generally accepted as US$1 a day (SARPN 2003). This, together with concerns about concentration, led government to call for an investigation of the maize price rises by the Competition Commission in 2002. A Food Price Monitoring committee has also been established by government that will report any abuses of market power to the Commission for further action.

This article consists of five sections. The first section gives a brief explanation of the economic theories useful in understanding how the maize market works. The second gives a broad overview of the maize supply chain in South Africa including its linkage with regional trade flows. Section three examines the determination of maize prices and production levels while the fourth discusses concentration and market power in the maize market. Finally, conclusions and policy implications are drawn.

Theoretical underpinnings of the maize market
The move to liberalised markets is based on orthodox microeconomic theory. The basis of this theory is briefly outlined before discussing the implications of its very restrictive assumptions. Broader issues of the governance of production and linkages between different levels of production are then explored. Maize goes through various stages of processing and the relations between producers and markets at these different stages are crucial for understanding the ultimate determination of prices.

Markets, prices and efficiency
The market mechanism yields an efficient allocation of goods from producers to consumers as the marginal utility (or benefit) that consumers will get from an additional unit will be just equal to the marginal cost of producing the unit. If this is not so, and marginal utility is greater than the marginal cost, welfare could be improved by increasing production; conversely if marginal utility is less than marginal cost, welfare could be improved by reducing production as the cost saved would be greater than the utility forgone. The price mechanism is the way in which changes in production and consumption are brought about. Higher utility will translate into willingness to pay, thus exerting upward pressure on price, to which producers will respond with increased production.
The efficient markets hypothesis therefore involves prices in a signalling role, the response of agents to those prices, and the mobility of resources between the production of different goods (Arndt 1988). As is well established, this is only the case under quite restrictive assumptions, which include complete information and no missing markets, perfect mobility of productive factors, perfect competition and no externalities. Complete information implies that all market participants know the future equally and that there are perfect insurance markets for all. Perfect competition means that there are so many participants in terms of both production and consumption that the decisions of any individual agent will not change the market price. Under these conditions the market price will reflect the underlying costs of production, including a reasonable return to capital invested.

In the absence of these assumptions being in place, market outcomes may well differ from welfare maximisation. In particular, uncertainty caused by the impact of weather on crop yields and rigidities in switching between production of different crops have important implications. Weather changes mean that supply quantities – and hence market prices – differ from the expected prices. A higher price should act as a signal for increased production, but for this response farmers must judge whether the higher price is due to a long-term shortage in production or short-term weather changes that will not necessarily be repeated in the next year.

Volatility in production and prices means that there is an incentive for speculation. For example, news of lower production (due to bad weather) will lead to expectations of higher prices. Holders of maize will not, therefore, release maize onto the market, and this behaviour itself will create or exacerbate shortages, pushing prices higher, and further inducing the holding of stocks by speculators. Volatility in itself makes it difficult for producers to plan ahead. Coupled with the lags from planting to the time when crops are harvested, this means that, in the absence of perfect insurance and financial markets, producer responses are likely to be weak.

International trade may lessen price fluctuations. As the domestic price rises due to low domestic production it becomes worthwhile to import, and the domestic price will not rise above the international price at which maize can be imported. This assumes that the importing country is small relative to the world market for maize, and that weather conditions in different countries are independent of each other.

International or ‘border’ prices are commonly used to represent the
economic value of a crop such as maize (see, for example, Ellis 1992). If there is a surplus of domestic supply over demand then the price received for exported maize (the export-parity price) is the amount that would be forgone to supply an additional unit to the local market. On the other hand, if there is a deficit of domestic supply relative to domestic demand, meeting one more unit of domestic demand means importing, and the price paid (the import-parity price) is the appropriate value or ‘opportunity cost’. This assumes the country is small relative to the international market, and it also does not take into account the important externality effects that the pricing of a staple has on health and nutrition.

Trade restrictions can be applied to the price or quantity of maize to be traded, with the effect of driving a wedge between world and domestic prices. While restrictions on imports will tend to raise the local price relative to the international price, restrictions on the export of maize produced domestically will result in lower domestic maize prices relative to world prices (Meier 1995).

The importance of maize as a staple food for low-income people in particular means that the effects of price volatility have major implications for food security. Periods of high prices will mean malnutrition and hunger for low-income groups. As expenditure is diverted to the purchase of more expensive food, other areas of household consumption will also suffer, such as the schooling of children. The disproportionate effect of higher maize prices on low-income households in itself worsens inequality.

**Governance and control of value-chains**

Although there are a great many farmers producing maize in South Africa, there are several further stages in the processing, distribution, packaging and retail of maize meal. A focus on the ‘real markets’ rather than ideal textbook constructs means taking account of the sources and exercise of power at the different stages of what has been called the maize filière (Bernstein 1996) or value-chain. Each of these stages involves some transformation of the product. Economies of scale and barriers to entry at different stages may mean that there are only a few agents operating at some of these stages and some agents are vertically integrated.

Moreover, the long-term linkages needed in the value-chain to coordinate operations from production through processing and distribution means that the ‘governance’ of the chain would reside in its dominant firms (Kaplinsky 2000). The chains are characterised by horizontal concentration in trading, exacerbated by the importance of access to finance given the volatility in
prices, and shifts in control downstream from wholesale to retail. The importance of access to the major brands’ distribution and marketing networks in the food industry means that the value-chains for food products internationally are increasingly becoming buyer-driven (Raikes and Gibbon 2000).

Understanding the operation of maize markets therefore means assessing the dynamics at different levels of the value chain. As will be discussed, the removal of price controls in South Africa happened in conjunction with the transformation of the large, white, agricultural co-operatives into private companies where farmers became shareholders. As argued by Bernstein (1996), this ensured that the barriers to the facilities of the former co-operatives were raised at just the point where government policy was shifting to support the development and growth of black farmers.

Overview of the maize supply chain in South Africa
There are two types of maize available: white maize, used mainly for human consumption, and yellow maize, which dominates world trade and is used mainly as animal feed or for industrial processes. Human consumption of white maize is concentrated in Eastern and Southern Africa, with the result that the international market for high-quality white maize is generally thin, with most countries using the maize they produce for their own domestic consumption. Maize meal can also be categorised according to its quality level, of which three gradings are typically used: special, super and sifted; special meal is of the highest quality and sifted the lowest. In South Africa, maize is mostly farmed commercially in Gauteng, Mpumalanga, North-West Province, Northern Cape and the Free State. The silo and milling companies, as a result of the influence of the now defunct Maize Scheme, also tend to be situated in these areas.

The maize market generally operates on four levels. The first is that of the maize farmers who plant the crop, harvest it and then either store it on their farms, deliver it to the silo owners for storage, or sell it to traders or millers. Maize is then kept in the silos until it is distributed to the milling companies, who process it and sell to retailers. The exact number of maize farmers in South Africa is unknown.

There are 223 silos in South Africa concentrated in the hands of 23 owners, with an overall capacity of 14.5 million tons. Most of these silos are owned by former grain co-operatives that have evolved into large, diversified companies. There are three main companies who between them control 72 per
cent of the market: OTK, NWK and the Senwes Group (SWK) (NALEDI 2002). The main milling companies of white maize in South Africa are Tiger Oats Limited, Premier Group Limited, Pride Milling Company and Pioneer. The main yellow maize millers are Epol, OTK, Meadows and Bokomo. Millers are to a large extent organised under the National Chamber of Milling.

At the time the Marketing of Agricultural Products Act was passed in 1996, grain was already being traded in a free market, with prices set according to the forces of supply and demand. The South African Futures Exchange (SAFEX), also 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, therefore, 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 domestic price of maize generally fluctuates between these two levels, with the import parity price being the maximum point and the export parity price being the minimum point. However, the actual level of the domestic price will depend on 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. The gap between export and import parity prices will further depend on transport and related costs and tariffs.

**Regional trade flows and the relationship with domestic supply and demand**

In order better to understand the influences on maize pricing, it is useful firstly to establish the relevant geographical market, as well as look at how regional trade flows may have had an influence on local quantities of maize demanded and supplied.
Generally speaking, the demand for maize will stay constant as it is assumed that consumer preferences are fairly stable over time, while supply varies in the short-term with the weather and in the medium-term with the area planted. A key question is how the geographic market is defined. Vink and Kirsten (2002) state that whether import or export parity prices apply will depend on demand and supply balances in the southern African region as a whole. The shift to 2001-02 import-parity prices in this analysis is due to the total regional shortfall (Table 1) from deficits in Zimbabwe, Zambia, Malawi and Angola. This assumes that transport costs within the region are trivial relative to transport costs from international sources to and from the region.

### Table 1: Maize production in Southern Africa (thousand tons)

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>370</td>
<td>-410</td>
<td>505</td>
<td>-322</td>
<td>428</td>
<td>-215</td>
<td>395</td>
<td>-394</td>
<td>476</td>
<td>-283</td>
</tr>
<tr>
<td>Malawi</td>
<td>1532</td>
<td>-318</td>
<td>1772</td>
<td>-51</td>
<td>2478</td>
<td>550</td>
<td>2501</td>
<td>682</td>
<td>1713</td>
<td>-275</td>
</tr>
<tr>
<td>Mauritius</td>
<td>2</td>
<td>-35</td>
<td>2</td>
<td>-35</td>
<td>2</td>
<td>-35</td>
<td>2</td>
<td>-35</td>
<td>2</td>
<td>-35</td>
</tr>
<tr>
<td>Mozambique</td>
<td>1042</td>
<td>0</td>
<td>1124</td>
<td>133</td>
<td>1196</td>
<td>161</td>
<td>1019</td>
<td>-252</td>
<td>1143</td>
<td>-7</td>
</tr>
<tr>
<td>SACU</td>
<td>9300</td>
<td>1201</td>
<td>7785</td>
<td>2740</td>
<td>7773</td>
<td>125</td>
<td>10820</td>
<td>2441</td>
<td>7689</td>
<td>596</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1835</td>
<td>-776</td>
<td>2685</td>
<td>-449</td>
<td>2502</td>
<td>204</td>
<td>1310</td>
<td>120</td>
<td>802</td>
<td>-380</td>
</tr>
<tr>
<td>Zambia</td>
<td>960</td>
<td>-273</td>
<td>649</td>
<td>-490</td>
<td>856</td>
<td>-326</td>
<td>1310</td>
<td>120</td>
<td>802</td>
<td>-380</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>2192</td>
<td>-406</td>
<td>1466</td>
<td>-646</td>
<td>1520</td>
<td>-597</td>
<td>2040</td>
<td>-61</td>
<td>1476</td>
<td>-593</td>
</tr>
<tr>
<td>Total</td>
<td>17053</td>
<td>-205</td>
<td>15988</td>
<td>880</td>
<td>17155</td>
<td>-133</td>
<td>20096</td>
<td>1708</td>
<td>15880</td>
<td>-155</td>
</tr>
</tbody>
</table>

Source: South African Grain Information Services
Note: Southern African Customs Union (SACU) consists of South Africa, Lesotho, Botswana, Swaziland and Namibia, with South Africa providing the bulk of the production.

In the past five years, the total regional net output has ranged from a shortage of 1,155,000 tons in 2001-02 to a surplus of 1,708,000 tons in 2000-01. Although there are countries that have consistently experienced a shortfall of maize supply (Angola, Zimbabwe and Zambia), SACU and Mozambique have been producing surpluses. In addition to this, most countries have a positive opening stock, indicating that although there might be a deficit of maize supply in one particular season there is not necessarily a deficit of total maize stocks in that particular country. Generally, fluctuations in price should depend on the availability of a commodity overall, not just in one season. Furthermore, excess demand is also characterised by an ability to purchase. Some countries in the region...
therefore may not be able to afford to purchase maize even if it is available. Maize shortages in one country do not necessarily signify an effective market deficit in the region.

**Determining maize prices and production levels**

Maize prices have been highly volatile, with changes of more than 50 per cent in a few months not uncommon. Although volatile, the maize prices from 1998 until around December 2001 were all within a range of R500 to R1000 a ton. In December 2001, however, the maize price shot up to levels of R2200 a ton within five months (Figure 1). There are a few factors that could explain this increase, among them 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.

The maize price is a combination of changes in the international price of white maize (which South Africa itself influences) and the exchange rate. In mid-1998 and again at the end of 2001, sharp depreciation led to maize price increases (Figure 1). But the price increase was much greater than the exchange rate change.

**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 2). 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 2000-01, South Africa maintained a sizeable trade surplus in both that year and again in 2001-02.

Table 2: South African maize production and trade (thousand tons)

<table>
<thead>
<tr>
<th>Period</th>
<th>Total Production</th>
<th>SA-exports white maize</th>
<th>SA-imports white maize</th>
<th>Net trade white maize</th>
<th>Total-SA maize exports</th>
<th>Total-SA maize imports</th>
<th>Net trade total maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994/95</td>
<td>4 836</td>
<td>1 889</td>
<td>0</td>
<td>1 889</td>
<td>4 629</td>
<td>0</td>
<td>4 629</td>
</tr>
<tr>
<td>1995/96</td>
<td>9 694</td>
<td>332</td>
<td>747</td>
<td>415</td>
<td>88</td>
<td>1 119</td>
<td>232</td>
</tr>
<tr>
<td>1996/97</td>
<td>9 582</td>
<td>1 394</td>
<td>88</td>
<td>1 306</td>
<td>2 526</td>
<td>139</td>
<td>238</td>
</tr>
<tr>
<td>1997/98</td>
<td>7 082</td>
<td>1 119</td>
<td>5</td>
<td>1 114</td>
<td>1 921</td>
<td>109</td>
<td>1 812</td>
</tr>
<tr>
<td>1998/99</td>
<td>6 716</td>
<td>1 108</td>
<td>0</td>
<td>1 108</td>
<td>1 388</td>
<td>98</td>
<td>1 290</td>
</tr>
<tr>
<td>1999/00</td>
<td>10 142</td>
<td>594</td>
<td>0</td>
<td>594</td>
<td>652</td>
<td>569</td>
<td>83</td>
</tr>
<tr>
<td>2000/01</td>
<td>7 225</td>
<td>861</td>
<td>0</td>
<td>861</td>
<td>1 488</td>
<td>0</td>
<td>1 488</td>
</tr>
<tr>
<td>2001/02</td>
<td>7 483</td>
<td>812</td>
<td>47</td>
<td>765</td>
<td>1 335</td>
<td>395</td>
<td>940</td>
</tr>
</tbody>
</table>

Source: South African Grain Information Services

Note: South Africa’s trade surpluses are larger than the data above, which are for SACU as a whole.

Export and Import parity prices

There is a significant difference between export and import parity prices. For example, in August 2002, the import-parity price was R1665.59 while the export parity price was R994.23 (Tables 3 and 4). These prices are based on the same international price of US$105.87. The large margin between the export and import parity prices are a result of the various costs associated with either supplying maize to, or sourcing it from, the international market.
Table 3: Export-parity price calculation

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

Source: South African Grain Information Services

Note: * denotes difference in quality and location. This is the ‘white maize premium’

Table 4: Import-parity price calculation

<table>
<thead>
<tr>
<th>Futures prices</th>
<th>USA No3 Maize (Gulf)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(August 9, 2002)</td>
</tr>
<tr>
<td>FOB Gulf value ($/t)</td>
<td>$105.78</td>
</tr>
<tr>
<td>Freight rate ($/t)</td>
<td>$19</td>
</tr>
<tr>
<td>Insurance ($/t)</td>
<td>$0.32</td>
</tr>
<tr>
<td>Total cif ($/t)</td>
<td>$125.1</td>
</tr>
<tr>
<td>Converted to R/t</td>
<td>R1304.48</td>
</tr>
<tr>
<td>Financing costs (R/t) (@ 16percent)</td>
<td>R17.15</td>
</tr>
<tr>
<td>Discharging costs: Durban (R/t)</td>
<td>R71.56</td>
</tr>
<tr>
<td>Import tariff (2001/05/18) (R/t)</td>
<td>R137.4</td>
</tr>
<tr>
<td>Total import cost (Durban) (R/t)</td>
<td>R1530.59</td>
</tr>
<tr>
<td>Transport costs to Randfontein (R/t)</td>
<td>R135</td>
</tr>
<tr>
<td><strong>Delivered price (R/t)</strong></td>
<td><strong>R1665.59</strong></td>
</tr>
</tbody>
</table>

Source: South African Grain Information Service

South African prices were close to export parity from 1997 until 2000 (Bhorat and Poswell 2002). This was the case even though there was also a critical shortage of maize in that time period. If regional deficits were responsible for very high increases in the maize price, then the maize prices from 1997 to 2000 (in times of shortages in supply) should also have been closer to import parity prices, as was the case in 2002.

The rise in the South African maize price in 2001 was characterised by a shift from export parity to levels greater than import parity price (Figure
2). Even if we were to add the white maize premium of approximately $10 per ton, the price of maize would still have been at levels greater than the import parity price. This part of the price increase cannot be blamed on the depreciation of the Rand. The Rand depreciation and the increase in the world price had the effect of increasing both the export and import parity prices, and thus cannot explain the jump from export to import parity levels. This part of the price increase also implies an increase in profits of more than R600 per ton for producers, as this increase is over and above any exchange rate linked increase in costs.

**Figure 2: Comparison of SAFEX price with import and export parity prices**

![Comparison of SAFEX price with import and export parity prices](image)

Source: South African Grain Information Services

According to the border price criterion, the domestic price of a commodity should always be between the export and import-parity price. A price above import parity price implies a further deviation in the pricing of maize, which cannot be explained away by the normal factors that influence maize prices. From the beginning of 2002, the maize price did indeed rise above the import-parity level.

**Geographical market definition**

The definition of the geographic market is crucial for understanding at what point border prices correctly apply. There are two main ways of looking at the maize market in South Africa. In the first instance, the relevant
geographical market could define South Africa or SACU as being a unit. Neighbouring countries in the southern African region would therefore be regarded as belonging to the international market. In the second instance, the relevant geographical market could be defined as southern Africa as a whole and therefore crop shortages and surpluses are viewed at the regional level. A regional deficit could explain a rise to import-parity levels if this is the correct market definition.

Whether southern Africa is the relevant geographical market essentially depends on the size of transport and related costs between countries in the region compared with costs from other international sources. Transporting a ton of maize from Johannesburg to Lusaka by road will cost about R850 per ton while the price of transporting a ton from Johannesburg to Blantyre increases to R928. In other words, these costs amount to around 50 per cent of the price of a ton of maize. Even transporting maize by rail to Lusaka will cost about R688 per ton, which still constitutes about 34 per cent of the price of a ton of maize (R2000 in March, 2002). Considering that the average cost of transporting maize within South Africa (from Durban to Randfontein for example) will cost around R140 per ton, it is obvious that there is a large difference in transport costs within the region.

In general, sea freight is much cheaper than overland. This implies that a buyer in Zambia or Malawi will view South Africa and other sources (such as the US or Argentina) as possible external sources for importing maize. Demand from these countries form part of the international demand for South African maize and should not be classified as part of the same market. Crucially, this means that regional deficits do not justify a shift in South African prices to import-parity levels since it must be remembered that the regional deficit will still have an impact on South African prices through the impact that such demand has on the international price. In other words, increased international demand will increase the international price and hence both the export and import parity prices in South Africa, but it is not a justification for a jump from export to import parity levels.

**Concentration and market power in the maize market**

It is evident that the maize market is highly concentrated, especially at the silo level. This section addresses aspects of concentration at the level of farms and millers, as well as silos.

**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, taking into account the fact that the Department of Agriculture sends out 3800 crop-estimate questionnaires to maize farmers can serve as a reasonable estimate. There has been a long-term decline in the number of operational farms. According to Bernstein (1996), the 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. In the mid-1980s it was estimated that 40 per cent of gross farm income was generated by only 6 per cent of white farms. This increasing concentration is mainly associated with the growing differentiation in commercial farming, which has resulted in larger farms becoming highly organised and successful at the expense of smaller farmers, who have gone under. The result has been that since the 1980s the concentration of farmers in the maize market has increased further. This has important implications in terms of the bargaining power these farmers hold when it comes to negotiating prices for their crops (NALEDI 2002).

**Silo Owners**

The top three companies, who control 72 per cent of the market capacity, are OTK, NWK and the Senwes Group (SWK). OTK has been in operation for 77 years. It was originally known as the Oostelike Transvaalse Landbou Ko-operatiewe Vereeniging and, since the early 1930s, has been responsible for the handling of 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 three main sectors: 1) agricultural produce handling; 2) storage; and 3) agricultural produce processing. OTK mainly operates in Mpumalanga, KwaZulu-Natal, Gauteng and Limpopo, and controls 28 per cent of the market capacity (OTK 2002). It is also one of the main maize traders.

De Centraal Westelijke Co-operatiewe Landbou Vereeniging was founded in Klerksdorp in 1909. With the deregulation of the maize market, the cooperative changed its business form and started operating as Senwes Limited in April 1997. Senwes’ main activities include grain industry, retail and mechanisation sectors, as well as interests in other agri-industries. They mainly operate in the Free State, North West, Northern Cape and Gauteng Provinces (Senwes 2002). Senwes controls 30 per cent of the market capacity (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 tonnes. The services that NWK offer are handling and storage of grain, the sorting of groundnuts, the issuing of silo certificates, and the sale of grain bags (NWK 2002). NWK controls 14 per cent of the market capacity (NALEDI 2002).

**Milling companies**

The main owners of milling companies are Tiger Oats Limited, Premier Group Limited, Pride Milling Company and Pioneer (McGregors 2002), though OTK and Senwes also own milling operations. There are 17 members of the National Chamber of Milling, which represents the main milling companies (National Chamber of Milling 2002). The largest four firms accounted for 42.5 per cent of output in 1996.¹⁰

**Traders**

Since liberalisation, traders have played an important part in the workings of the maize market. Although farmers can sell their crop directly to millers, most small farmers prefer selling through traders, most of whom are affiliated to the South African Cereals and Oilseed Trade Association, a member of the South African Chamber of Business. There are four main traders of maize: Cargill (a US multinational), Dreyfuss (a French multinational), OTK and W J Morgan. Traders have been connected to allegations about illegal speculation in the trading of maize. If these allegations prove true they could explain the excessive price changes in the maize market.

Speculation in the trading of maize is significant since it means that price changes do not reflect real fluctuations in supply and demand but rather reflect the expectations of price increases by traders. Although traders have denied the allegations, the trustees of a pension fund have recently stated their intention to sue W J Morgan for losses of R1.4 billion, sustained as a result of over-exposure to the maize market. Apparently, W J Morgan exposed funds amounting to R2.7 billion (R2.643 billion more than is legally allowed) to the agricultural derivatives market. The decision to speculate was taken on the basis of expectations by W J Morgan that the price of maize would continue to rise.¹¹

**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’ (Act no. 89 of 1998 1.(1).(xiii)). To determine, therefore, whether any firms hold market power in the maize market, we have to see if any contain characteristics described in the definition.

A recent trend in the agricultural sector has been increasing economies of scale. At the same time, the ownership of silos has become more concentrated. The buying up of small farms and silos has led to a situation where an oligopoly exists in the maize market. These conditions may enable collusion. Another recent development has been the organizing of producers into associations that reflect their interests, for example 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 much other information exchanged between members. In an industry such as this, where for example, all milling companies stand to benefit from farmers obtaining low prices for their crop, there is a motive for members of interest groups to come together to devise strategies to maximise their revenue potential.

**Vertical integration**

Vertical integration describes the extension of ownership and control over operations along a production chain. 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.

The three large companies operating silos extend their operations from the large farmers (who are the main owners of the companies), through storage, trading and milling. OTK, in particular, is a major trader. The main firms 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. Most recently, these companies have secured other sources of finance and still act as creditors to farmers. In some cases farmers are obliged 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 save on 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 (Amin and Bernstein 1996). It is important to recognise, however, that the firms operating the silos do not necessarily own the grain that is stored; owners, whether farmers or traders, pay fees for the grain storage. But the silos do have a very important role as market makers, posting prices for the purchase of grain. This function, and the way in which information is shared among them, requires further investigation. As already noted, it is also the vertical integration and combination of related activities which makes the silos so pivotal in the market.

**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), Statistics South Africa, the National Agricultural Marketing Council as well as a private consultant. It sends out questionnaires to a sample of farmers, the results of which, along with other information, are used 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 carried out by the ARC proves that the white maize crop is consistently under-estimated. Furthermore, the NCM claims that for every one per cent of under-estimation in the maize crop, there is a 0.71 per cent 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.

**The role of competition policy**
The sharp rise in food prices and maize in particular led the Minister for Trade and Industry to call on the Competition Commission to examine ‘pricing policies in the South African economy’, and whether price increases had been ‘opportunistic’. At the same time the National Treasury commissioned a study into the agricultural sector to ascertain what underpinned the sharp price hikes. In this section we review the study undertaken by the Competition Commission and reflect on the role of competition policy in issues such as this.
Competition policy is meant to address the abuse of market power by large companies and to regulate the acquisition of such market power through mergers. Under the Competition Act of 1998 the Competition Commission has powers to undertake investigations in response to complaints or where they have reason to believe an abuse may have occurred. The three main areas provided for in the Act are: 1) restrictive horizontal practices; 2) restrictive vertical practices; and 3) abuse of a dominant position. Although there are distinct legal provisions dealing with each, they are closely associated as the basic issue being addressed is the exertion of market power in ways that have negative effects on economic efficiency and welfare.

The Commission’s investigation found that the ‘food price inflation does not appear to have been caused by anti-competitive conduct’. Instead the price rises were attributed to the monetary policy accommodation of the inflationary pressures arising from the Rand’s sharp depreciation towards the end of 2001. In addition, the inquiry found that retailers had only passed on the price rises (in part or in full) and had not increased profits as a result of market power in price setting.

Two key influences on the price increase were identified – the exchange rate depreciation and increased demand from the southern African region for maize. The Commission’s report spends considerable time explaining why the exchange rate is an equilibrating mechanism for the balance of payments and the role of macroeconomic policy. Aside from the obvious fact that short-term exchange rate changes such as those experienced at the end of 2001 are not explained by any change in the underlying macroeconomic ‘fundamentals’, the failure by the Commission to distinguish between supply-side and demand-side inflationary pressures largely diverts attention away from the core issue of why maize prices quoted on SAFEX rose by a much greater extent than the exchange rate depreciation. In particular, the question why prices rose up to and above import-parity levels is inadequately addressed.

Import-parity pricing
The Commission outlines the practice of local suppliers charging prices up to the price at which goods can be imported (including tariffs, transport and related costs). Under the conditions of excess local supply, with a freely operating market producers should be willing to sell to the local market at the export-parity price, as this represents the best alternative price they can achieve. The export-parity price is the price on international markets minus
the transport and related costs to supply it. At issue, therefore, in explaining the more than doubling of price per tonne from May 2001 to January 2002 is the supply and demand balances and the market power at the level of suppliers and traders. In addition, the largest acceleration of prices occurred in September 2001, in advance of the major Rand depreciation. Although the Commission finds increasing profits in the farming/fishing sector in each of the last five years (Parr 2002:38), it fails to undertake any analysis of what underpins this, despite its extensive powers to obtain information from firms. Perhaps even more surprising is its discussion of the key issue of supply and demand balances, which is limited to a long quote from The Economist magazine about food shortages in the southern African region (Parr 2002:19).

As discussed above, for an analysis of the appropriateness of import or export-parity pricing, the geographical definition of the market is crucial. If the market is correctly defined as regional then there is clearly a shortage and import-parity pricing would be expected. However, if the market is defined as national (or smaller), then there is still a surplus of supply over demand and export-parity pricing should continue in the absence of market power. To characterise the issue, is Zambia part of the world market as far as South African producers are concerned or part of the local market? At issue is the magnitude of transport and related costs, which the Commission failed to assess.

As we have already shown, for Zambian consumers imports from South Africa can be seen as substitutes for imports from further afield. The main transport costs are land-related – sea freight is relatively cheap by comparison. If this analysis is correct, then the shortage in the region did partly account for the rise in world prices, and the exchange rate effect did account for increases in the Rand value of the export-parity price. But the jump from export-parity to import-parity pricing by local sellers is highly questionable. Indeed, there is some evidence to argue that the Cape Town market is separate from the markets of Gauteng, North West, Limpopo, KwaZulu-Natal and Mpumalanga. Firms have reportedly imported maize to serve the Cape Town market because of the high overland transport costs from facilities in the central regions.12 There is also a range of other complicating issues:

- The largest shortfall in the region is due to Zimbabwe. However, the price controls in that country mean that market-oriented importers (as opposed to donor agencies) would not be willing to import at the ‘import-
parity’ international price. The shortage is partly created, therefore, by the price ceiling and cannot at present be filled by imports. This reduces the effective ‘market-based’ deficit in the region.

- Counting against this is the expectation of food relief being purchased by international agencies at the prevailing price, providing a strong incentive to hold stocks for such future buyers, which in itself pushes up the price.
- The stand taken by countries such as Zambia on genetically modified maize serves to differentiate maize. South African maize (which is not GM free) is therefore not a substitute for local Zambian maize.

But, even taking these into account it is evident that further investigation is required, given the high levels of concentration at different levels of the value chain.

**The role of competition policy – impotence and inappropriate theory**

The Competition Commission’s conclusion that the maize price increases are not due to market power is questionable. But of greater concern is the failure to collect information enabling a better understanding of the factors underlying the pricing of maize at different levels of the supply chain. An example of this is the failure to collect information about the allegations of illegal speculation among traders.

Under the Competition Act, it is very difficult to prove that the exertion of market power constitutes abuse of a dominant position. ‘Excessive pricing’ requires demonstration that the price does not bear ‘a reasonable relation to the economic value of the good or service’ and that it is above such an economic value. Three and a half years after the Competition Act came into force this has not been shown in any case. Indeed, by mid-2003 there had not been any substantive prosecution of firms under the abuse of dominance or collusion provisions. Given the very high levels of concentration in the South African economy this is somewhat surprising.

In the maize market it has been demonstrated that there are three firms that control the majority of silos and four traders account for most of the trades (by volume traded) on SAFEX. Milling of maize meal is also very concentrated, while there is vertical integration of a firm (OTK) from farming through trading, silo management and into milling. Nevertheless, it may be difficult to demonstrate that the extreme price rises are not related to changes in the ‘economic value’, as required by the Competition Act, in order to demonstrate abuse of dominance. This is as much a reflection of the onus of proof under the Act as it is the economic theory underpinning the
legislation of the Commission. Still, the Commission signally failed to analyse information on:

- The appropriate geographic definition of the market.
- The implications of regional shortfalls given the nature of markets in countries like Zimbabwe and Zambia, and the differentiation of genetically modified maize.
- The behaviour of the main firms in the market, especially the traders and ex-cooperatives linking farming with silo storage.
- Why maize prices rose in advance of the exchange rate depreciation.
- The nature of vertical integration and price determination.

Given the huge welfare impact on consumers of the maize price rise, these flaws are striking. Regardless of whether evidence would have been sufficient to take a case before the Competition Tribunal, the Commission could at least have shed light on firm behaviour and the nature of the various markets at different levels of the supply chain. For example, such information might have allowed an evaluation of the extent of speculative behaviour, not uncommon in a price-inelastic market dominated by a small number of traders, where news on weather and production can have an important influence on pricing. The static economic theory employed by the Commission does not allow for strategic behaviour and interaction between firms, but the information they could collect would be a public service in furthering our understanding of such issues. The Food Price Monitoring Committee set up by government needs to get to grips with these issues.

**Conclusions and some policy implications**

From the analysis above, it is evident 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), and the low yield of crops in Zimbabwe caused by political instability. But the maize price increase at the end of 2001 was much larger than the exchange rate depreciation and South African production exceeded consumption by a significant margin, reflected in the net exports of white maize of 765,000 tons for 2001-02. This means we cannot ignore the high levels of concentration that are present at all levels of production in the value-chain. The trend towards increased concentration as well as increased co-operation between competitors suggests anti-competitive practices such
as collusion may be taking place. In fact, there are indications that this is happening already, especially at the level of silo ownership.

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 government intervention, especially in the area of price stabilisation. Do these groups raise a valid point? Have the costs of deregulation outweighed the benefits?

Until the end of apartheid, all major agricultural commodities were subject to varied controls 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 deregulation progressed. More than six years down the line, deregulation has led to maize being a highly traded commodity. It may also have encouraged improvements in productivity (Vink and Kirsten 2002). Over the longer-term, food-price inflation has also come down, along with the overall inflation rate (Bhorat and Poswell 2002).

On the other hand, the process of liberalisation over the past few years has also exposed the vulnerability of farmers to volatility and higher risk, and many small farmers have had to leave the industry (NALEDI 2002). The link between exposure to world markets and the exchange rate has had severe effects on the price of maize. Small farmers are less able to deal with such volatility through hedging or insurance, which flies in the face of government’s objective of encouraging the growth of black commercial farmers. Price volatility also has high costs in terms of food insecurity for low-income consumers. A commodity like maize, which is subject to such uncertainty from year to year and where demand is so inelastic, is also likely to be subject to speculation, further exacerbating price fluctuations.

Despite concentration and vertical integration, the Competition Commission’s investigation failed to collect the necessary information to
properly assess the behaviour of the major firms with an interest in price increases. It also failed to address the fundamental questions of market definition and regional demand, which underlay the increase from export to import-parity price levels. It is hoped that the Food Price Monitoring Committee established by government, albeit with much weaker powers to collate information, will address these issues more effectively.

Finally, amid the academic debate on whether maize pricing is excessive or whether or not there is collusion, there is one essential element that should not be forgotten which is that maize is the staple food for the vast majority of South Africans, many of them living below the poverty line. This issue is not only about the theory behind the volatility of the maize price but also about the livelihood of many South Africans who have to struggle daily to feed themselves and their dependants.

Notes
1. I would like to thank Professor Simon Roberts and Eric Watkinson for their help both in terms of useful information and comments.
3. The term ‘governance’ is used in the context of value chain analysis as by, for example, Kaplinsky (2000).
4. This figure refers to the overall capacity; most of this storage capacity is unused, however.
5. The market in this context refers to that portion of the maize crop the farmers decide to store in the silos.
6. Personal communication with major hauler company.
7. Personal communication with Spoornet agricultural division.
8. Transport costs to Cape Town are R240 per ton. Interview with Dirk Kok and Piet Louw of Graansilo Industrie, November 29, 2002.
9. OTK was renamed Afgri in 2002.
References


