Trade flow patterns of maize in South Africa – Adjusting to structural changes

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For

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First Draft: May 2014

Final version: June 2014

Contents

1. Introduction

Before the maize market was liberalized, trade in South Africa was relatively simple. Under controlled marketing, maize prices were set by the Maize Board at levels that were in many years significantly higher than export parity levels. Furthermore, maize prices were also far less volatility than under a free market regime. As a consequence the area under maize production expanded rapidly and in years of good rains, farmers produced a surplus of maize, which was then exported by the Maize Board. Maize was often exported at a so called 'loss' when the local prices that were offered to farmers where higher than export parity. This loss was cross subsidized by higher prices on the local market. In short, the Maize Board was applying the principles of a surplus removal scheme.

With the abolishment of the marketing boards a completely new environment of price discovery was introduced with the opening of the futures markets and local supply and demand dynamics driving the relative level of maize prices within an import-export parity price band. If South Africa has a surplus of maize, prices tend to trade lower towards or at export parity levels and if the markets happens to be in a shortfall of maize, prices will trade at import parity levels. Within this free market environment, relative price levels provide the trigger for trade to occur where the surplus has to get big enough and general market prices drop low enough enabling private exporting companies to purchase maize and export the maize at a profit. Before significant volumes are exported to affect the projected carry-out levels, local prices are depressed, which could lead to lower production levels if sustained for a longer period of time and only after all or most of the surplus has been removed prices ease away from export parity levels and the cycle starts all over again.

Over the past five years structural shifts in regional maize markets have brought along a new set of dynamics. Surplus production out of Zambia and Malawi has started feeding into South Africa's traditional white maize export markets. In the 2011/12 exporters managed to export large surpluses of South African white maize to Mexico due to their severe drought, which led to a shortfall in the Mexican white maize markets. However, Mexico will not always be a major off-take market for South African white maize and together with new regional dynamics in terms of surplus maize production, stakeholders in the South African maize value chain are already adapting to this new marketing environment.

Against this background this study provides an overview of recent South African maize trade flow patterns and sets out to put these trade flow patterns within the context of the outlook for maize production and consumption trends in South Africa and the region. This study presents maize commodity balance sheets for African countries in the region that are published for the first time. These balance sheets were generated by the newly established Regional Network of National Agricultural Policy Research Institutes (ReNAPRI)[1] African countries. The commodity balance sheets serve as basis to generate a visual representation of potential trade flow patterns of maize in the region.

2. An overview of maize market fundamentals and trade flow patterns

Behind any trade flow of a commodity, there lays a commodity balance sheet that portrays the balance between total supply and total demand in the market. Tables 1 and 2 present the historic commodity balance sheet for South African white and yellow maize.

Table 1: South African white maize balance sheet

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
							thousand hectares						
Area harvested	1596	1843	2083	1842	1700	1033	1625	1737	1489	1720	1418	1636	1617
							t/ha						
Yield	2.9	3.0	3.1	3.2	3.8	4.1	2.7	4.3	4.6	4.6	4.3	4.2	3.4
							thousand tons						
Production	4636	5576	6366	5647	6108	4392	4309	7190	6737	7518	6105	6867	5545
Feed cons	446	105	641	733	543	787	1142	772	362	1658	1202	902	692
Human cons	3858	3643	3687	3580	3643	3598	3609	4260	4193	4213	4172	4105	4130
Domestic use	4585	3874	4925	4656	4365	4584	4936	5080	4660	6145	5535	5147	4962
Ending stocks	559	1718	2123	2402	2301	1630	618	762	1362	1609	518	785	570
Imports	47	274	33	0	0	1	46	0	0	0	133	11	90
Exports	812	817	1069	712	1844	480	431	1966	1477	1126	1794	1464	888
							R/ton						
SAFEX price	1304	1540	1004	823	854	1422	1799	1799	1504	1300	1638	2312	2263

Source: BFAP, March 2014

[1] ReNAPRI is a network of policy institutes in seven countries that collaborate under a Memorandum of Understanding. BFAP was instrumental in the establishment of ReNAPRI and is represented on ReNAPRI's Board of Directors and leads the technical committee.

Table 2: South African yellow maize balance sheet

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
							thousand hectares						
Area harvested	1112	1174	1017	1001	1110	567	927	1062	939	1023	954	1063	1160
							t/ha						
Yield	3.0	3.1	3.1	3.4	3.6	4.1	2.8	4.4	5.2	4.4	4.4	4.7	5.3
							thousand tons						
Production	3300	3734	3026	3446	3947	2315	2573	4709	4892	4498	4235	5032	6142
Feed cons	3011	3373	3078	3012	3477	3260	3286	3695	4265	3109	3614	3936	4228
Human cons	247	249	245	262	258	290	257	326	346	356	393	397	359
Domestic use	3324	3665	3809	3300	3792	3556	3553	4045	4650	3472	3993	4353	4839
Ending stocks	643	992	501	746	868	440	431	819	769	727	476	679	893
Imports	348	651	408	219	360	930	1074	27	27	0	288	0	0
Exports	523	371	116	120	393	117	103	303	319	1068	781	476	1089
							R/ton						
SAFEX price	1168	1293	1047	863	794	1415	1852	1766	1403	1379	1682	2331	2351

Source: BFAP, March 2014

From the tables it is clear that in the majority of marketing seasons SA was a net exporter of white and yellow maize with domestic production exceeding domestic consumption levels by a significant margin. However, during the period 2001 to 2013 SA experienced one significant drought in 2007, which affected all yields. Yet, despite of ending stocks plummeting SA still exported more white maize in that season than what was imported. The majority of white maize exports went into neighbouring countries Botswana, Lesotho, Namibia, Mozambique and Zimbabwe and the white maize that was imported originated from Zambia. In the case of yellow maize however, more than 1 million tons was imported from Argentina, which represents the highest level of imports of yellow maize over the period and only a small volume was exported to feed mills in Namibia and Swaziland.

Whereas yellow maize imports matched and exceeded the level of exports before 2007, the level of exports rose significantly from 2008 onwards and only in 2011 a meaningful amount of yellow maize was imported from Romania and Ukraine. In the case of white maize the trade patterns have remained relatively stable, yet from 2011 onwards more consistent volumes of white maize have been imported from Zambia.

The main drive behind higher export levels has been an increase in average yields, especially in the case of yellow maize where national yields have increased above 5t/ha. Yields where driven by the rapid adoption of improve hybrids and GMO technology. Furthermore, the sharp rise in prices in 2008 boosted profit margins, which initiated a wave of investment in irrigation infrastructure and the area under centre pivot irrigation increased rapidly. It is mainly yellow maize that is produced under centre pivots with new varieties and good management pushing yields comfortably above 16t/ha. Whereas the area under yellow

maize has remained relatively stable the area under white maize production has shrunk over the past decade by approximately 300 000 ha, with the main loss in production occurring in the marginal areas in the Western parts of the country.

The drastic decline in the area under production and the consequent drop in export levels in 2006 can be regarded as an anomaly. For three consecutive seasons (2003 to 2005) maize prices had fallen and on the back of the desperate position of farmers and strong lobbying by the producers organization, maize farmers reduced plantings by more than 40% resulting in a shortfall of maize and prices increasing to import parity levels. In the consecutive season maize hectares jumped back to more average levels but yields were low due to a severe drought.

Apart from the production trends, the dynamics in the demand for white and yellow maize are also playing a role in the trade flow patterns. Compare to a relatively sluggish increase of only 8% in the demand for maize in the human market and therefore mainly white maize, the demand in the feed market has expanded by 45% over the past 10 years and this trends is set to continue. Another important observation within the feed market is that feed mills seem to have a larger uptake of white maize in the feed market. This is evident in figure 1 that clearly illustrates higher volumes of white maize flowing into the feed market over the long run.

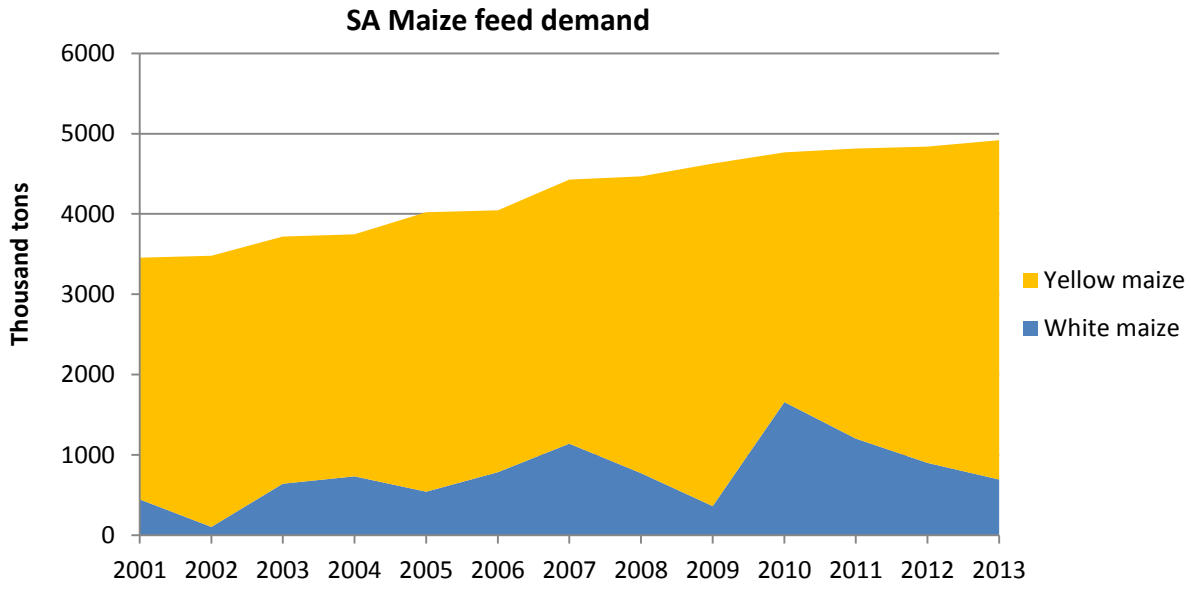

Figure 1: South African maize feed demand
Source: BFAP, April 2014

Since the SA maize industry operates in a free market environment, the main driver behind the market fundamentals that are highlighted in the section above remain the maize prices and how these local prices are trading in relationship to the import and export parity prices. Figures 2 and 3 illustrate the price space for white and yellow maize and bring these relative

price movements into comparison with the level of imports and exports. The first important point to take note of is that these prices are expressed as annual averages. Furthermore, the parity prices are derived from the US Gulf free on board price, which can be used as a proxy for the world maize price, but within a season there can be significant differences across various maize markets world worldwide, not even to mention the big differences occurring in the regional maize markets. One observation that can, however be made is that the relative movement of local prices within the import-export parity band seems to be consistent with what one would expect from a free market where local prices trade closer to export parity levels in years of bigger surpluses and trade closer to import parity levels in years where stock levels are significantly lower. The structural shift in the yellow maize market is evident from figure 3 with local prices trading closer to export parity level and therefore boosting exports while imports are almost disappearing (except for 2011).

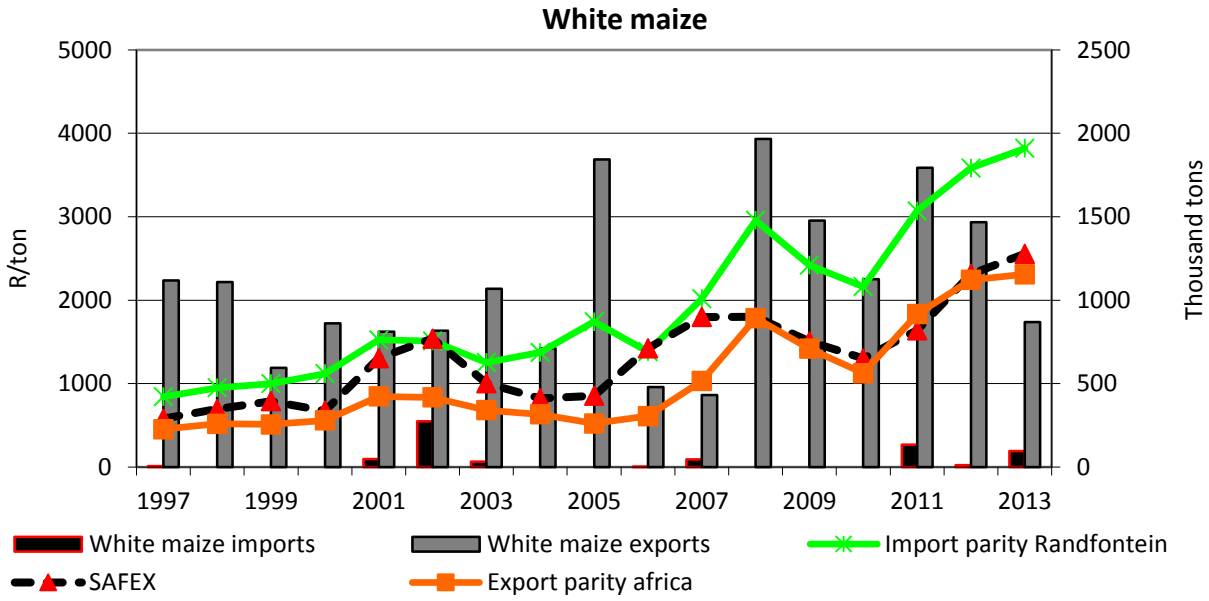

Figure 2: South African white maize price and trade space
Source: BFAP, April 2014

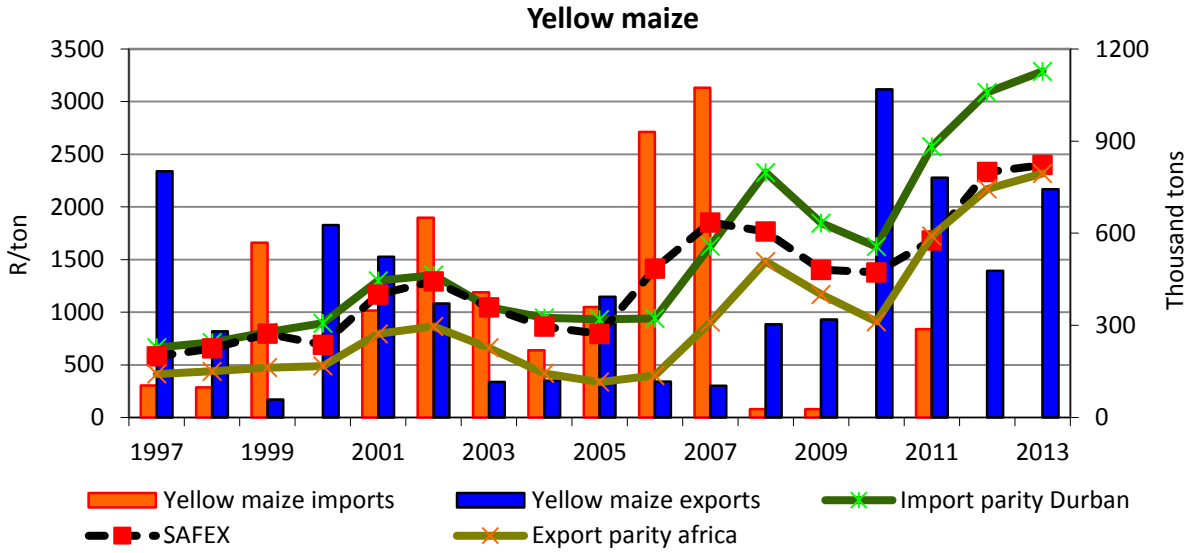

Figure 3: South African yellow maize price and trade space
Source: BFAP, April 2014

Taking only the annual averages into consideration, one can raise the question of where the incentives for large volumes of exports or imports come from if prices are not moving outside of the band in order for traders to lock in some profits. Hence, analysing the monthly price trends becomes far more interesting and illustrates how the local market has the ability to move from export parity to import parity within one season or simultaneously export out of the harbours and import across the border from countries like Zambia.

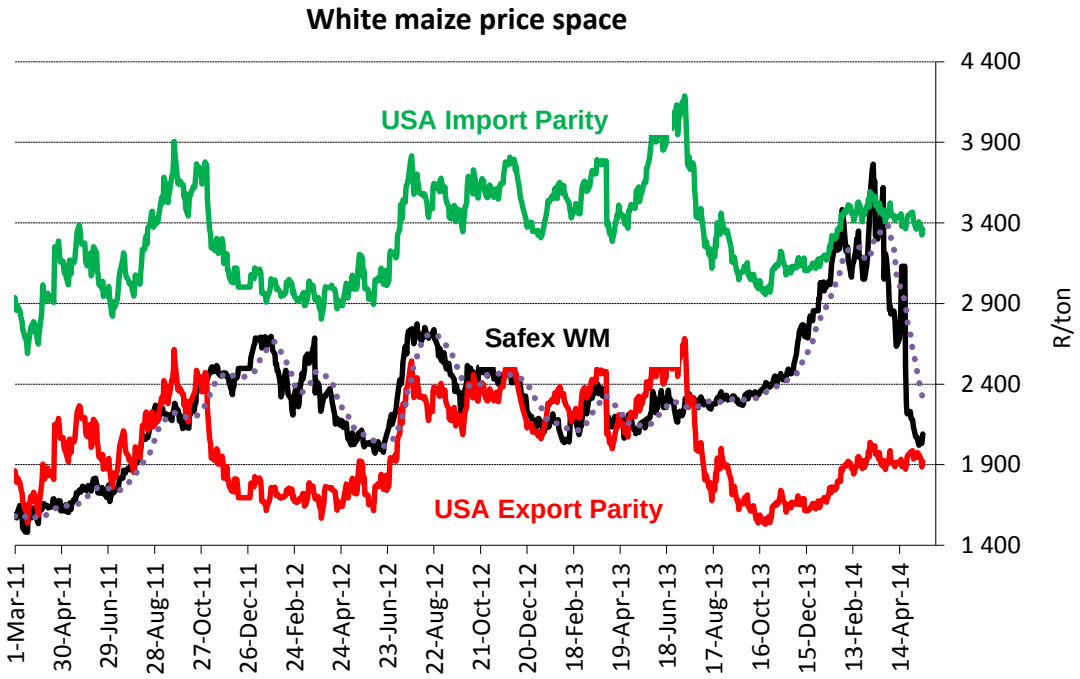

Figure 4: South African white maize price space
Source: GrainSA, April 2014

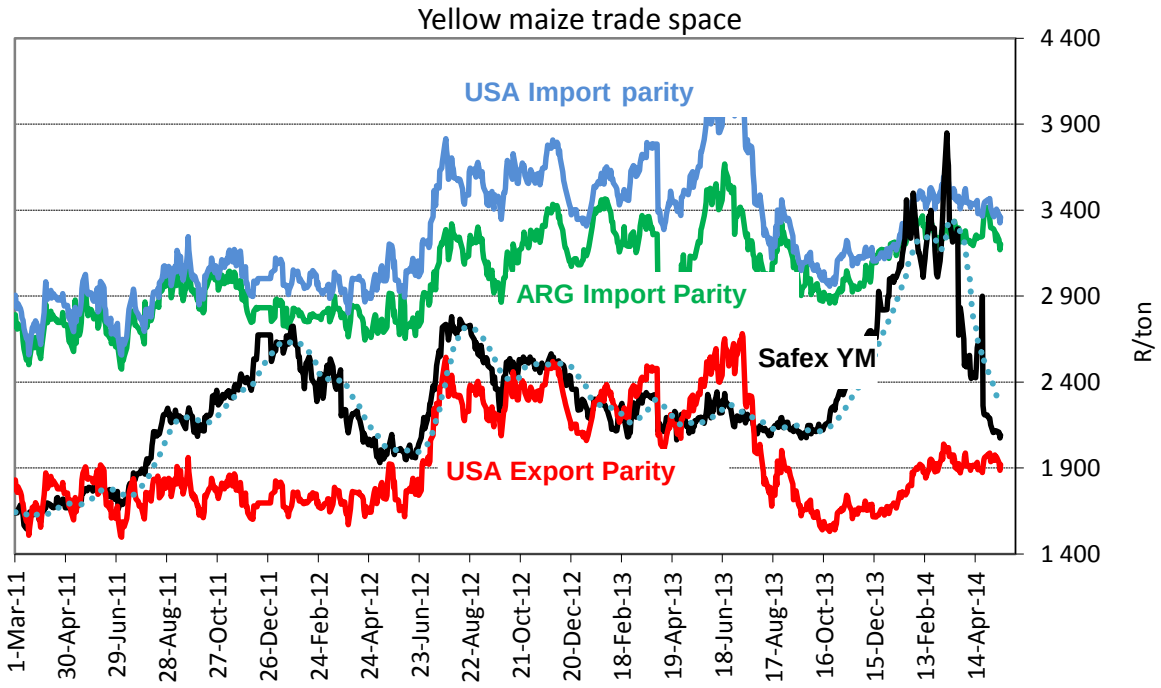

Figure 5: South African yellow maize price space
Source: GrainSA, April 2014

Figures 4 and 5 provide a clear impression of the level of volatility in the SA white and yellow maize markets just over the past two marketing seasons. The first important observation to make is that whereas the annual average prices do not present the opportunities for arbitrage where traders can fix import or export contracts, the monthly prices clearly present the periods where local prices are trading outside of the parity band. Local prices that are trading below export parity levels provide the necessary incentives for exporters to secure export contracts (for e.g. May 2011 and May 2013). These periods where followed by large volumes of exports flowing out of the country and local prices consequently breaking away from export parity levels as stock levels are reduced. Apart from the movement in world prices and the exchange rate, local prices tend to be the highest around planting time. Although there is a discount between the spot price and the futures price at harvesting time in most of the seasons, a price premium is factored into the futures prices, which provides an additional incentive for farmers to plant maize. This price cycle remains an important driver for SA to maintain the position as surplus producer of maize.

From the discussion above it is therefore evident, that trade flow under a free market dispensation provides the required incentives for markets to maintain equilibrium between demand and supply. Having said this, it is worth noting the drastic rise in prices over the period January to March 2014. This represents a period where one can argue that exporters might have overshot their target by securing too high volumes of export contracts and the

market not responding fast enough to the depletion of stock levels by raising prices sufficiently to disincentives exports. The situation was exacerbated by three further events. Although yellow maize could have been imported from Argentina to supplement local stock levels, the specific GM events that are planted in Argentina are not registered in South Africa and therefore a special certification for the imports had to be issued, which took a long time to process within the governmental departments. Secondly, because the Western Cape market is relative small, the local processors had to book a parcel of maize individually for the uptake of a full shipment before it was worth the while for an importer to book such shipment. Typically under free market circumstances this delayed the order time for the shipment. Thirdly, at the time the alternative source of yellow maize imports was the Ukraine, however political instability in this country caused major delays and the shipment of yellow maize arrived a few weeks late, which added to the periodic panic in the local market causing maize prices to rise sharply.

The fact that SA is in a position where future exports do not have to be declared by the exporting companies as is the case in the US, implies that information regarding the future position of export volumes is not transparent to all roleplayers on the market. Over the past two years industry forums have discussed this challenge in detail, which led to the establishment of the National Supply and Demand Estimates Committee that is chaired by the National Agricultural Marketing Council (NAMC). The role of this committee is to compile commodity balance sheet on a monthly basis that project all supply and demand items for maize, wheat, sunflower and soybeans and based on these projections calculate the carry-over stocks at the end of the season. The 2013/14 season was the first year of operation of this committee and the projected ending stock levels that were published by the committee seemed to be relatively on target. One has to assume that it will take some adjustments and a period of validation of this information in the market place. However, despite of transparent market information there will always be external events like the two examples mentioned above that can lead to extreme market volatility over the short run and sometimes resulting in market participants to be caught it tight positions in the market.

3. Destinations for maize exports en sources for maize imports

This section of the study provides an overview of historic export destinations and sources of imports. Figures 6 and 7 illustrate the volumes and destinations of maize trade since 2001. Some of these facts have already been mentioned in the section above. From the graphical presentation it is evident that although SA maize export levels are very volatility, the country has managed to export more than 1 million tons of maize each year following the drought in 2007 and reaching more than 2.5 million tons in 2011 and 2013. When having a closer look at the exporting destinations for white maize, it becomes clear that SA has a handful of “fixed customers” that are always in the market with relatively fixed volumes. These customers are Swaziland, Mozambique, Botswana and Namibia. In most of the seasons Zimbabwe is also importing but the volumes are varying from one season to the

next. In 2005 SA exported more than 1 million tons to Zimbabwe and in 2008 a further 500 000 tons. However, this is a typical example where region trade dynamics started playing a role. Zimbabwe turned to non-GM white maize surpluses produced in Zambia in 2011 and 2012 season. Yet in 2013 the Zambian government introduced export restrictions due to shrinking maize stocks and Zimbabwe turned back to South Africa to supplement white maize stock levels in the country. This is evident from the end period in figure 6 where Zimbabwe becomes the main exporting destination again. In 2009, South Africa exported large volumes of white maize to Kenya despite of Kenya imposing restrictive policies on GM maize. Apart from highlighting the volatile nature of trade within the region, these trends also illustrate the fact that the trade policies with respect to GM maize are not consistently applied in the region.

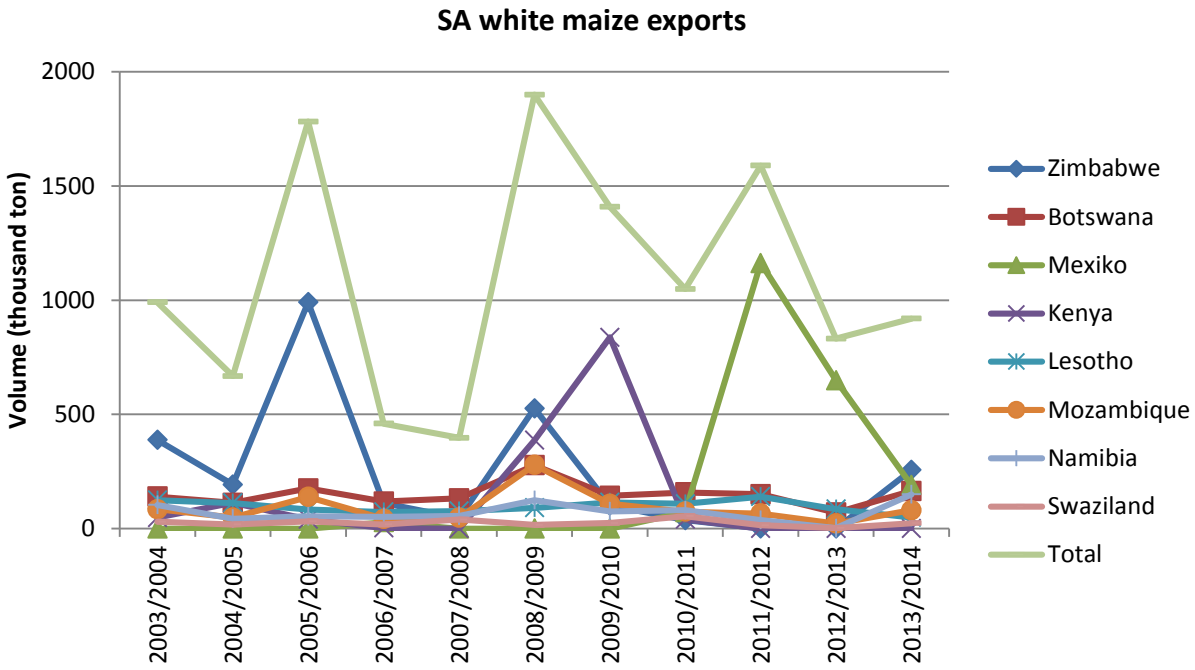

Figure 6: South African white maize exports per destination
Source: SAGIS, April 2014

Since human consumption of white maize as staple food is not common, deep sea export destinations are limited for South African white maize. In 2011/12 season Mexico experienced a drought and SA exported large volumes of white maize for the human consumption market. SA white maize was competitively priced due to large surpluses in the local market.

Similar to white maize, yellow maize export levels are also very volatile and apart from a handful of consistent and small clients engaging in cross-border trade, the major export destinations are changing based on relative pricing of SA yellow maize in the world market. Typical markets where SA yellow maize has in recent years competed include Korea, Japan

and Taiwan. As was previously mentioned, in most of the seasons where large yellow maize export volumes were recorded, the amount of white maize used in the feed market increased. This provides some illustration of the relative competitiveness between white and yellow maize in the international markets. Depending on the season, it is sometimes more profitable to use white maize in the feed market and engage in deep sea exports with yellow maize. Under this scenario, white maize has to trade below the price of yellow maize for it to be absorbed in the feed market.

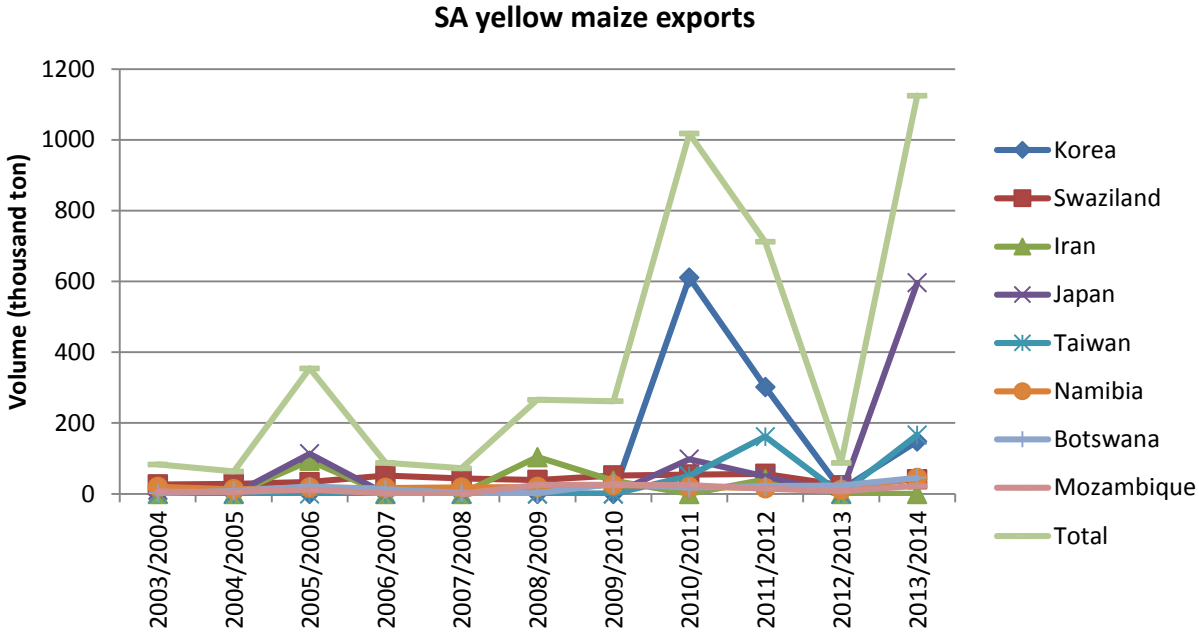

Figure 7: South African yellow maize exports per destination

Source: SAGIS, April 2014

The sources of white maize for imports into South Africa are extremely limited. Over the past decade it was only Zambia that was able to export competitively priced white maize into the South African market. Whereas SA imported relatively consistent volumes of yellow maize into the Cape Town harbour in the past, these imports have basically disappeared beyond 2007 and SA has become a net exporter of yellow maize. There is a wide range of competitive sources of yellow maize in the world market that can be imported to South Africa if local prices increase to import parity levels. These sources include Argentina, Brazil and in more recent years Ukraine has become a very competitive exporter of yellow maize.

It is important to note that apart from varying production levels, the switch between white and yellow maize in the feed market is an important driver to balance ending stocks in the market.

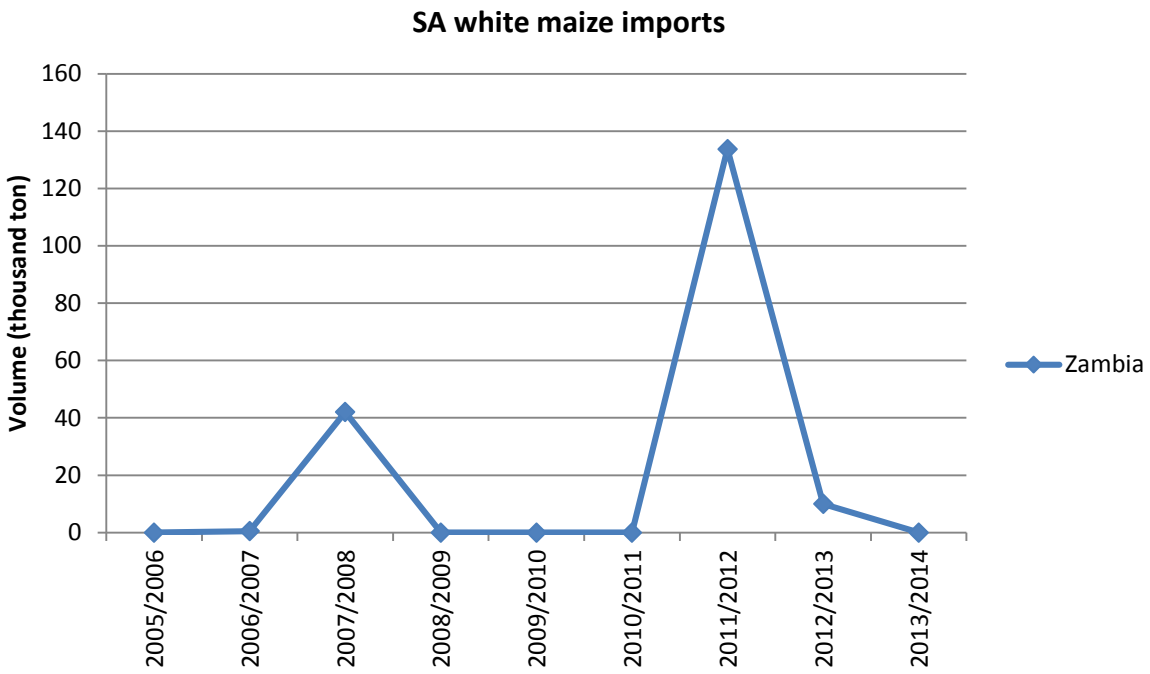

Figure 8: South African white maize imports per destination

Source: SAGIS, April 2014

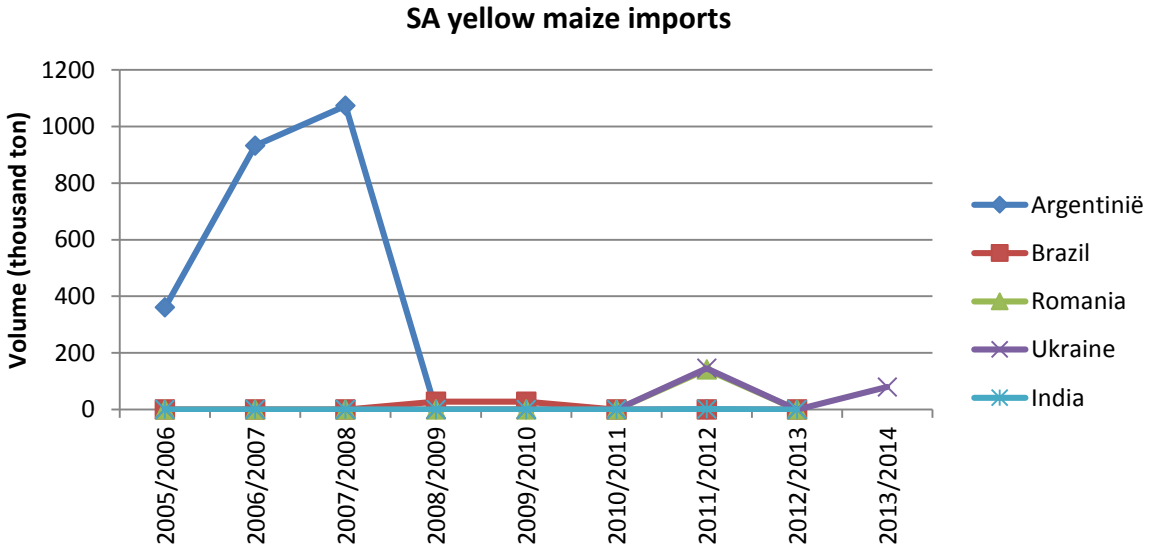

Figure 9: South African yellow maize imports per destination

Source: SAGIS, April 2014

4. Shifting fundamentals in regional maize markets

For the purpose of this study, it is worthwhile to consider the structural changes that have already occurred in regional maize markets or the shifts that might occur in these markets under certain assumptions. Since 2008 a handful of countries in Southern and Eastern Africa have started producing surpluses of maize and although poor infrastructure (roads and storage) provides a major challenge for export large volumes of grain the flow of basic grains across borders has picked up significantly. Figure 8 presents the volumes of maize exported by the various countries excluding South Africa. Although South Africa is by far the leading exporter, significant surpluses have emerged in Zambia, Malawi and Tanzania. Although highly volatile, there has been an increasing trend in the level of surpluses produced in the region, and these surpluses are starting to affect the potential exporting destinations for SA white maize, especially because the white maize that is produced in these countries is non-GM maize.

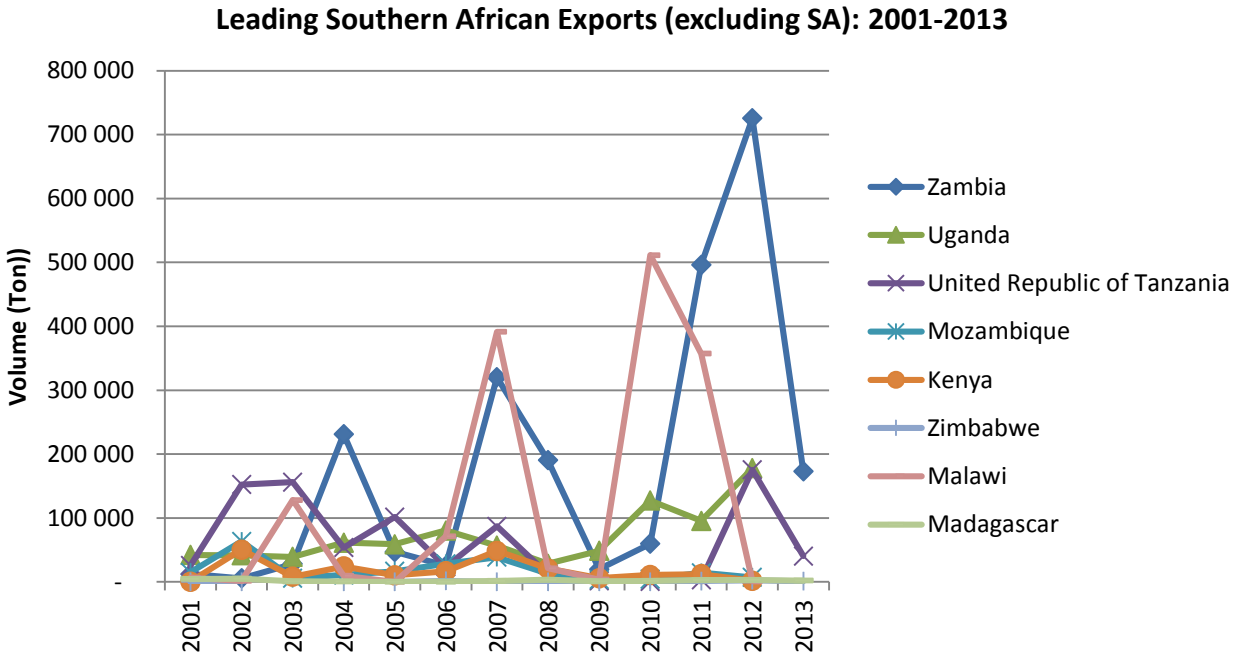

Figure 10: Leading Southern African exporting countries
Source: ITC, April 2014

There are various factors influencing the sharp rise in production in countries like Zambia and Malawi. In the case of Zambia the area of maize area harvested has increased by 64% between 2008 and 2013. Much of this increase can be attributed to farm area expansion resulting from the government's Food Reserve Agency's (FRA) buying activities, which offers a maize price to small scale farmers that is significantly higher than market prices and an expansion of the fertilizer and maize seed subsidy. Together these have provided sufficient incentive for small scale growers to expand the area under maize production. Equally

important, in terms of maize area harvested, has been the favourable weather conditions that have prevailed in Zambia over this same period. However, the generally favourable maize cropping conditions that have prevailed since 2008 did witness some deterioration from 2012 to 2013. A widespread mid-season drought in February and March, which affected the maize crop during its maturation phase, coupled with an early season army worm attack in some major maize producing regions, contributed to an aggregate decline in maize production of 10.8%. This decline is results from a 9.3% decline in maize yields, compared to 2012, and a 1.5% decline in area harvested.

While Zambia has witnessed a general increase in maize production over the last decade, the production of maize on commercial farms has declined significantly. From 2002/03 to 2012/13 maize production on commercial farms has declined by 64.6% from 412,000 tons to 146,014 tons. This decline has been caused a several factors, including the price unpredictability caused by FRA activities in the maize market, particularly since 2010. Beginning in 2010 Zambia has experienced a series of bumper maize harvest. In total the anticipated surplus maize produced in Zambia over that period exceeded 4 million metric tons, of which the FRA bought over 80%. It then off-loaded this maize on to the market at prices below the cost of procurement. Because Zambia's commercial farm sector is prohibited from selling to the FRA, and cannot effectively compete with the FRA's subsidized sales prices of $140-170 mt, many commercial farmers moved out of maize production. Due to favourable domestic market conditions for soyabeans, which are cultivated during the same season as maize, many farmers shifted to soyabeans. The exit of commercial farmers from the maize sector may expose Zambia to greater maize supply risk resulting from weather variability than was previously the case.

Due to the monopolization the surplus maize market in Zambia by the FRA since 2010, private cross border trade in maize has declined substantially. Unable to compete with FRA's buy and sell prices cross border private trading relationships from Zambia to the region have deteriorated. Much of the formal trade that has occurred from Zambia to the region has been conducted as government to government trade, particularly in the case of Zimbabwe, or through the FRA to private traders, and then to export markets. However, the pace of this trade has been impeded by infrastructural bottlenecks, both at border crossings and at FRA silos where maize is loaded. As seen in Figure 11, the market uncertainty caused by FRA activities has limited the integration of the Zambian maize market with the SAFEX and world maize markets. Especially in the past five years, prices have been extremely volatile and there has been a complete disconnect with world markets due to FRA pricing strategies as well as import and export parity bands.

Important developments are underway in Zambia regarding government involvement in national maize markets. Due to the high costs and extensive borrowing associated with FRA's buying and selling practices since 2010, the Government of Zambia has announced

that it will cease to provide subsidized maize to the milling sector in Zambia. This decision may have important implications on the performance of the maize market in 2013. In particular, it is likely that with the removal of the price subsidy, maize processors will re-enter the maize to procure grain from farmers. This may contribute to higher levels of competition for maize, leading to higher prices. This decision may also encourage commercial farmers to re-enter the maize market in 2013/14. Under these market conditions total production is anticipated to top 3 million tons within the next three years and local prices will trade more in line with the world and SAFEX maize prices. As was previously mentioned in the South African outlook, the SAFEX price is anticipated to break away from export parity as South African surpluses are dwindling towards the end of the outlook period.

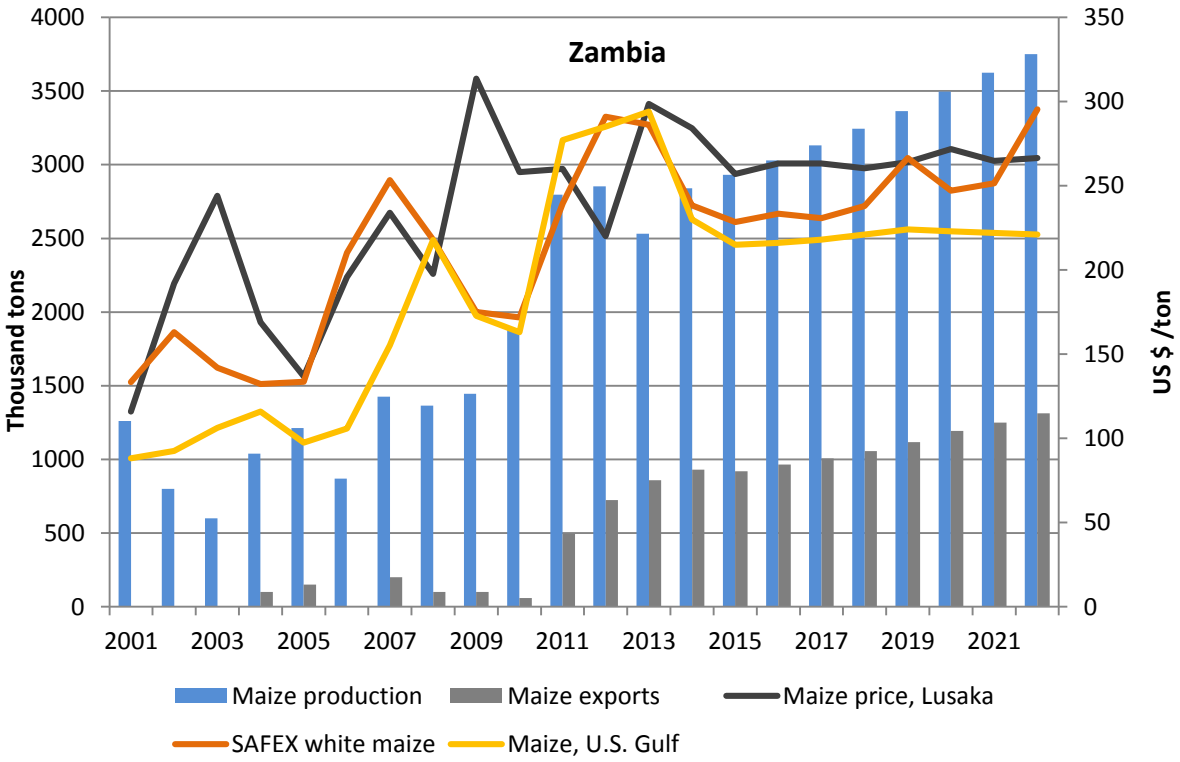

Figure 11: Zambian maize production, exports and prices

Due to significant government intervention in the maize market, there are a number of plausible future scenarios that can evolve. Figure 12 presents three plausible future outcomes where the area under maize production continues to expand rapidly to reach 2.3 million ha by 2022 under the assumption that the market is liberalised and private investment takes place. Another plausible outcome is also presented where the area under maize production declines and is very volatile as government funding is depleted due to the excessively expensive current subsidy programme. Under this scenario, it is likely that some form of government support will still be allocated every fifth year in order to coincide with an election year.

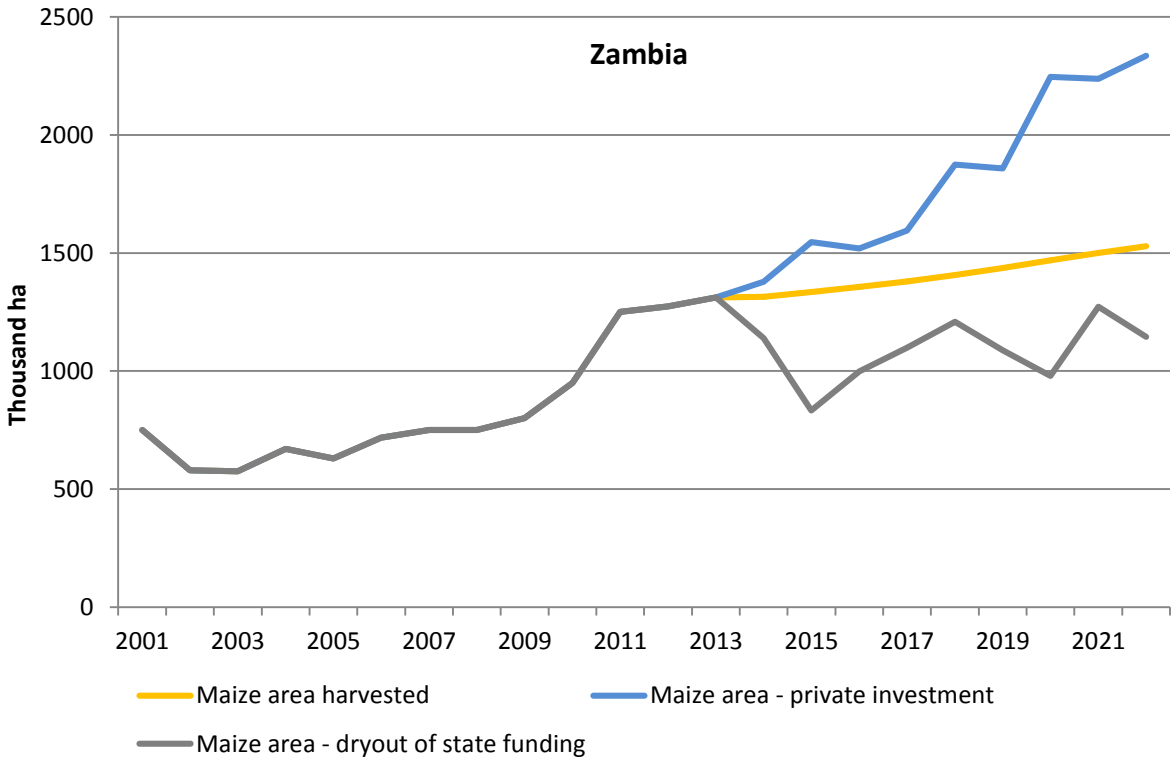

Figure 12: Zambian maize area planted

Under the scenario that presents the middle road also referred to as the baseline scenario, it is assumed that some form of government support will remain, but with more clear direction and signals to the market at what level and timing these support measures might kick in. As a result, the area under maize is anticipated to increase modestly over the period of the outlook. Model simulations illustrate that under the baseline scenario, Zambia will become a major source of exports into the Southern African region with almost 1.5 million tons being exported per annum by 2022. This will only materialise under the assumption of no further export limitations and a general upgrade of border post facilities and infrastructure. Under this scenario, Zambian white maize will become a fierce competitor in the regional white maize markets.

Zambia has vast tracts of land that can be unlocked for agricultural production. There are a number of proposals regarding land reform policies. In each of the ten provinces the government has identified farming blocks of between 100 000 ha to 150 000 ha. Government's vision for each of the farming blocks is to establish one nucleus commercial farming operation of approximately 10 000 ha and then let smaller units develop around the commercial farm. There has been very little private investment so far, but under a favourable political environment, investment in these farming blocks is likely to accelerate. This could bring another 1.5 million hectares under production over the long run.

Although there are a number of countries importing maize, Kenya and Zimbabwe can be classified as the consistent maize importing countries. As previously discussed, Zambian surpluses have been flowing into these markets and it can be expected that these trade patterns will continue to increase if Zambia surpluses rise and infrastructure in the region is improved.

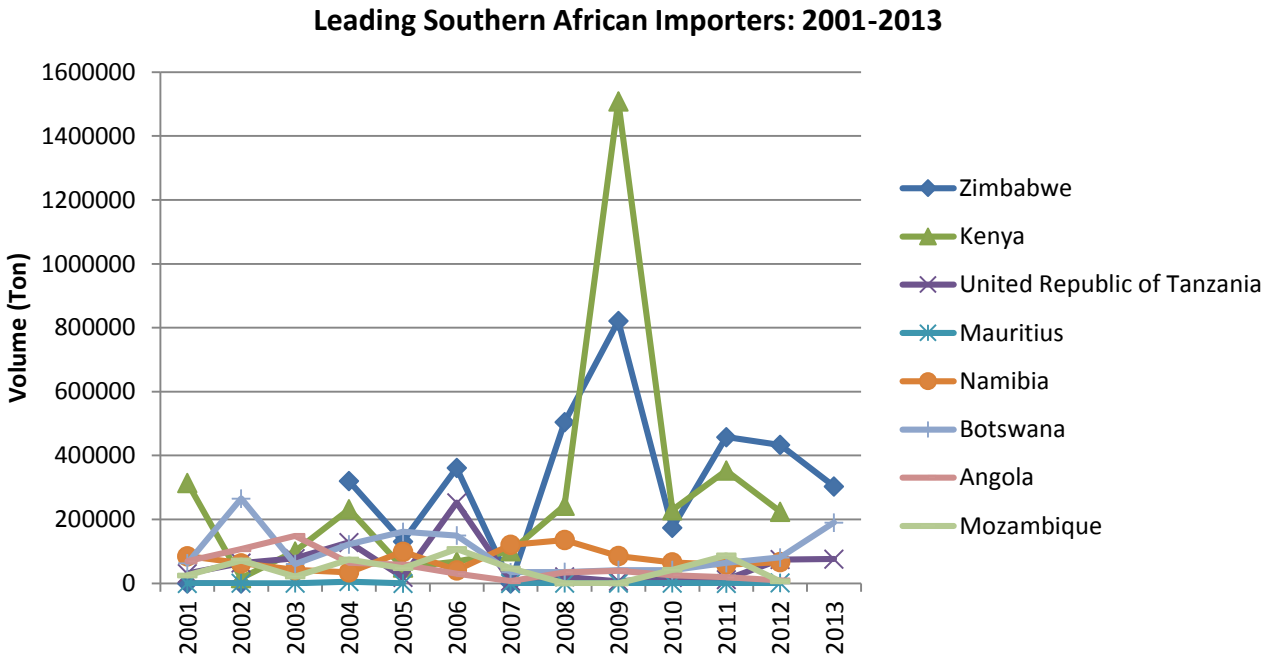

Figure 13: Leading Southern African Importing countries
Source: ITC, April 2014

Lastly, the impact of poor infrastructure on current and potential regional trade flow cannot be overstressed. Recent trends suggest that a rise in investment infrastructure is occurring, which will lower the transaction costs of shifting maize into the future. Figure 14 presents clearly illustrates the major lack of railway lines in Africa to move large volumes of grain at lower prices. Currently most of the grain is moved by trucks. Table 3 shows the Union of African Railways's master plan for the development and improvement of railway lines for 10 corridors in Africa.

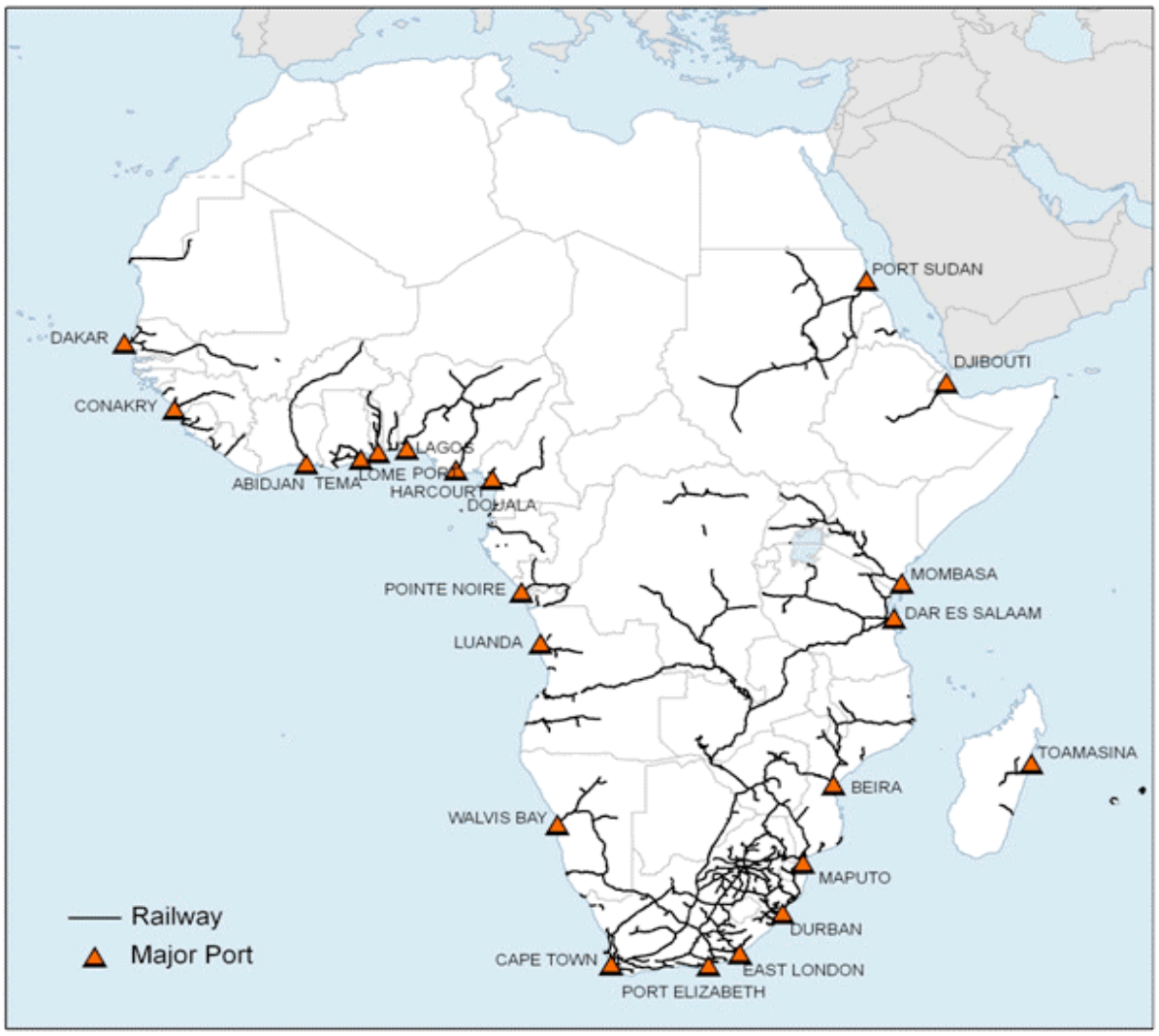

Figure 14: Rail map of Africa
Source: AICD database

Table 3 Union of African Railways 10-corridor master plan

	Corridor	Countries linked
1	North-Centre -South	Libya-Niger-Chad-Central African republic (CAR) CAR-Republic of Congo –DRC-Angola-Namibia
2	West- Centre	Senegal-Mali-Burkina Faso – Niger- Nigeria – Chad Cote d'Ivoire-Ghana-Togo-Benin-Nigeria-Cameroon
3	North-East	Sudan-Ethiopia-Kenya-Tanzania-Uganda
4	North-East-West	Sudan-Chad-Nigeria
5	East-South	Tanzania-Rwanda-DRC-Uganda Dar es Salaam-Kigoma-Burundi
6	East-Centre	Sudan-CAR-Cameron Kenya-Uganda-DRC
7	North	Morocco-Algeria-Tunisia-Libya-Egypt-Mauritania
8	East-South	Tanzania-Zambia-Zimbabwe-Mozambique-South Africa
9	Centre-South	Cameroon-Gabon-Republic of Congo-DRC-Angola-Namibia
10	North-West	Senegal-Mauritania-Morocco

Source: Union of African Railways, 2006

5. An outlook of Southern African maize production – surpluses vs shortfalls

When considering the future trade flow patterns of maize and the potential structural changes that might occur, one has to base this analysis on potential future outcomes of the key supply and demand fundamentals in the Southern African maize industry. The following section presents the commodity balance sheet for various Southern and Eastern African countries and then provides a visual representation of a potential trade flow scenario for maize taking the outlook for the SA maize industry into consideration.

5.1 Regional commodity balance sheets for maize

Over the past year, the Regional Network of Agricultural Policy Research Institutes (ReNAPRI) has been compiling commodity balance sheets for maize for the countries within the network. Although there are still a number of refinements to be undertaken, table 4 presents that first version of these balance sheets. Based on earlier discussions in this paper, the potential future trade flow patterns will have a major impact on the South African maize industry; not only from a production point of view, but also taking a value chain approach into consideration.

Table 4: Maize balance sheets for South-East Africa

SOUTH AFRICA				
Crop supply and utilization	**2011**	**2012**	**2013**	**2014**
Maize area harvested	2372.3	2699.2	2781.0	2729.1
Maize yield	5.4	4.6	4.3	5.1
Maize production	12759.0	12365.0	11900.0	13821.0
Maize imports	422.1	10.0	79.7	0.0
Maize exports	2301.5	919.1	2044.0	2435.0
Maize dom. consumption	10700.0	10800.0	10900.0	10978.9
Maize ending stocks	3676.0	3166.0	1991.0	1941.5
Maize feed dom. consumption	4950.0	5000.0	5100.0	5238.8
Maize food use	5750.0	5800.0	5800.0	5740.1
Zambia	**2011**	**2012**	**2013**	**2014**
Maize area harvested	1102.0	1075.0	1100.0	1133.6
Maize yield	2.7	2.7	2.4	2.4
Maize production	3020.0	2850.0	2600.0	2935.4
Maize imports	5.0	0.0	0.0	1.6
Maize exports	358.2	613.6	142.7	620.0
Maize dom. consumption	2500.0	2500.0	2400.0	2543.7
Maize ending stocks	825.0	675.0	475.0	491.2
Maize feed dom. consumption	500.0	500.0	500.0	526.9
Maize food use	2000.0	2000.0	1900.0	2016.8

Kenya	**2011**	**2012**	**2013**	**2014**
Maize area harvested	2132.0	2266.0	1800.0	2230.2
Maize yield	1.6	1.6	1.4	1.6
Maize production	3377.0	3603.0	2600.0	3587.4
Maize imports	400.0	250.0	900.0	529.5
Maize exports	14.0	7.0	5.0	0.0
Maize dom. consumption	3750.0	3800.0	3750.0	4021.0
Maize ending stocks	433.0	479.0	224.0	319.9
Maize feed dom. consumption	350.0	350.0	300.0	388.6
Maize food use	3400.0	3450.0	3450.0	3632.4

Tanzania	**2011**	**2012**	**2013**	**2014**
Maize area harvested	3288.0	3100.0	3100.0	3232.9
Maize yield	1.32	1.39	1.35	1.43
Maize production	4341.0	4300.0	4200.0	4635.1
Maize imports	0.2	61.9	48.9	45.1
Maize exports	2.1	110.6	39.1	125.0
Maize dom. consumption	4200.0	4400.0	4500.0	4601.0
Maize ending stocks	848.0	673.0	298.0	382.5
Maize feed dom. consumption	400.0	400.0	400.0	419.1
Maize food use	3800.0	4000.0	4100.0	4181.9

Mozambique	**2011**	**2012**	**2013**	**2014**
Maize area harvested	1813.0	1572.0	1400.0	1627.2
Maize yield	1.2	1.1	1.5	1.3
Maize production	2179.0	1746.0	2150.0	2097.0
Maize imports	100.0	100.0	100.0	210.6
Maize exports	5.0	5.0	5.0	4.9
Maize dom. consumption	2100.0	1900.0	2200.0	2287.6
Maize ending stocks	220.0	161.0	206.0	221.0
Maize feed dom. consumption	200.0	200.0	200.0	209.8
Maize food use	1900.0	1700.0	2000.0	2077.9

Malawi	**2011**	**2012**	**2013**	**2014**
Maize area harvested	1675.0	1680.0	1750.0	1715.2
Maize yield	2.2	2.2	2.1	2.2
Maize production	3699.0	3620.0	3680.0	3844.4
Maize imports	10.0	25.0	25.0	24.9
Maize exports	300.0	300.0	100.0	386.4
Maize dom. consumption	3500.0	3500.0	3600.0	3593.8
Maize ending stocks	452.0	297.0	302.0	391.1
Maize feed dom. consumption	500.0	750.0	600.0	632.3
Maize food use	3000.0	2750.0	3000.0	2961.5

Source: Regional Network of Agricultural Policy Research Institutes (ReNAPRI), Mei 2014

5.2 South African maize outlook and the implications for trade

The BFAP baseline projections provide a 10-year outlook of commodity markets. In other words, a future scenario is simulated for the next 10 years that is grounded in a series of assumptions about the general economy, agricultural policies and technological change. The typical macro-economic assumptions that are used to generate the baseline are presented in Table 5 The outlook for international maize prices was generated by the Food and Agricultural Policy Research Institute's (FAPRI at the University of Missouri) in February 2014.

Table 5: Macro-economic baseline assumptions

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Crude Oil Persian Gulf: (USD/barrel)	101.0	95.5	100.9	105.4	109.8	114.3	117.7	121.0	124.4	127.8
SA Population (Millions)	51.2	51.4	51.7	51.9	52.1	52.3	52.6	52.8	53.0	53.3
Exchange Rate (R/USD)	11.00	10.83	11.20	11.56	11.97	12.40	12.84	13.30	13.77	14.26
Yellow maize, US nr 2 fob ($/ton)	231	215	216	218	221	224	223	222	221	218

Source: BFAP & FAPRI, 2014

Since the BFAP sector model also takes future rainfall into consideration when projecting the area planted and the yield for a specific crop, a further critical driver that has to be incorporated is the future expectations of rainfall. Traditionally in this type of modelling exercise, it is assumed that "normal" rainfall conditions will prevail and in BFAP's baseline analysis "normal rainfall" is taken as the average rainfall received over the past thirty years from Weather SA's database. One can, therefore, anticipate that the deterministic outlook is far less volatile than what will actually be the case. In order to simulate any alternative outcome and to illustrate the impact of volatile weather conditions, the model is simulated stochastically where the variability of precipitation that occurred in the past, is projected into the future.

Figure 15 presents the projected levels of white maize production, consumption and yield under the baseline assumptions. The difference between demand and supply represents the projected trade flows. Despite varying yields over time, there is a strong upward trend in national yields that is offsetting the decline in the area under production, a surplus of white maize will be produced over the outlook. Another important trend to pick up from the white maize market is that of the domestic consumption of white maize which is expected to remain flat as people move to higher income levels, where the general shift is from maize meal to bread and rice. Over the outlook, approximately 1.3 million tons of white maize will be available for exports.

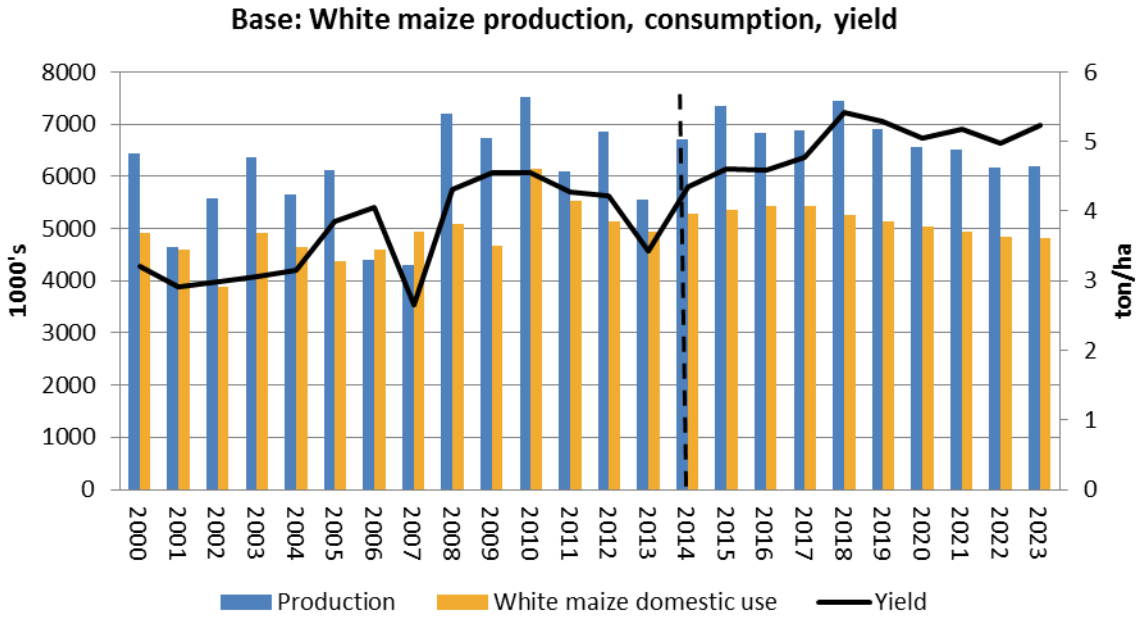

Figure 15: Base - White maize production, consumption and yield

The corresponding price and trade space for white maize is presented in Figure 16. Local white maize prices are expected to gradually ease away from export parity levels as the area under production shrinks and the stock levels are declining.

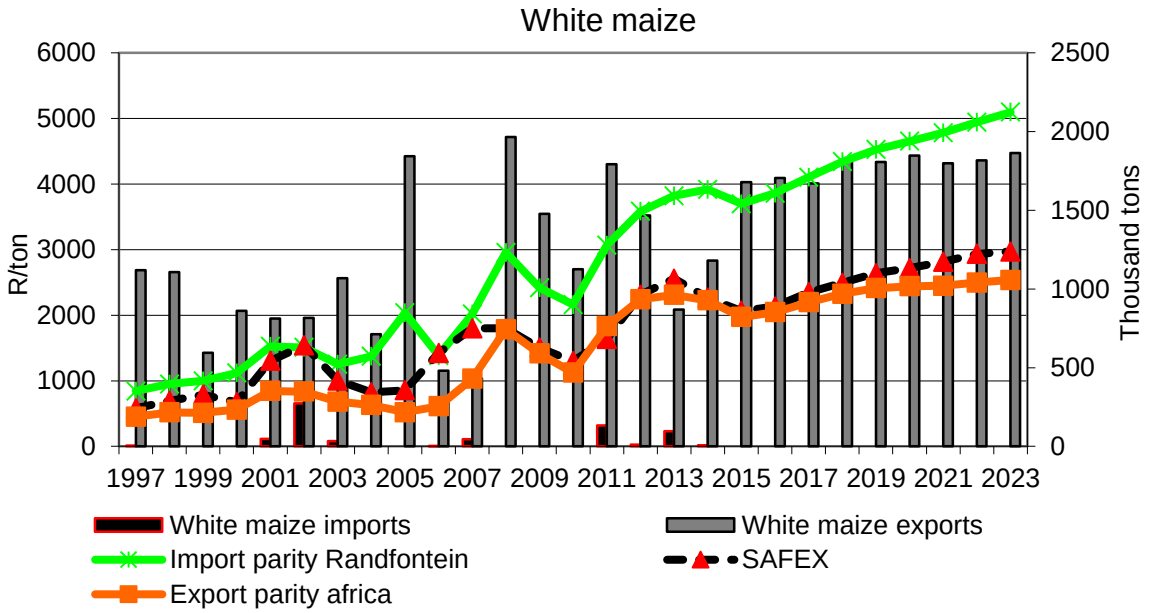

Figure 16: White maize price and trade space

In the case of yellow maize (Figure 17) the balance between demand and supply is significantly tighter with the demand for yellow maize increasing rapidly in the feed market on the back of larger livestock production, mainly poultry. Despite of a strong growth in

yields, the supply of yellow maize is barely able to keep up with demand in most of the years. The projected volume of yellow maize exports is expected to decline over time.

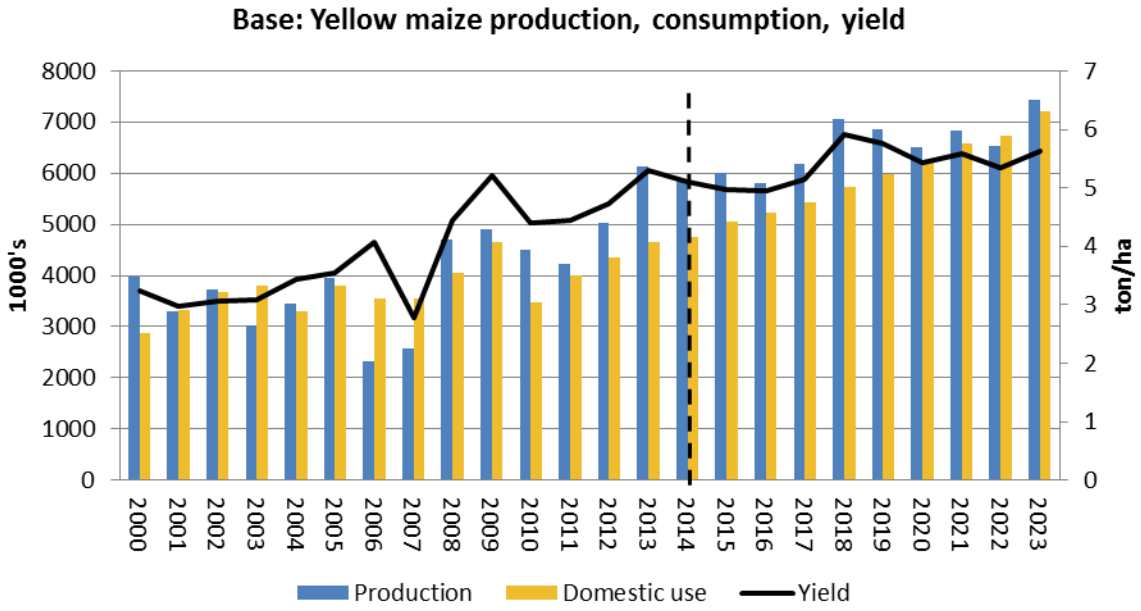

Figure 17: Yellow maize production, consumption and yield

Figure 18 presents the corresponding price and trade space for yellow maize. The rise in demand is expected to outpace the rise in production (despite of the increasing trend in yields) and therefore yellow maize exports and projected to decline over time. Naturally, in the feed market yellow maize can be substituted with white maize with a slight price premium and therefore the level of correlation between these two markets will remain high. However, due to lower stock levels the model simulates a sharp increase in yellow maize prices towards the end of the outlook period.

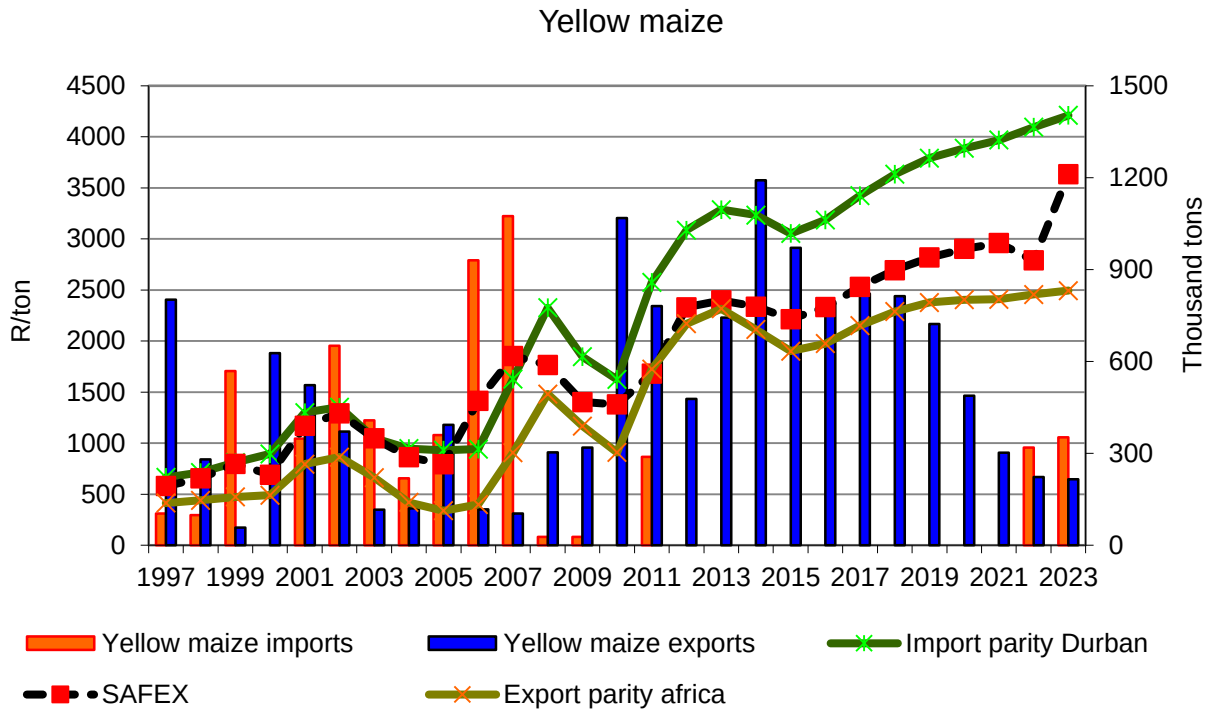

Figure 18: Base Yellow maize price and trade space

5.3 Potential trade flow scenarios for 2014/15

In this last section of the report, the focus shifts to the 2014/15 marketing seasons, which provides an interesting case study for potential future scenarios that could unfold with respect to maize trade in the region. Adding up the anticipated maize production figures in 2014, it is plausible that 2014 could be the year where the largest maize crop is produced in the history of the region. This has vast implication for the potential maize trade flow patterns for the 2014/15 marketing season. Figure 19 illustrates that maize production is anticipated to increase from 2013 in all of the countries, except for Mozambique. The main regional maize trade flow that is anticipated based on these production levels is presented in figure 2020.

South Africa remains the largest producer of maize by a significant margin with production reaching almost 14 million tons. The BFAP model projects that maize exports will exceed 2 million tons and the majority of these exports will have to have to find deep sea export markets. It is anticipated that South Africa will service its long-standing clients with some smaller volumes of white and yellow maize moving across the borders. In terms of production, Tanzania lies second with an estimated maize crop of 4.6 million tons. Yet, domestic consumption is expected to fall in the same range and therefore only relatively small volumes of white maize will be exported, mainly in the form of unofficial cross-border trade with Kenya where maize prices are significantly higher.

Zambian will most likely harvest more than 3 million tons with approximately 700 000 tons available for the export market. This is non-GM white maize and depending on government policies, the majority of surpluses can be exported to Zimbabwe, where a shortfall of at least 500 000 tons of maize has to be supplemented by imports.

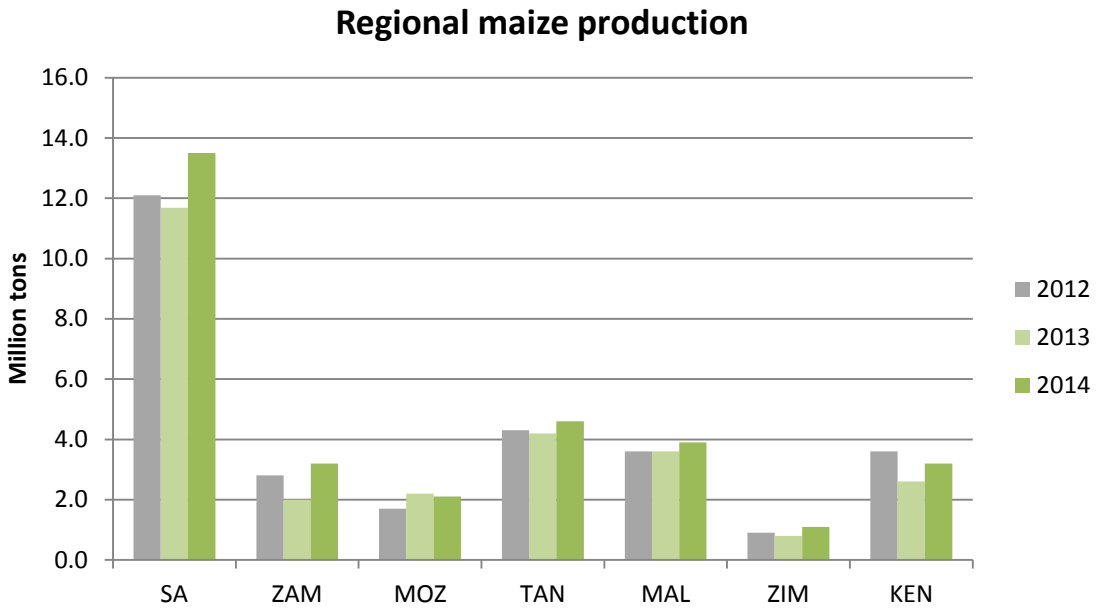

Figure 19: Recent trends in regional Maize production

Although a much improved maize harvest is expected in Kenya compared to the crop in 2013, its domestic consumption levels are also increasing and this market will also be in a shortfall of approximately 600 000 tons. Kenya also has trade policies in place related to the importation of GM maize, which again makes Zambia and Malawi an attractive bidder for the Kenyan demand for maize. For the past few years Malawi has consistently produced a surplus of maize and has exported maize to various destinations including Northern Mozambique, the DRC and the southern parts of Tanzania.

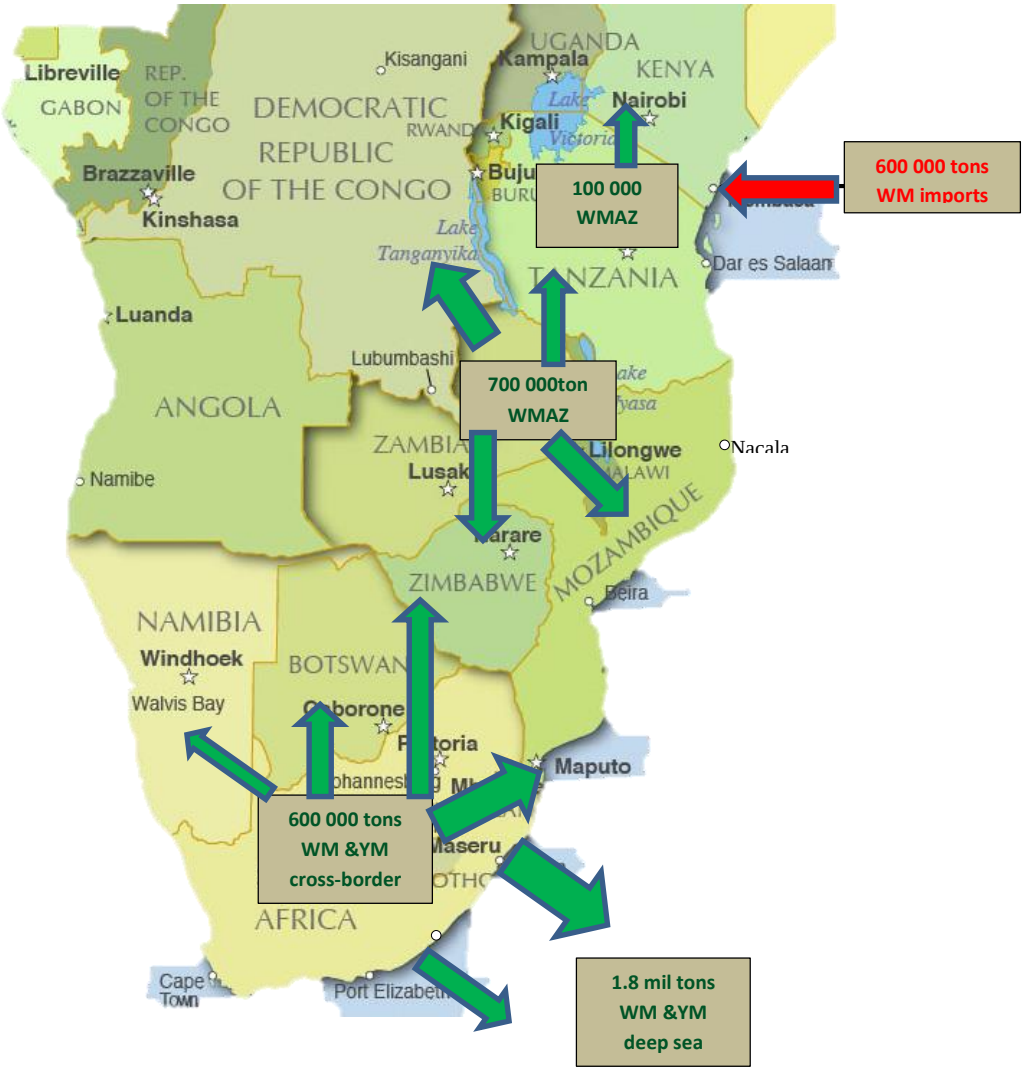

Figure 20: Potential maize trade flow map, 2014/15

6. Conclusion

The study has presented a strategic overview of current and potential future maize trade flow patterns in South Africa and the region. From the empirical findings it is clear that SA will remain the largest maize producer and exporter of maize grain in the foreseeable future. However, the structural changes occurring in the Southern and Eastern African countries will increasingly play a role. Alone the surpluses produced by countries like Zambia will potentially displace South African maize exports into Kenya and Zimbabwe as these countries still follow erratic border policies when it comes to genetically modified maize. The most plausible outcome for South African maize trade is that future levels of maize exports into the region will decline as the regional level of production gradually increases.

7. References

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