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**FINAL REPORT**

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**THE CRITICAL REVIEW OF THE ROLE AND IMPORTANCE OF THE  
AGRICULTURAL SECTOR IN THE ECONOMY AND DEVELOPMENT OF THE  
FREE STATE PROVINCE: A COMPUTABLE GENERAL EQUILIBRIUM (CGE)  
BASED RESEARCH.**

**A RESEARCH PROPOSAL UNDERTAKEN ON BEHALF OF THE FREE STATE PROVINCE  
DEPARTMENT OF TREASURY**

**BY**

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# Executive Summary

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## **Report 1 – A profile of the Free State Agricultural sector.**

This part of the report is on the profile of the Free State Province agricultural sector. Agriculture is an extremely important sector but it is also a sector that changes with the economic growth of the country. Linked to growth in the economy are changes in consumer demand and also the influence of globalization in the industry has led to various changes in production techniques and processing. The Free State, known as the “Granary of the Country”, and has arable land covering 3.2 million ha, whilst natural veld and grazing cover 8.7 million ha.

A short review of the different agricultural industries is given, along with the most favourable areas of production. The increase in the profitability of game hunting has resulted in many farms changing into game farms, specifically in the western and southern reaches of the province. Sheep farming mostly dominates the southern area of the province. Wine is also produced in the Jacobsdal district and the two main producers are Landzicht and Wilreza Cellars. Potatoes also comprise a large part of the production in the area because of the access to irrigation. Sheep farming is again found in the Smithfield district. Grass plains characterize the Motheo district with mountains in the east. Commercial livestock farming is mainly found at Montsopa and Naledi while the eastern parts are predominantly utilized for potato and sunflower farming. A large fruit juice concentrate manufacturer has its factory in Bloemfontein.

The province is the largest producer of grain crops in the country and the second largest producer of sunflower seed, groundnuts and dry beans. 90% of the country’s cherry crop is produced in the Ficksburg area; the town also has two asparagus factories where both green and white asparagus are processed. Soya, sorghum, sunflowers and wheat are also produced in the Eastern Free State. 40% of the country’s potatoes are cultivated in the high-lying areas of the province (South African Year Book, 2010). In 2008, more than half of the national sorghum and sunflower output was produced in the province and the provincial share was 54% and 52% respectively. Overall, 100 000t of vegetables and 40 000t of fruit are produced in the Free State annually. Also, more than a million tons of cut flowers are exported annually. 23% of all wool and 18% of all dairy products nationally are produced in the region. Together, these are two of the largest contributors of livestock production income (South African Year Book, 2010).

Agricultural employment was reviewed which was found to have decreased as well as formal highly skilled employment in the province. Informal employment has increased; which shows that there is a “brain-drain” occurring in the Free State, where the highly skilled people are moving away. The fact that many company headquarters are situated in Gauteng and Western Cape has moved the highly skilled people out of the province. The number of HIV infections has increased, not as steeply as 1995 – 2000 but the trend is still upward, thereby also removing persons from the economically active part of the population. Certain industries have been

identified by BFAP as growing industries with high-employment potential. These industries are successful in the Free State province and, therefore, should be focused on. Examples include citrus, cherries, vegetables.

The following industries such as wheat, maize, sorghum, soybeans, livestock, poultry, eggs and dairy, were profiled, in terms of their production and, price trends in the Free State province. Agriculture in South Africa plays a significant role in the economy by contributing 3% to the GDP of the country. More in particular the Free State Province is one of the largest contributors of field crops and livestock production in South Africa. Field crop production in this province included the production of wheat, maize and oil seeds. The Free State Province produces a third of South Africa's wheat and maize. Wheat is the second most important field crop that is produced. It contributes about 250 000 tons of wheat per year. South Africa is a net importer of wheat. The country imports 1 100 000 tons of wheat per year. Prices increased over the last number of years, the reason for the sharp increase in prices is mainly due to a shortage of wheat and the price of wheat moving to import parity. Maize production in the Free State Province exceeds 3 000 000 tons per year, and is one of the largest procurers of maize in South Africa. Maize production increased over the last number of years. The total land utilized for production has decreased; this is an indication that farmers have become more productive over time.

The Free State Province plays an important role in the livestock sector of South Africa, contributing 16% of the total cattle numbers and 17% of the total small stock numbers. Over time the national stock numbers remained constant, but the Free State Province showed an increase in stock numbers. When a closer pitcher is taken there is a decrease in stock number over the last three years. This is mainly due to the many challenges over the last number of years. Drought, animal diseases, stock theft and predation have become a growing problem for farmers. As previously said, the total livestock numbers have declined over the last number of years. Farmers want to reduce risk in farming; meaning that there is a tendency to move from small livestock to large livestock. Predation and stock theft are some of the main reasons. Predation in the Free State amounts to almost 6% of total stock per year and stock theft increased by almost 9% of small stock in South Africa (RPO, 2011). Due to a combination of all of these factors, under-supply of meat, especially sheep has occurred. This shortage has had an effect on the price of meat - over the last 3 years an increase of prices can be seen.

In the final part of Report 1, "Review of the role of Agriculture in the Free State Province" the authors briefly compiled a risk identification matrix to identify the risks in the macro and micro perspective of the province. The final part consists of recommendations made by the authors in light of the above findings.

## **Report 2 – Social Accounting Matrix (SAM) and Computable General Equilibrium (CGE) Simulations.**

In report one, the profile of the Free State Agricultural sector was presented. The theoretical perspective of the economic growth and development and the role of agriculture were also discussed with reference to the situation in the Free State Province.

In this section, the SAM and CGE models were used to empirically analyse the role of agriculture by determining whether it is still capable of stimulating economic growth and development in the province.

The two main objectives of this section are to:

- To investigate the inter-linkages (backward and forward) between agriculture and other sectors and industries in the province and outside and
- To identify evidence-based targeted policy interventions and practical programmes to revive agriculture in the Free State.

The results show that the subsistence sector uses more semi-skilled and unskilled labour than the commercial agriculture and more value added from this sector is contributed by semi-skilled and unskilled labour than the commercial agriculture. There is a great demand for agricultural intermediate inputs from the non-agricultural sectors especially the agro-processing sectors. The results show that for each R100 worth of agricultural output, R22.3 must be spent on intermediate inputs from the activity/services sector. This is an indication of backward linkages. The result also shows that others sectors such as transport, trade, the chemical and grain sectors have strong backwards linkages with agriculture.

Strong forward linkages are shown between agriculture and manufacturing sectors, especially the agro-processing sub-sectors. This is because the greatest demands for agricultural intermediates are in this sector. There are few or limited intermediate input use from subsistence agriculture to both commercial and subsistence sectors. This implies a decrease in the productive use of agricultural intermediate inputs to produce more agricultural outputs.

Agriculture in the Free State as depicted in the SAM analysis is both capital and labour intensive but they are low-skilled labour intensive. Agriculture has a very small share of the consumption spending across the different household categories while agro-processing manufacturing has the largest share. The results show that households consume less of agricultural goods but more of manufacture and services.

Low-income households spend large portion of their income on manufactured products such as meat, fish, vegetable, grains, dairy and beverages but less on primary agricultural produce. Household income in the SAM is mainly from labour returns and non-factor incomes such as

government transfers and foreign remittances. Labour income accounts for 62.85 % of the total income for the middle income households, 37.15 % are transfer incomes from the South African government, the RSA and the ROW. The low-middle income group earn 30.65 % from labour income whereas the low-income group earn 20.03 from labour other incomes are transfers and remittances.

Manufacturing and services have the largest shares of the government expenditure across the three spheres and the departments (National, provincial and local). The provincial education department spends most of its income on manufacturing and transport services while the local government consumes most of manufacturing and utilities. About 34.81 % of the manufacturing is consumed by the national government in the province, 32.82 % by provincial education and 17.5 % by local government. The local government has the largest share of utilities consumed (23.95 %).

The SAM multiplier analysis depicts that agriculture has strong backward and forward linkages with other sectors. The results show that the change in the demand for agricultural commodities as a result of R1 million increase in agricultural export demand generates greater output multiplier effect than vice versa. The results show that the total person year equivalent employment in the agricultural sector following an increase in the exogenous demand by R1 million is 10. Others include; manufacturing (22), mining (9), agro-processing (9), Utility (8), construction (4), trade (6), private services (52) and public services (27).

In the CGE modelling scenario, the forward and backward linkages between agriculture and other sectors made the output price of the sectors with the strongest linkages with agriculture (for example agro-processing sector) to increase as agricultural output increases. Due to increased productivity, agricultural producers will demand more factors of production hence the quantity of factor supply increases.

In the last section of the report, we simulate the economy and decompose impacts to the agricultural sub-sector levels. In others words, the strength of the sub-sectors in terms of contribution to GDP and employment subject to investment project or cash injection into agriculture is examined. The result shows that for every R10 million injection into agriculture, the livestock sub-sector contributes 46.68 % to the agricultural GDP, field crops contribute 44.64%, and horticulture contributes 8.63%. Beef cattle, poultry, sheep and goat play major roles to the GDP of the livestock sub-sector. The major contributors in the field crop sub-sector are maize with 29.44%; wheat, 8.34%; and sunflower, 2.42%. Potato contributes 7% whereas others contribute less than 1 %. The contribution of aquaculture and forestry are minimal compared to other sub-sectors. The potential for job creation due to a cash injection into the agricultural sector is shown as follows: field crop will contribute 58.01% to employment; horticulture 24.25 % while livestock sector will contribute 17.64%. Most jobs are created in the field crop, with maize

contributing 27.33%, wheat, 14.85%, sunflower, 6.33%, legumes, 3.6 %and fodder, 2.05 %. Overall, the total employment due to a cash injection in the agricultural sector is calculated to be 80.15.

The major recommendations that stem from the study are as follows:

- Increase productive use of agricultural intermediate inputs to produce more agricultural outputs; This is a simple way of saying make efficient use of intermediates inputs from non-agriculture; use less intermediate from non-agriculture but increase intermediate demand by agriculture for agricultural inputs, thus producing more with the same amount of inputs (intermediate, labour and capital).
- Approve agricultural funds to only service providers or stakeholders who have, or, are more likely to invest in agriculture in the province. This practice has feedback effects and minimizes leakages from the sector.
- Increase government expenditure in the agricultural sector to help stimulate job creation through increased farm income and consumption expenditures in the sector.
- Agriculture has been found in the study to have strong linkages with agro-processing sector; therefore, it important to expand agricultural output through expanding the agro-processing sector. This can be achieved through the establishment of agro-processing units especially in the sub-sectors with high employment multipliers.
- Increase the efficiency and productivity in the sector through increased education training of farmers and farm workers.
- Increase the expenditure in research and development in the agricultural sector.

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## **REPORT 1**

### **Section 1. The profile of the Free State province agricultural sector**

#### **1.1 Agriculture in economic development: historical perspectives**

Agriculture in the past was seen as a passive sector that naturally declines as the economy grows, but the successes in certain parts of the world, for example, the green revolution in Asia, has helped reshape modern thinking that the sector can contribute immensely by creating linkages among other sectors and stimulating growth in the economy. Many schools of thought who, in one way or the other, refuted or supported it have for more than two centuries, debated these views. In this report, it is important to trace the early historical theories and empirical studies on economic development in order to gain an understanding of the role agriculture plays in the overall economic transformation of a country.

Most western development economists in the 1950s and 1960s namely, the classical and the development economists, did not view agriculture as an important contributor to economic growth. Economic growth was seen as the structural transformation of the economy with the decline in agriculture's relative share of the national product and of the labour force, which in their thinking is a prerequisite for economic growth. According to the classical economist (Norton and Alwang, 1993), the reason is that in the early stages of development, agriculture has surplus labour with an abundant supply of natural resources and increasing population, thus productivity tends to be high.

During the course of development, as productivity accumulates, there is an increase in the demand for labour and with the given population in the short-run, wages rise. As the population grows, the demand for food increases and, if high quality land is in fixed supply (as is usually the case), demand is matched with supply by bringing marginal land into production. Under this circumstance, the price of food rises to cover the cost of production and because of the

diminishing returns to increased labour supply applied to a fixed supply of land, there is a constraint to growth, leading to a decline in productivity in the agricultural sector.

For this reason, the development economists, influenced by a popular article by Arthur Lewis in (1954), "*Economic Development with Unlimited Supply of Labour*," postulates that since economic growth facilitates the structural transformation of the economy in the long-run, the rapid transfer of surplus labour and other resources from traditional agriculture to industry (non-agriculture) - the presumed engine of growth, was an appropriate short-run strategy (Eicher & Staadz, 1990). Some reasons amongst others, explain their viewpoint. Firstly, as per capita income increases during the early stages of growth, the proportion of household expenditure on food falls, consequently, the income elasticity of agricultural food falls below one and declines further with higher income in exchange for the increased demand for industrial commodities or imports. This is what is known as the Engel's law. Secondly, if output per labour increases, surplus labour becomes redundant, implying a transfer of labour to other sectors is an optimal option.

These and other views about the role of agriculture in economic development between 1950 and 1960 led to total neglect of agriculture until the later part of the 1960s to 1980s when this attitude was revised. There was a rethink (Fei & Ranis, 1964; Johnston, 1970; Johnston & Mellor, 1961; and Jorgensen, 1961; 1962). Johnston & Mellor (1961) argue that agriculture plays an important role during structural economic transformation by providing food, labour, capital, foreign exchange and market for domestic industry. Accordingly, growth in industrial employment depends on the rate of growth in agricultural surplus. In other words, the neglect of agriculture will lead to food shortages that choke off growth in the industrial sector. This fact stresses not only the importance of agriculture in economic development, but also the inter-dependence between agriculture and industrial sector. Therefore, understanding the relationship between agriculture and industrial sector and how agricultural transformation influences economic transformation, is necessary if growth is to be achieved. These are discussed in the next section.

## **1.2 Factors influencing the rate of economic transformation: implication for agriculture**

During the early stages of growth, as the population increases, the labour force expands: at this stage there are more productive hands; as a result, with optimal utilization of available resources, output expands in the short-run. In the long-run, as development proceeds, the role of population in economic transformation will depend strongly on: the rate of growth of the entire population relative to the labour force; the proportion of the labour force that is initially in agriculture and the rate of growth of the industrial labour force. If there are more economically inactive people relative to active labour force, the net effect of population growth will be negative; that is, there will be pressure on food, employment and on natural resource base, because there are large numbers of consumers but few productive hands.

During the growth stages, agriculture releases labour to the industry where labour productivity is thought to be higher. The rate at which this occurs has an important implication for economic transformation. Notably, during the period of increased industrialization as growth proceeds, the industrial wage increases in value leading to increase in wages; if at this stage productivity in agriculture is not sustained; higher industrial wage rate will cause labour to migrate to industry. Under this circumstance, Norton and Alwang (1993) suggest that the rate of economic transformation depends on whether the industrial sector offers higher wages than agriculture; whether agriculture is the residual claimant of labour; if not, whether productivity in agriculture is sustainably high enough to allow labour to migrate to the industrial sector without sacrificing food production. If productivity in agriculture is sustainable at this stage, equilibrium will still be maintained as labourers migrate to the industry without a resultant decline in agriculture.

On the other hand, even though the industry is the residual claimant of labour, equilibrium conditions will still be reached because of the adjustment cost involved and because of the fact that the industrial sector may not absorb all the labour migrants. For the industrial sector to absorb all the labour migrants, its growth rate must outweigh the rate at which the total labour force grows. Therefore, the question is whether the industrial sector has the capacity to absorb all the increased labour due to population growth. If not, an intervention strategy that will champion the course of growth and development is needed. The question is: what type of developmental

strategy is the most appropriate? Should agricultural development precede or take priority over industrial expansion, or should both sectors grow simultaneously? Opinions on this issue may vary because both sectors have different characteristics and growth potentials. Firstly, factor proportion is greater in agriculture than in industry; that is, a higher proportion of land to labour ratio is required in agriculture than in industry. This will be seen later on in the report.

As a result, a greater ease of specialization in industry than in agriculture is observed, thereby resulting in increased output per unit of labour used. Secondly, as explained previously, there is a circular decline in agriculture productivity and substantial expansion in the industry as development proceeds. This phenomenon is a crucial developmental process and structural transformation and does not mean that agriculture is less important, but as Johnston and Mellor (1961) explain, it is a necessary condition for a self-sustaining growth. Therefore, simultaneous growth in both sectors may be pursued, provided there is adequate resource endowment to enable agriculture to develop while minimizing its demands upon resources most needed for industrial development but maximizing its net contribution to the capital required for general economic growth. With the above theoretical background in mind, it will be important to know the current situation in the Free State province in terms of the development of the agricultural sector. The next section provides background information about the Free State agricultural sector.

## **2.0 Background information on Agriculture in the Free State**

The Free State, known as the “Granary of the Country”, has arable land covering 3.2 million ha, whilst natural veld and grazing cover 8.7 million ha. The increase in the profitability of game hunting has resulted in many farms changing into game farms, specifically in the western and southern reaches of the province. Sheep farming mostly dominates the southern area of the province. Wine is also produced in the Jacobsdal district and the two main producers are Landzicht and Wilreza Cellars. Potatoes also comprise a large part of the production in the area because of the access to irrigation. Sheep farming is again found in the Smithfield district. Grass plains characterize the Motheo district with mountains in the east. Commercial livestock farming is mainly found at Montsopa and Naledi while the eastern parts are predominantly utilized for

potato and sunflower farming. A large fruit juice concentrate manufacturer has its factory in Bloemfontein.

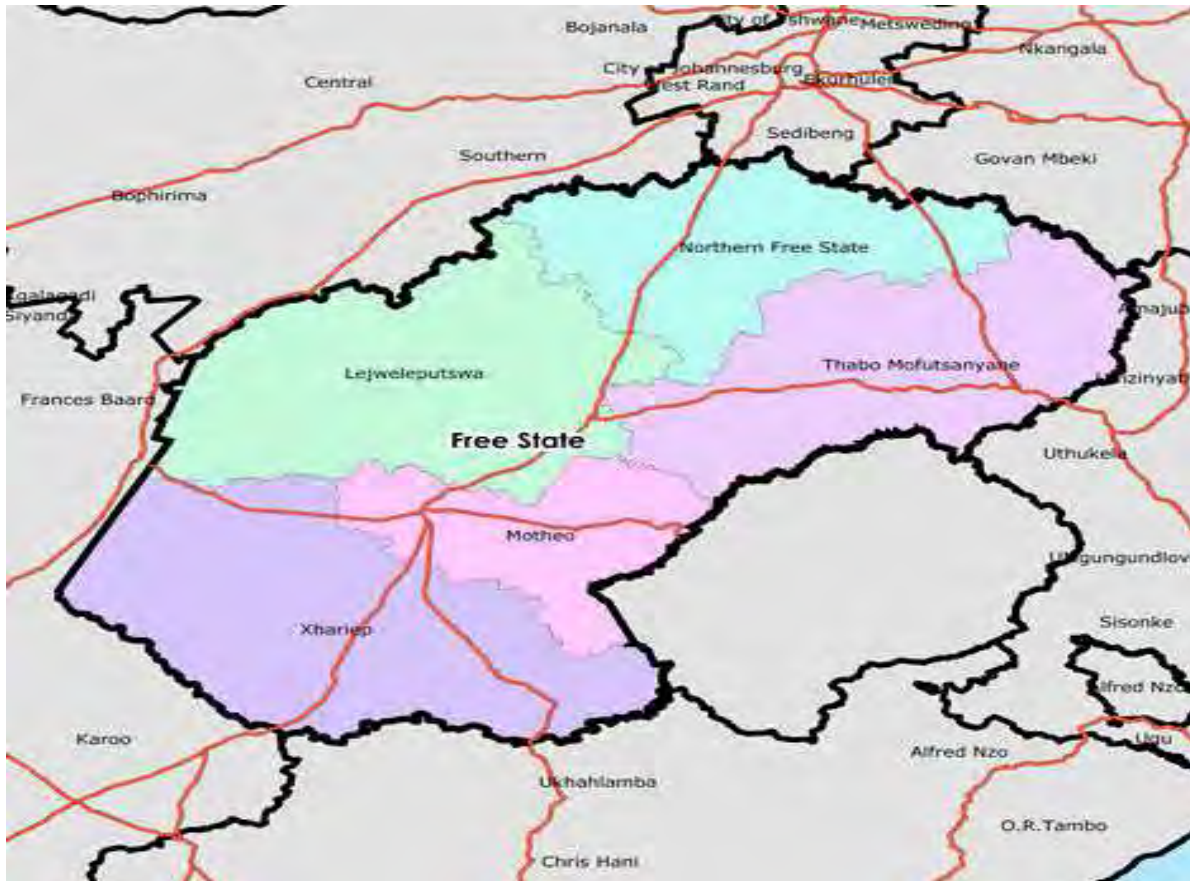
The province is the largest producer of grain crops in the country and the second largest producer of sunflower seed, groundnuts and dry beans. 90% of the country's cherry crop is produced in the Ficksburg area; the town also has two asparagus factories where both green and white asparagus are processed. Soya, sorghum, sunflowers and wheat are also produced in the Eastern Free State. 40% of the country's potatoes are cultivated in the high-lying areas of the province (South African Year Book, 2010). By 2008, more than half of the national sorghum and sunflower output was produced in the province and the provincial share was 54% and 52%, respectively. Overall, 100 000t of vegetables and 40 000t of fruit are produced in the Free State annually. Also, more than a million tons of cut flowers are exported annually. 23% of all wool and 18% of all dairy products nationally are produced in the region. Together, these are two of the largest contributors of livestock production income (South African Year Book, 2010).

Horticulture is mainly found near towns like Reitz and Bethlehem. Trout fishing is an established tourist attraction of the area and water sources like the Sterkfontein Dam create investment opportunities for aquaculture. The Free State has the second highest gross income in animal production at 15,4% or R6 718 million, after the Western Cape at R7 219 million. In field crop earnings the Free State was first by earning R4 226 million or 26,4% of what. The total outstanding farming debt in the Free State is R25 054 million, which is the second highest in South Africa after the Western Cape at R44 629 million.

Despite the relative importance of the sector to the provincial and national development, the Free State's agricultural output declined from R3.6 billion in 2000 to R3.1 billion in 2008, decreasing at an average rate of -1.9 % annually. This, together with the fact that agricultural output nationally has increased from R35 billion to R41 billion over the review period, has resulted in the decline in the provincial contribution in this sector (from 10.3% in 2000 to 7.6% in 2008). Provincially, this sector further declined to R3.0 billion in 2009, while its share to the national agricultural output remained unchanged. The sector's employment share as a %age of the total provincial employment decreased from 12.7 % as of March 2001 to 11.0 % as of March 2009.

The fact that only 11 % of value-adding is done in the Free State and that farmers were adversely affected by veld-fires and droughts in 2008, may account for the low and declining contribution to the national agricultural sector.

Figure 2.1: The municipal demarcations of the Free State province



Source: Demarcation Board (2012)

### 3.1 Agro-climatic conditions in the Free State province

Table 3.1 illustrates the agricultural potential for the province according to the municipal regions. Fezile Dabi has the second lowest population but contributes, along with Motheo the highest Gross Value Added (GVA) to the Free State province (32%). In terms of agriculture, the highest GVA contribution is by Xhariep and Thabo Mofutsanyana; the main factor contributing to this is the fact that these areas farm with high value crops. The Xhariep district has the lowest

population but the highest contribution to GVA made by agriculture, which shows that the agricultural practices are not labour intensive or very intensive and specialised. The Xhariep district is also dependant on irrigation, which increases the yield per hectare compared to dry land production. Please see Appendix B, for a map compiled by the Bureau for Food and Agricultural Policy (2011), explaining which areas in the province are bestsuited for which crops.

Table 3.1: Agriculture potential for the province

Feature	Xhariep	Motheo	Lejweleputswa	Thabo Mofutsanyana	Fezile Dabi
<b>Size in Ha</b>	3 424 966	1 399 864	3 193 028	2 834 556	2 130 046
<b>Population size</b>	135 791	730 402	657 952	727 403	460 703
<b>Number of local municipalities</b>	Three	Three	Five	Five	Four
<b>Number of towns</b>	17	10	18	19	15
<b>%contribution to Free State GVA</b>	3%	32%	21%	12%	32%
<b>%contribution of agriculture to district GVA</b>	28%	5%	10%	21%	6%
<b>Main agricultural products</b>	Small stock, Irrigated vines, Maize, Wheat and Potatoes	Sheep, Beef, Maize, Wheat	Maize, Wheat, Poultry	Cattle, Maize, Wheat and Fruit, Soya	Maize and Wheat

Source: Free State Department of Agriculture, 2007

\* Gross Value Added (GVA)

### Xhariep district

This district is located in a semi-desert area and most crops cannot survive without irrigation. Some irrigation originates from the Orange-Riet canal. In the Jacobsdal district, some vines are produced and processed in the district. The Xhariep district is also known for the production of

potatoes and lucerne. The area is well suited for grazing, with many farmers farming with sheep and goats. Game farming is also gaining popularity in the area for the higher returns on investment (Free State Department of Agriculture, 2007).

### **Motheo district**

This area provides an attractive market for primary agricultural products such as vegetables, dairy and meat products; especially due to the larger populations found in Bloemfontein, Botshabelo and Thaba Nchu, where predominantly subsistence farming is practised. The Thaba Nchu area also has the most value-adding industries in the province. In the Motheo district mostly mixed farming is practiced (Free State Department of Agriculture, 2007).

### **Lejweleputswa district**

The main agricultural enterprise found in this district is maize production and Bothaville is seen as the maize centre of the Free State as it also forms part of the Free State Maize Route. The annual NAMPO Harvest Day attracts more than 20 000 visitors to the area; it is the second largest agricultural show in the world and attracts exhibitors from all over the world. The district is mostly covered by non-arable, moderate potential grazing land as well as marginal potential grazing land. The high water table found in the northwestern part of the district stimulates the production of maize (Free State Department of Agriculture, 2007). The headquarters of Grain SA was also situated in Bothaville, but is currently relocating to Pretoria at the time of compiling this report.

### **Thabo Mofutsanyana district**

A wide variety of products is produced in this region, varying from cherries, asparagus, apples, grain, livestock, milk and flowers. As mentioned, 90% of South Africa's cherries are produced in the Ficksburg district. Although cattlefarming is the main activity in the north-eastern part of the district, it also hosts two of the largest asparagus-packing factories and also exports apples and flowers to Europe. Soya is a growing industry in this district because of better prices and the value-adding opportunities. The advantage of this district is its higher rainfall. The focus in this area is mostly on dairy production, grazing and wildlife (Free State Department of Agriculture, 2007).

### **Fezile Dabi district**

This region is known for its high production of maize, sorghum and wheat. Beef and sheep production are the main livestock enterprises found in the district. This area is closer to the lucrative Gauteng market and it should play a more important role in stimulating agricultural value-adding activities. The district is characterised by non-arable, moderate potential grazing land as well as marginal potential arable land (Free State Department of Agriculture, 2007). This area contributed 20.2% to the province's growth in GDP and 69% of the exports out of the province in 2007. The following sectors were responsible for this growth: manufacturing, community service and the finance. Products that are exported are petroleum products, basic chemicals and Coke (Free State Development Corporation, 2008)

Vegetation links on to the availability in natural resources like water and a thorough study is required in determining the suitability of crops in a specific region, called EcoCrop? - this is available at <http://ecocrop.fao.org>. Factors like climate, soil PH, latitude, altitude, soil depth, - drainage, fertility and texture need to be known in order to use the EcoCrop model. Three main types of vegetation can be found in the Free State. These are:

1. The dry, sandy Highveld grassland is found in the dry, western parts such as Bloemfontein. The erratic summer rainfall makes it a high-risk area for agronomy. The area is better suited for natural grazing, particularly sheep and cattle, although the natural vegetation in the area is overgrazed. Crops have also replaced a lot of the already mentioned natural grazing.
2. The moist, cool Highveld grassland is found in the central-eastern part of the province. The soils in the area are excellently suited for agronomy. Cattle and sheep farming, in combination with poor conservation, contribute to this intensively grazed area; 72% of the area has been transformed due to cultivation and ploughing.
3. The cold Highveld, grassland occurs in the rolling plains west of the eastern escarpment. The area is characterized by summer rainfall ranging between 700mm and 800mm and severe frost and snow in the winter. Wheat and maize are cultivated, together with dairy farming, which is the major economic drivers in the province.

Table 3.2 illustrates the suitability of crops in a certain area of the province. The table shows the suitability of a specific crop can be linked to an area according to rainfall, temperature and vegetation. In this instance the suitability of the crop in the Free State province was analysed. This specific project was done for the Free State department of Agriculture for certain crops identified. It was not done on cherries specifically; the researchers added this.

Table 3.2: The suitability of commodities in the Free State

<b>Crop</b>	<b>Suitable</b>	<b>Suitable with some degree of climate softening</b>	<b>Unsuitable</b>
<b>Almond</b>	Western to central Free State	Rest of the Province	
<b>Cherry</b>	Eastern Free State	Eastern and North Eastern Free State	Rest of Free State
<b>Apple</b>	Eastern Free State with shade nets	Eastern and north eastern Free State	Western Free State
<b>Brazil nut</b>			Free State
<b>Cashew nut</b>			Free State
<b>Chestnut</b>	Districts of Vredefort and Parys	North western Free State and other isolated areas	South eastern Free State
<b>Citrus</b>		Western to north western Free State	South eastern and eastern Free State
<b>Cotton</b>	Western and North		Eastern Free State

	western Free State		
<b>Garlic</b>	Central to northern Free State	Eastern to south eastern parts	
<b>Grape</b>		Western perimeter of the Free State	Central to eastern Free State
<b>Hazelnut</b>	Eastern Free State	Rest of Free State	
<b>Macadamia</b>			Free State
<b>Olives</b>	Western to north western Free State	Central to north eastern Free State	
<b>Pecan nut</b>	South western Free State	Central Free State	Eastern Free State
<b>Pistachio nut</b>	South western perimeter	Central Free State	Eastern Free State
<b>Walnut</b>		North western, north eastern and south western Free State (Fauresmith)	Central, south western and eastern Free State

Source: Adapted from van den Berg, Manley and Strauss (2002)

### 3.1 Remarks

- High-value crops contribute to agricultural growth in the province.
- Irrigation is important but not sustainable, therefore investigation into climate change and crops suitable for dry conditions should be explored in order not to be dependent on irrigation for higher yields.
- Overgrazing should be better managed and training should be provided to producers in the rural areas.

- Training of small farmers in homelands and rural areas should be promoted in order to prevent erosion and improve the quality of the animals allowing the small-scale farmer to shift from a subsistence farmer to commercial farming.
- Some areas are not suited for cattle but rather for sheep, etc., this should be taught to the local farmers.
- Crops are “less risky” than cattle in terms of theft, but not best suited for certain areas. The use of natural grazing land for the growing of crops should be discouraged.

#### **4. Water**

Climate change is changing the weather patterns of not only the world but also the Free State province. Extreme weather conditions can lead to disastrous outcomes for producers and consumers and put strain on government when food production is reduced and water is scarce. These patterns can result in the migration of people and political conflict (National Planning Commission 2011)

The Free State province has two primary catchment areas, the Vaal River and Orange River. The province is drained by five major rivers. The Vaal River forms the northernmost border and has two dams, known as the Bloemhof dam and the Caledon River, which also forms the border between Lesotho and South Africa. The Orange River runs into the Gariiep Dam. The Riet River flows into the Kalkfontein Dam, which passes through Koffiefontein and joins the Modder River near Jacobsdal. The availability of sustainable natural water sources is important when determining which crops will be more suitable for an area and also in terms of the availability of water in a district (Free State Development Growth Strategy, 2007). According to Nieuwoudt, Backeberg and Du Plessis (2004), agriculture is a very inefficient user of water as it contributes the least jobs per million m<sup>3</sup>. A cubic meter of water adds R1,50 in agriculture, R157,40 in industry, R39,50 in mining and R44,40 in eco-tourism (Conningarth Consultants, 2001). Within agricultural sectors, water contributes, per cubic meter, the most to Gross Domestic Product in livestock production, than game farming and the least in orchards and fodder crops respectively. This fact should be considered when investing in agriculture as livestock production contributes less to job creation compared to orchards and fodder crops. In terms of job creation, a million cubic meters of water supports 250 jobs in agriculture but 1 785 000 jobs in the manufacturing of

glass products (BKS, 1999). This data did not take into consideration the forward and backward linkages of agriculture to the manufacturing sector, thus agricultural production could contribute, indirectly, to many more jobs. In the allocation between water and agricultural sectors it is taken for granted that certain crops will flourish in areas where water is abundant while some of the best quality fruit and vegetable-growing areas are located in areas where water is scarce. Market forces will encourage industry location where resources, including water, are relatively abundant. Therefore it is not always the best option for the local authorities to subsidize certain resources (Nieuwoudt, Backeberg and Du Plessis, 2004). The fruit industry is very dependent on irrigation and it is also one of our main sources of foreign exchange due to exports. This industry is growing in the Free State and creates employment for both permanent employees as well as seasonal workers.

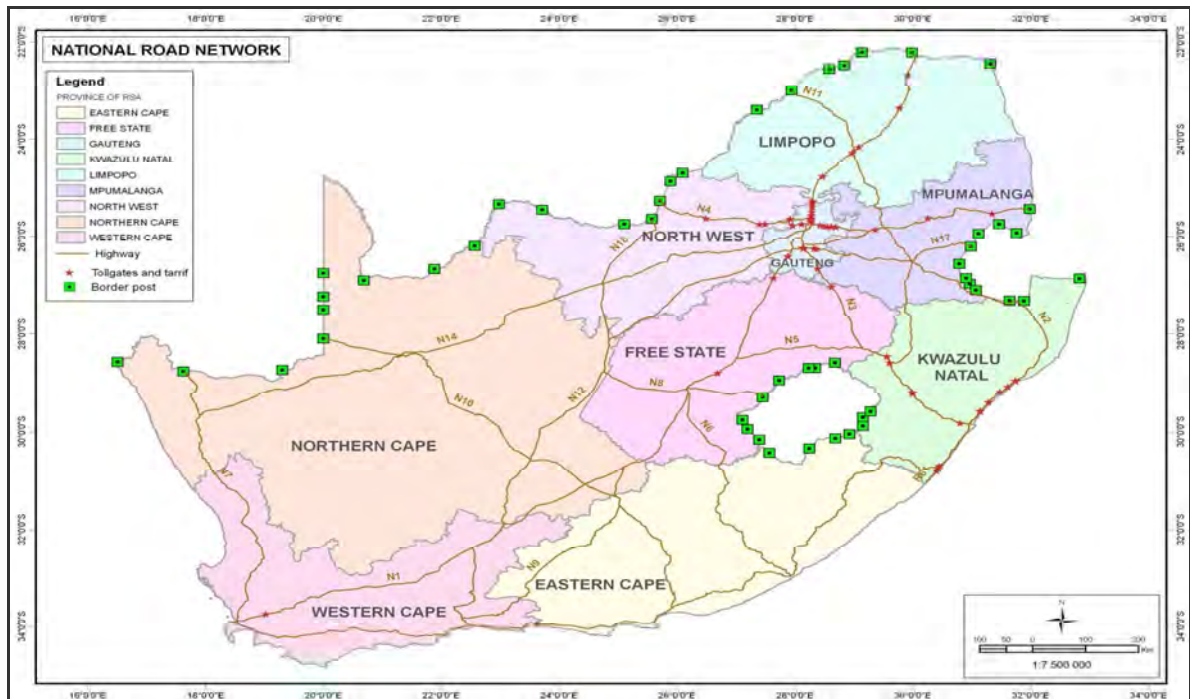
#### 4.1 Remarks

- Water rights issue regarding the transfer of water rights to farmers. The Department of Water Affairs has been told that the transfer of water rights should not only be done on the basis of ownership but on all 7 elements of the BBBEE charter.
- Should not be dependent on irrigation – research into drought-resistant crops, as average rainfall for province is decreasing.
- When investments in agriculture are made, the jobs that are created per cubic meter of water should also be considered as the scarcity of water is increasing, which may result in higher costs and decreasing margins for the producers.
- Department of Water Affairs – Atlas of SA rivers shows that the Orange River has major damage and pollution, which will impact on the agricultural products produced nearby.
- The Vaal River has been changed dramatically due to human interference, but this fact may also lead to damages in agricultural production in the area, as water may be prevented from flowing into certain areas resulting in erosion and drought.

## 5. Transport

The Free State is servicing three main transport routes according to the Free State Government Development Survey, 2007.

- Freight between Gauteng and Western Cape: this route is expected to grow with 40% by 2020 (Figure 5.1). With only 15% of the cargo transported by rail and the rest by road (Figure 5.2). 90% of the freight will be used for local purposes, while 10% will be for exports. The main commodities to be transported will be processed foods, coal, chemicals, beverages and fruit.
- In Figure 5.1 the second route is a sub-corridor from the Gauteng/Western Cape to Port Elizabeth as can be seen. This transport route is anticipated to grow by 39% by 2020. Additionally, 92% of the freight will be by road and 8% by rail, illustrated in Figure 6.2. 90% will be destined for the local market and 10% for exports. The main commodities on this link are processed meats, maize, chemicals, iron, steel and ferro-alloys, railway equipment and motor vehicles.
- The last link, Figure 5.1, is the sub-corridor from the key Gauteng/Western Cape route to East London. This will probably grow by 31% by 2020. 9% will be for export purposes and 91% will be transported via road. The main products to be transported on this road link are processed foods, maize, chemicals, and wood. According to the National Department of Transport (2002) in their strategic framework that was done from 1985 – 2001, the road conditions in the country has deteriorated. In 1985, 75% of the roads were in a good to very good condition and in 1996/97, 56% of the roads were in a good to very good condition. In 1997 the %age of poor to very poor road conditions in the Free State province was 44%, this increased to 67% in 2001.



Source: Department of Transport (DOT)

Figure 5.1 National road network

Source: Department of Transport

The Fezile Dabi district municipality includes towns like Kroonstad, Sasolburg, Parys and Vredefort. 17,3% of the country's population lives in this area, which is known as a strategic agricultural region, contributing the majority of South Africa's grain crop. This district is the only area where manufacturing contributes the most to the province's GDP.



Source: Department of Transport (DOT)

Figure 5.2 National Railway Network  
Source: Department of Transport

## 5.1 Remarks

- Although improvements were made to the roads in 2009/2010, these were the main roads and not necessarily the roads used for the transport of agricultural products. The condition of these roads is leading to an increase in transport costs.
- Diesel prices have increased by 26% in the last year with electricity increasing by 17% (Reserve Bank, 2011) which resulted in an increase in input costs for producers and therefore also a decrease in their profit margins.
- Harbours for exports should be better managed and costs should be decreased where possible
- Major transport routes to our neighbouring countries should be investigated and improved. As these are the countries that show the highest growth potential and they are close to the Free State province, producer should enter these markets.

- These major corridors will move the majority of the freight throughout South Africa. This will include the Free State Province; the Northern Free State is situated closest to the Gauteng province and, therefore, most agricultural commodities are transported to that province. The produce harvested in the Eastern Free State will be moved to the Durban harbour for exports or for use within the province, especially maize of which there is a shortage in the province. Access to markets plays an important role as well as being a low cost producer; therefore it is vital to ensure that producers are situated close to their markets or major transport networks, especially with the increase in toll roads and the decreasing quality of rural roads.

## **6. Agricultural Losses**

Figure 6.1 is a graphical illustration of the information given in Table 6.1, in order to easily compare the losses in agriculture and therefore they will be discussed as one. In the Free State, producers lost R35, 830 million due to stock theft, along with veld-fires and natural disasters. The province has a combined cost of R56 292 million. Stock theft indirectly also costs producers additional costs for the measures in order to prevent theft, these days GPS systems, dogs and additional workers are used to protect the sheep at night. These costs are not added to the costs below.

Table 6.1 Losses in Agriculture according to province (2007)

Province	Losses due to disasters and accidents						
	Building and equipment	Other	Pilfering and stealing of crops	Predators	Stock Theft	Veld and forest fires and natural disasters	Other
Eastern Cape	4 176	4 743	5 142	29 801	31 832	16 270	8 505
Free State	2 371	4 109	4 544	18 562	35 830	20 462	12 746
Gauteng	2 220	13 512	2 129	1 024	12 660	15 327	6 177
KwaZulu-Natal	4 625	4 606	14 978	6 119	26 509	36 695	17 237
Limpopo	1 343	3 513	12 161	6 185	6 619	12 260	11 289
Mpumalanga	7 206	10 022	10 072	8 339	23 207	35 276	19 100
North West	3 425	7 748	5 019	4 373	25 987	11 291	8 557
Northern Cape	5 199	3 737	2 782	36 600	15 414	7 739	13 350
Western Cape	4 091	20 096	8 480	103 987	13 975	34 181	45 698
South Africa	34 656	72 086	65 307	214 990	192 033	189 501	142 659

Source: Department of Agriculture, forestry and fishery, 2007

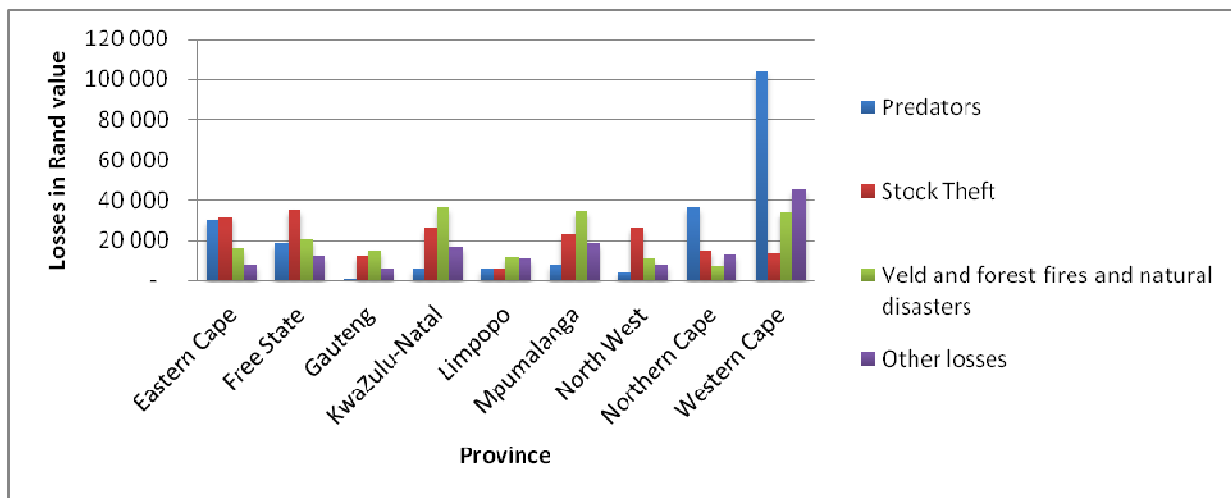


Figure 6.1 Losses due to various factors for each province (2007)

Source: Department of Agriculture, forestry and fishery, 2007

According to the Free State Provincial Government report (2003), stock theft contributed 3,8% to the total crime in the Free State and increased by 19% at that time. From 1994 to 2003 the average number of reported cases were 5 574; now according to Table 6.1 the number of cases reported for stock theft is 35 830, in the Free State.

## 6.1 Remarks

- Improved measures against stock theft
- Establishing a fund to assist farmers in times of natural disasters
- Training in firebreaks in order to prevent veld-fires.

## 7. Employment in the Free State province

This section investigates the current employment trends in the Free State province according to the different skills levels, industries and racial composition. Employment in the agricultural sector has been in the limelight for the past few years due to reports stating the steady decline within the sector (Provide, 2009). Labour is vital to the growth of the province, HIV plays a significant part in decreasing productivity and the number of people available to work. Figure 7.1 below illustrates the total population in the Free State and the number of HIV infections. Agriculture is physically very straining on an employee and HIV breaks down the immune system and decreases the physical strength of a person. As agriculture is very labour-intensive and one of the industries that employ the most workers, labour productivity plays a vital role in the success of the industry. According to the National Planning Commission (2011) the AIDS prevalence among youth is for the ages 15 to 49, which means it affects those who should contribute most to economic growth in the country. Therefore, it is important to identify the number of HIV infections in the Free State as this part of the population will rather be dependent on social grants and medical care than part of the economically active population.

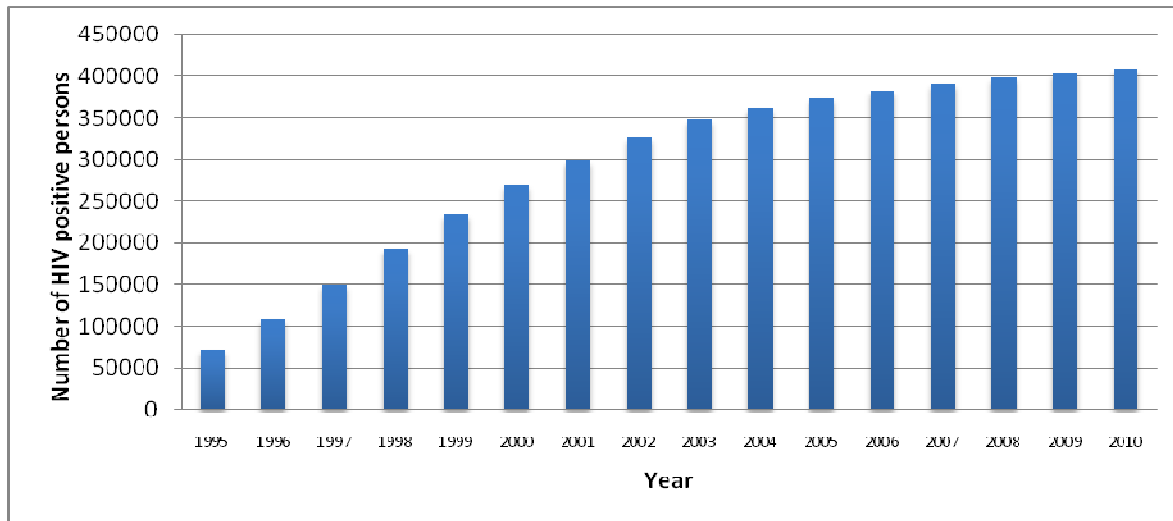


Figure 7.1 Number of HIV Positive persons in the Free State province (1995 – 2010)  
Source; Quantec, 2011

Figure 7.2 compares employment in agriculture since 1991 in terms of race. It is evident that employment in agriculture has decreased across all races, except for coloured people where there has been a small increase during this time period. The growth of the manufacturing and mining sectors in the province during this period could attribute to this.

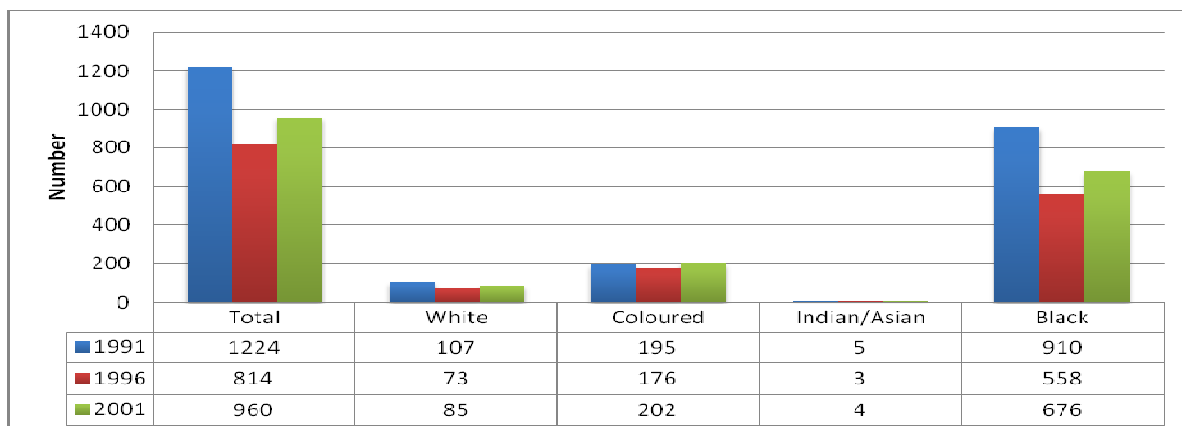


Figure 7.2: Total number of employed people in Agriculture in the Free State (1991, 1996, 2001)

Source: National Department of Agriculture, 2007

Table 7.1, shows the current number of workers employed in the agricultural sector according to the provinces. The Free State employs the second highest number of people as full-time workers and the third most people as seasonal workers. The seasonal element is almost unique within the agricultural work force because of the nature of the sector.

Table 7.1: Employment in Agriculture

Province	Full-time employees	Casual and seasonal employees	Full-time	Casual and seasonal
	Number employed		Remuneration R' 000	
Eastern Cape	34 253	30 565	510 404	106 497
Free State	53 944	45 150	737 796	98 996
Gauteng	22 979	11 957	534 083	93 461
KwaZulu-Natal	66 685	34 383	968 455	154 286
Limpopo	35 728	31 833	625 436	124 159
Mpumalanga	46 520	32 826	853 396	176 363
Noth West	51 741	32 008	574 596	75 250
Nothern Cape	26 871	47 874	339 948	123 723
Western Cape	90 943	98 546	2 029 275	485 108
<b>South Africa</b>	<b>431 664</b>	<b>365 142</b>	<b>7 173 389</b>	<b>1 437 843</b>

Source: National Department of Agriculture, 2011

Table 7.2 shows employment in the country according to the different industries from 2010 to 2011. Employment in the agricultural sector has decreased with 5.1% from 2010 to 2011, which is after the mining sector the second largest decrease. Manufacturing, trade and transport have increased their employees during the same time. Agriculture employs more people than mining and mining retrenched more people from 2010 – 2011. The reason for this is the closing of many mines in the Welkom area, which have left workers unemployed. Many dairy farms have closed in the Free State since 2007 and taking into consideration that a dairy farm employs on average 5

– 20 workers, depending on the size of the dairy, that has an impact on employment and also indirectly on the standard of living of the dependants, with families also being affected.

Table 7.2: National employment according to sectors (2010 – 2011)

Industry	Apr–Jun 2010	Jan–Mar 2011	Apr–Jun 2011	Qtr-to-qtr change	Year-on- year change	Qtr-to-qtr change	Year-on- year change
	Thousand				Per cent		
<b>Total</b>	<b>13 061</b>	<b>13 118</b>	<b>13 125</b>	<b>7</b>	<b>64</b>	<b>0,1</b>	<b>0,5</b>
Agriculture	630	603	598	-5	-32	-0,8	-5,1
Mining	315	313	282	-31	-33	-9,9	-10,5
Manufacturing	1 705	1 803	1 735	-68	30	-3,8	1,8
Utilities	96	97	93	-4	-3	-4,1	-3,1
Construction	1 049	1 031	1 043	12	-6	1,2	-0,6
Trade	2 903	2 962	2 944	-18	41	-0,6	1,4
Transport	766	727	777	50	11	6,9	1,4
Finance and other business services	1 723	1 631	1 704	73	-19	4,5	-1,1
Community and social services	2 710	2 828	2 831	3	121	0,1	4,5
Private households	1 157	1 118	1 117	-1	-40	-0,1	-3,5

\*Due to rounding, numbers do not necessarily add up to totals.

Source: Statistics South Africa, 2011

Figure 7.4 shows the employment in the Free State by comparing agriculture employment versus non-agriculture (formal and informal sector) employment. Employment in agriculture has decreased from 6.2% of total people employed in the Free State to 5.1% year-on-year.

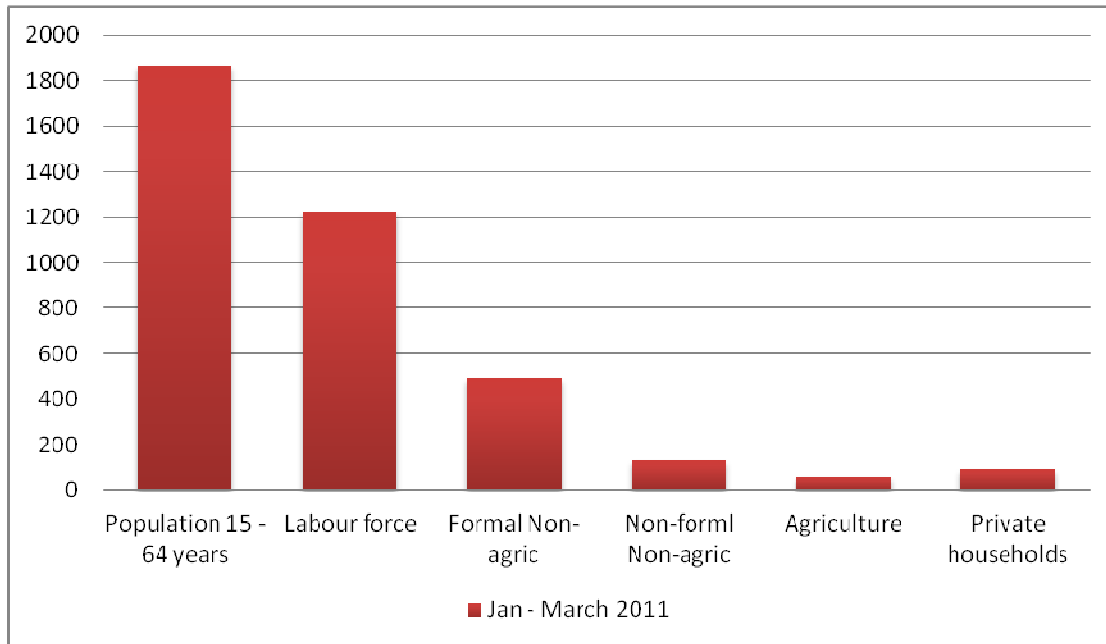


Figure 7.4: Free State employment Agriculture vs. Non-Agriculture  
 Source: Labour force Survey 2011

Figure 7.5 shows the number of paid employees and total salaries and wages per province as a %age of total agricultural employees. The Western Cape has the highest %age as a result of the vineyards and fruit orchards. Thereafter, it is KwaZulu-Natal which is predominantly also highly labour intensive. Third is the Free State, where there are very few intensive fruit orchards, but rather cattle and grain farms, which is not as labour intensive. Therefore, it is a good sign that the Free State can be rated that highly.

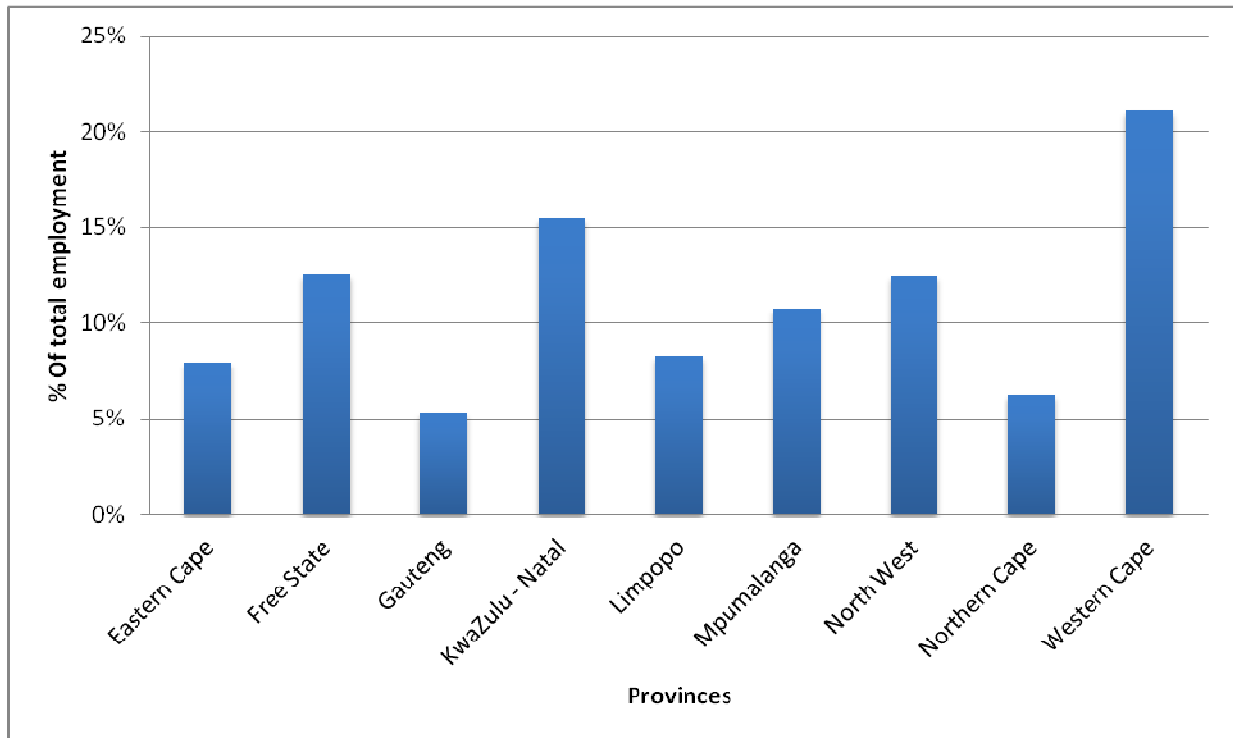


Figure 7.5: Number of paid employees and total salaries and wages per province as a %age of total agricultural employees  
 Source: Agricultural Census, 2007

Figure 7.6 indicates that employment has decreased in the formal highly skilled population but has increased in the informal unskilled population within the Free State. Factors attributing to this may be that many companies have consolidated and moved their headquarters to Gauteng and Western Cape. The cost to company is also less when employing workers on an informal basis than on a formal basis.

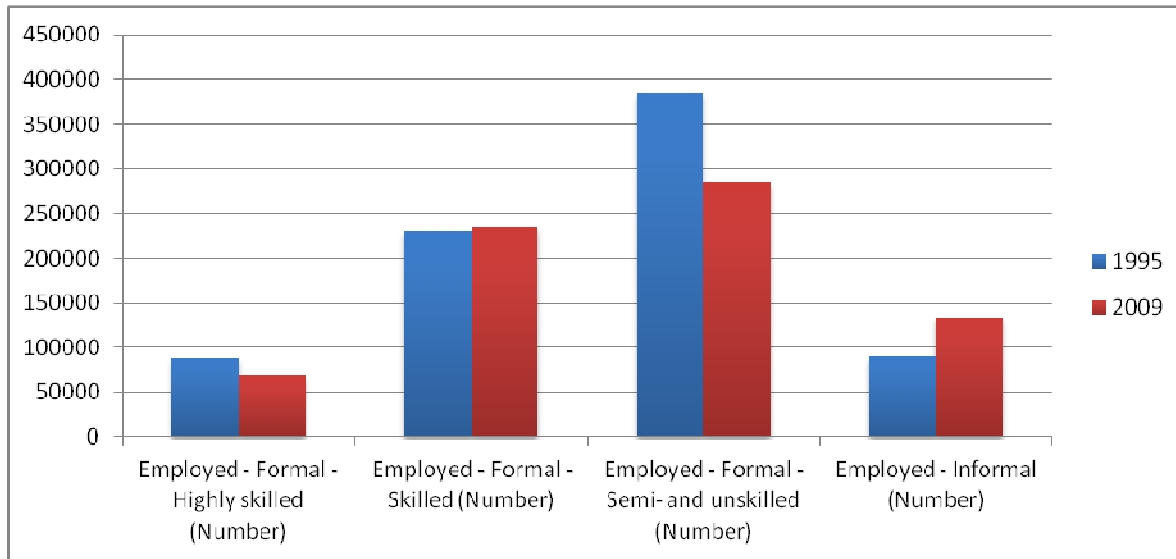


Figure 7.6: Employed population in the Free State  
 Source: Quantec, 2011<sup>1</sup>

### Employment Matrix

This matrix shows the industries with high employment capabilities which is labour intensive and then non-labour intensive. It also identifies industries with high growth and low growth which can then be linked with labour intensive or non-labour intensive.

<sup>1</sup> Quantec uses official data sources and transform the data into a usable format

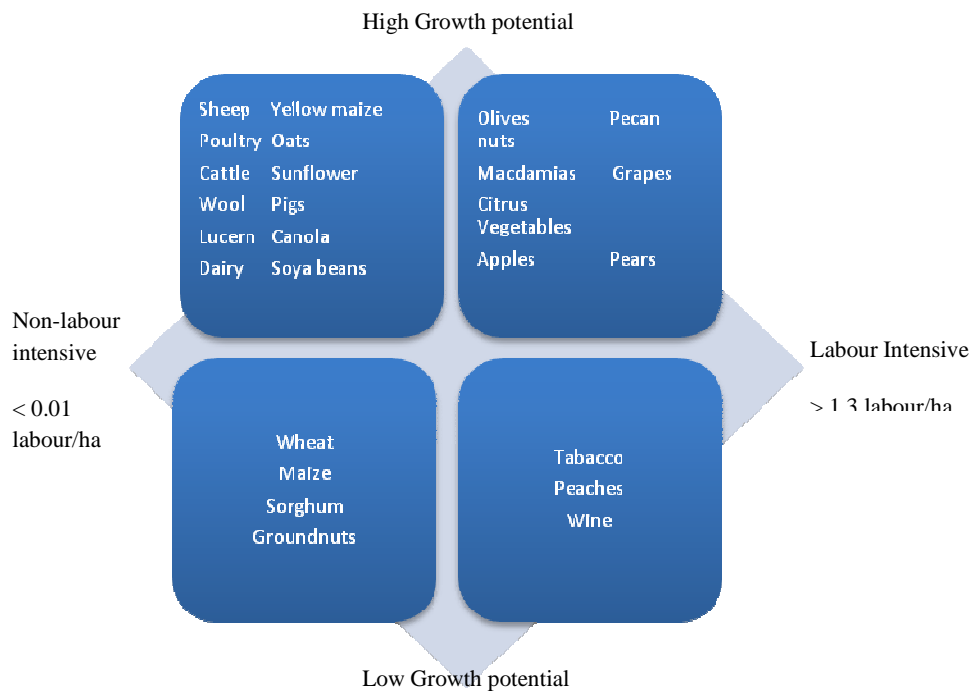


Figure 7.7 The Labour potential matrix  
 Source: Adapted from BFAP Agricultural Outlook 2011

Figure 7.7 shows commodities with high growth potential which is labour intensive; apples and vegetables are found in the Free State. Wine has a lower growth potential but is labour intensive, therefore it can create jobs. Currently, wine is produced successfully in the Jacobsdal area. Crop farming has lower growth potential but can create up to a 1000 up/down stream jobs (BFAP, 2011) and especially soya beans can create 2 633 additional jobs. Poultry, eggs, dairy and beef create more than a 1 000 jobs up/down stream jobs each; and poultry (9 479) and dairy (8 042) up/down stream jobs. These industries are growing in the Free State and have done well in the past. Therefore, they should be focused on for investments in the future.

Citrus can be grown in the Thabo Mofutsanyana district; this is seen as a high growth, labour intensive industry, which can create 1 job per 2 500 cartons packed. In South Africa, about 100 million cartons are packed per year, thereby creating 40 000 jobs per packing plant for a period of six months or 20 000 full-time employees. This does not include additional jobs down the supply chain (National Planning Commission, 2011).

Vegetables form another industry which shows high growth and high employment. Vegetables are grown throughout the Free State province; the demand for vegetables has grown by 30% over the last 10 years and will continue to grow with a growing middle-income and higher income population. The market is still 25% below its potential which means there is scope for growth, but what is important here is linking these producers to a market and assistance in complying with quality, volume and packaging requirements. This can be done by means of mentorships and linking small-scale farmers with commercial farmers. In terms of cherry production, the Ficksburg area is currently producing 90% of South Africa's cherries, which is a small %age of the 2,2 million tons produced worldwide. South Africa is producing 170 tonnes which shows that there is a gap in the market to increase production and export more cherries. Under ideal conditions, these smaller, labour intensive industries can create around 80 000 jobs and the Free State has the ideal conditions in which many of these crops identified can prosper.

## 7.1 Remarks

- Agricultural employment has decreased as well as formal highly skilled employment in the province. Informal employment has increased; which shows that there is a “brain-drain” occurring in the Free State, where the highly skilled people are moving away. The fact that many company headquarters are situated in Gauteng and Western Cape has moved the highly skilled people out of the province.
- The number of HIV infections has increased, not as steeply as 1995 – 2000 but the trend is still upward, thereby also removing persons from the economically active part of the population.
- Training colleges like the Agricultural College at Glen no longer produce skilled students or is up-to-date with research and development studies.

- Certain industries have been identified by BFAP as growing industries with high-employment potential. These industries are successful in the Free State province and therefore should be focused on (citrus, cherries, vegetables).

## **8. Manufacturing and value adding in the Free State province**

Very little data is available pertaining to value adding in the province. This is especially the case when wanting to quantify the link between primary agricultural production and value-adding or direct manufacturing resulting from that. The Free State Department of Agriculture and the Free State Development Corporation have many projects focused on value-adding and job creation in the Free State. Please see Appendix B, regarding some of the investment projects in the Free State by the Free State Department of Agriculture.

The province's objective from 2007-2014 is to establish the Eastern Free State as an agro-processing hub. This is evident in the strategic investments made in creating opportunities for value-adding to traditional agricultural crops (Free State Department of Agriculture, 2007). A conference on pro-poor value chain governance held in Johannesburg (2011) shed some light on the barriers to trade experienced by small-scale farmers when wanting to sell their produce at the fresh produce markets. When produce arrive at the market, the quality has deteriorated as a result of no packaging, insect infestation, chemical residues and exposure to wind or excessive heat. Figure 9.1 shows a major obstacle faced by producers in South Africa and, therefore, also in the Free State. This shows the %age finance given by financial institutions to producers. It is clear that the most finance is given by commercial banks, which may put the producer under a lot of pressure due to the higher interest rates. Co-operatives can ask up to 9% interest while commercial banks can go as high as 13% and upwards. The function of the Landbank has depreciated drastically; this can be seen as an obstacle to producers, as the Landbank was able to provide them with a better interest rate and lower costs.

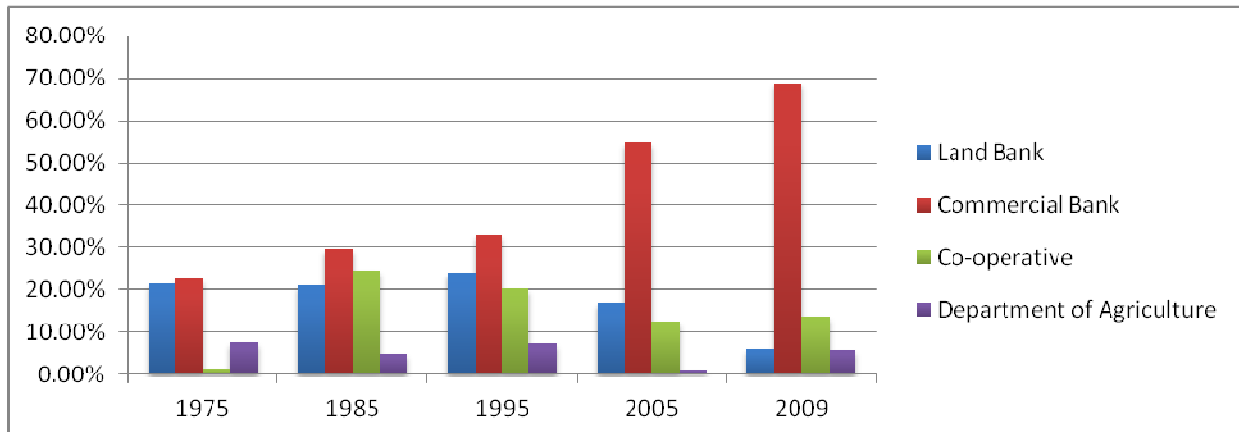


Figure 8.1 Access to finance

Source: Stock Farm Magazine

## 8.1 Remarks

Linkages to markets are vital for these small-scale farmers to move from subsistence farmers to commercial farmers. Therefore, there are some recommendations made by the researchers in terms of improving their marketing power:

- Access to markets

Provide access to seeds

Train farmers in using cultivars suitable for the area they are farming and not just what they are familiar with.

- Developing a brand and packaging for the farmers

This will assist farmers to gain a competitive edge and enhance their marketing power in terms of negotiating a premium price for their produce.

- Skills transfer and sharing of best practices (mentorships)

Link small-scale farmers with commercial farmers who can transfer their skills to the small-scale farmers. The commercial farmer can work on commission based on the output of the small-scale farmer.

Training days held by universities or private companies should be encouraged.

- Assisting in the efficient management of the facility

Provide access to machinery, packing plants and storage facilities. These facilities do not necessarily have to belong to the small-scale farmers but can be leased from the commercial farmers.

Availability of extension officers to provide knowledgeable advice to producers

- Assist in producing grading, quality control and logistics

Those who are in the industry should be encouraged to share their knowledge and train the producers and packing staff.

Government should invest in ways to decrease the costs for these farmers in a sustainable way, in order for them to compete for better markets and prices in the long term.

## **9. Gross Domestic Product of the Free State Province**

According to Global Insight 2010, the Free State's comparative advantage in agriculture has declined because its location quotient<sup>2</sup> has decreased from 1.92 in 2000 to 1.57 in 2008 and 2009. The Free State province fell from being the third largest contributor to the national agricultural GDP in 2000 to being the fourth largest contributor in 2008. This position remained the same in 2009. See table 9.1

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<sup>2</sup> A location quotient is an indication of an economy's comparative advantage. A provincial economy has comparative advantage in a particular sector when the share of that sector in the provincial economy is greater than the same-sector share in the national economy. The location quotient will be greater than one. (REX, 2010)

**Table 9.1: Agricultural Sector Gross Domestic Product by province**

Province	Constant 2005 prices - Rand million						Constant 2005 prices - %age					
	2000	2002	2004	2006	2008	2009	2000	2002	2004	2006	2008	2009
Western Cape	7643	8243	8382	8370	9479	9175	22.0	23.0	23.0	23.7	23.4	23.4
Eastern Cape	2189	2413	2392	2319	2648	2537	6.3	6.7	6.6	6.6	6.5	6.5
Northern Cape	1621	1719	1765	1907	2174	2183	4.7	4.8	4.9	5.4	5.4	5.6
Free State	3584	3028	2821	2676	3075	2976	10.3	8.5	7.8	7.6	7.6	7.6
KwaZulu-Natal	9741	10158	10717	10145	11683	11334	28.0	28.4	29.5	28.7	28.8	28.8
North West	2609	2451	2505	2408	2807	2681	7.5	6.8	6.9	6.8	6.9	6.8
Gauteng	2047	2099	2035	1985	2264	2147	5.9	5.9	5.6	5.6	5.6	5.5
Mpumalanga	3487	3563	3563	3023	3498	3447	10.0	9.9	9.8	8.5	8.6	8.8
Limpopo	1866	2153	2199	2527	2963	2806	5.4	6.0	6.0	7.1	7.3	7.1
South Africa	34787	35826	36380	35359	40590	39290	100.0	100.0	100.0	100.0	100.0	100.0

Source: StatsSA, GDP Third Quarter 2009; Global insight, 2010<sup>3</sup>

The Free State agricultural sector growth rate follows a similar trend to that of South Africa, being volatile throughout the 2000 to 2008 period, only more severe. The provincial growth rate declined from 23.1% in 2000 to -15.1% in 2001, a decrease of 32.8%. It further experienced negative growth rates of -0.4%, -7.3% and -9.8% in 2002, 2003 and 2006 respectively. Nationally, negative growth rates in the agricultural sector of -3.3%, -5.5% and -3.2% occurred in 2001, 2006 and 2009, respectively. Overall, the provincial growth-rate decreased by 11.4%, from 23.1% in 2000 to 11.7% in 2008. Nationally, this growth-rate has increased by 6.2% from 4.7% in 2000 to 10.9% in 2008.

This report investigates the Free State Agricultural sector by analysing important parameters in an attempt to provide reasons for the dismal performance of the sector in the past years. The focus will be on trend analysis of parameters of interest, telephonic interview of stakeholders and analysis of questionnaires completed by a sample of commercial farmers in the province. It is important to state here that the authors are aware of a study done in 2009 by Elsenburg College named: The Provincial Decision-Making Enabling Project or Provide Project. The study looked

at the profile of the Free State Province: Demographics, Poverty, Income, Inequality and Unemployment from 2000 till 2007, making specific reference to the agricultural sector. We decided to fill in the gap by looking at other important issues instead of duplicating what has already been done and in most cases updating available information where necessary.

## 10. Capital formation by sector

The annual growth in Gross Value Added is investigated in this section. In Figure 12.1, the primary sector growth was extremely high in 1995. Then it decreased with the closing of the boards in 1997/1998 and recovered again from 2001 – 2004. In 2008/2009 the growth has been negative. The Secondary and Tertiary sectors have shown positive growth, which shows again that our economy is moving away from primary sector growth to secondary and tertiary growth.

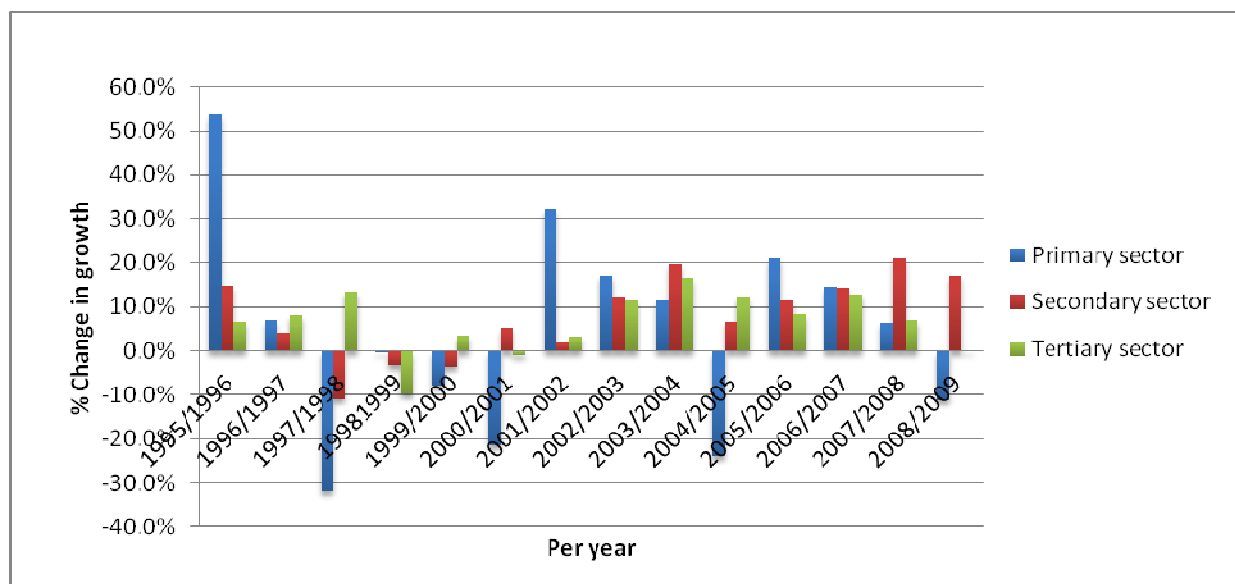


Figure 10.1: %age change in annual capital formation per sector in Free State province.

Source: Quantec, 2010

When analysing the Gross Value Added by agriculture specifically in the Free State, it shows that agriculture investments have been minimal or negative. See figure 10.2. The graph shows the %age change in capital formation year-on-year. Investments declined in the 1990's as a result of drought, which resulted in a drastic decline in the financial welfare of the producers. Thereafter, investments increased again until 2001/2002, but as producers' uncertainty and risk

increased it resulted in a decline in their confidence and therefore also a decline in agricultural investments (National Planning Commission, 2011).

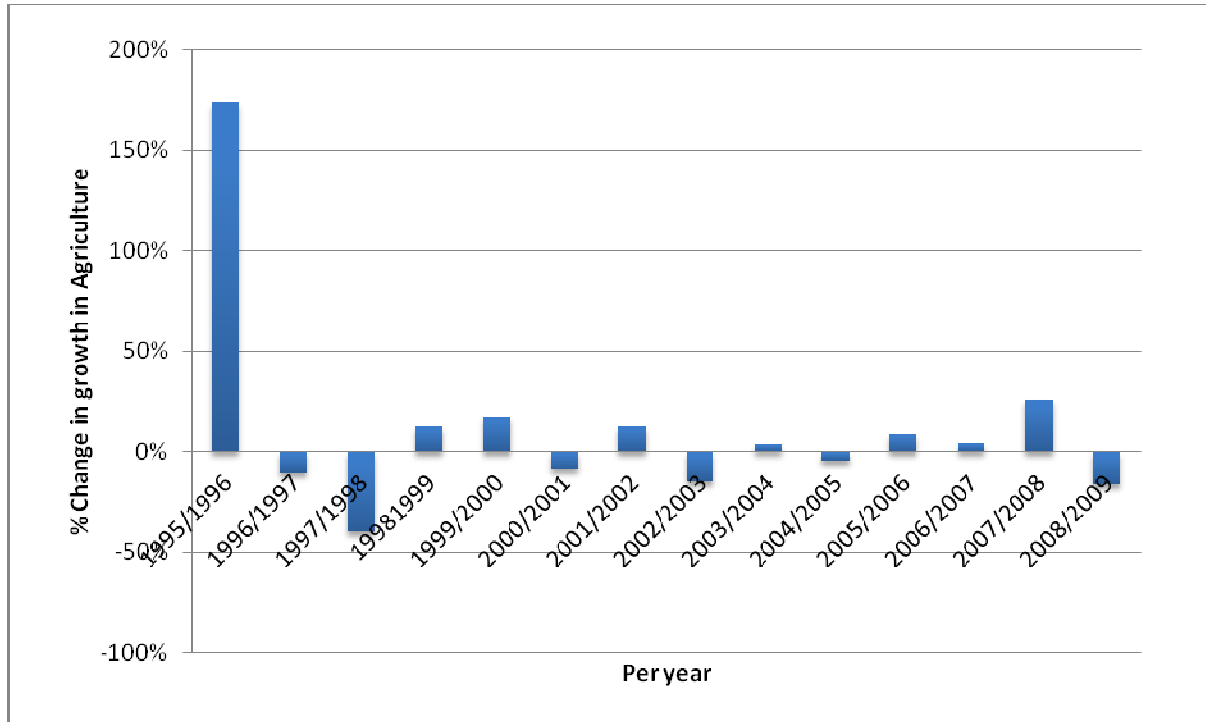


Figure 10.2: Annual %age change in Agriculture, Forestry and Fishing Capital Formation  
Source: Quantec 2010

### **11. Comparison between the Agricultural Census done in 1993,2002 and 2007**

A comparison was made between the Agricultural Census done for the country in 1993, Agricultural Census of 2002 and the Agricultural Census of 2007 in order to determine the changes in the agricultural industry during that time. From the table we can conclude that the number of farms have decreased, which resulted in a decrease in employment but that the farming units that are left are doing well and are re-investing in the industry. The Free State province will not be excluded from the trends witnessed in Table 11.1. As mentioned, farming units have decreased, but the income of farmers has increased which is an indication of the efficient farmers expanding and improving their efficiency. Higher yields and lower input costs can lead to higher profit margins, which again increases efficiency. Horticulture and animal products have increased in value, which shows that the sector is growing in value and, indirectly, demand. The number of employees employed has decreased from 1993 – 2007. The farming debt has increased which shows that farmers are leveraging less of their own funds, or it could be a result of the decrease in financial assistance from institutions like the Landbank, who assisted farmers in terms of lower interest rates than commercial banks.

Table 11.1 Comparison between Agricultural Census done in 1993, 2002, 2007

	Year		
	2007	2002	1993
Farming units (numbers)	39 982	45 818	57 980
Gross farming income (R)	79 543 813	53 329 052	19 620 180
Income from Field crops (R)	16 002 038	16 476 933	4 771 471
Horticultural products	19 014 544	14 228 909	4 493 681
Animal and animal products	43 738 602	21 222 618	9 314 413
Other farming income	788 627	1 400 592	1 040 616
<b>Employment</b>			
Owners and other unpaid family members (numbers)	47 978	46 026	68 647
Paid employees (numbers)	796 806	940 820	1 093 265
Expenditure	54 072 587	45 038 908	16 377 145
Capital	3 537 245	2 946 773	2 078 550
Purchases of animals	8 919 857	N/A	N/A
Market value of assets	178 647 301	98 428 254	66 905 614
Farming debt	37 090 712	30 857 891	15 295 001
Ratio between current expenditure plus purchases and GFI (%)	75	79	73
Ratio between farming debt and GFI (%)	47	58	78

## 12. Industries

In this section, we discuss the profile of some important agricultural commodities produced in the Free State. This is to have an understanding of what is happening in terms of the production, price, macro-economic environment and trade of these commodities.

## 12.1 Wheat

Agriculture in South Africa contributes to about 3% of South Africa's Gross Domestic Product (GDP) and about 8% of the formal employment. Field crop production is one of the largest agricultural industries in South Africa and more specifically in the Free State Province of South Africa. According to Free State Business (2011), the Free State Province can be seen as the breadbasket of South Africa. The Free State Province produces more than a third of South Africa wheat and maize. This sector contributes to approximately 7% of the provincial gross domestic product, while 14% of South Africa's agricultural GDP is generated in the Free State Province and 14.5% of South Africa's commercial farming takes place in the province (StatsSA, 2009: Free State Business, 2009).

In terms of volume of production, wheat is the second most important field crop that is produced in South Africa. According to DAFF (2010), the average annual gross revenue from wheat for the past 5 years, up to 2008/09, was R3 360 million. Wheat is a commodity that is grown in the winter, planted from mid-April to mid-June in winter rainfall areas and between mid-May and mid-July in summer rainfall areas. Most of the wheat that is produced in South Africa is bread wheat, and is generally classed as B, C, D and E. This is an indication of the protein content, ranging from bread wheat to pasta wheat.

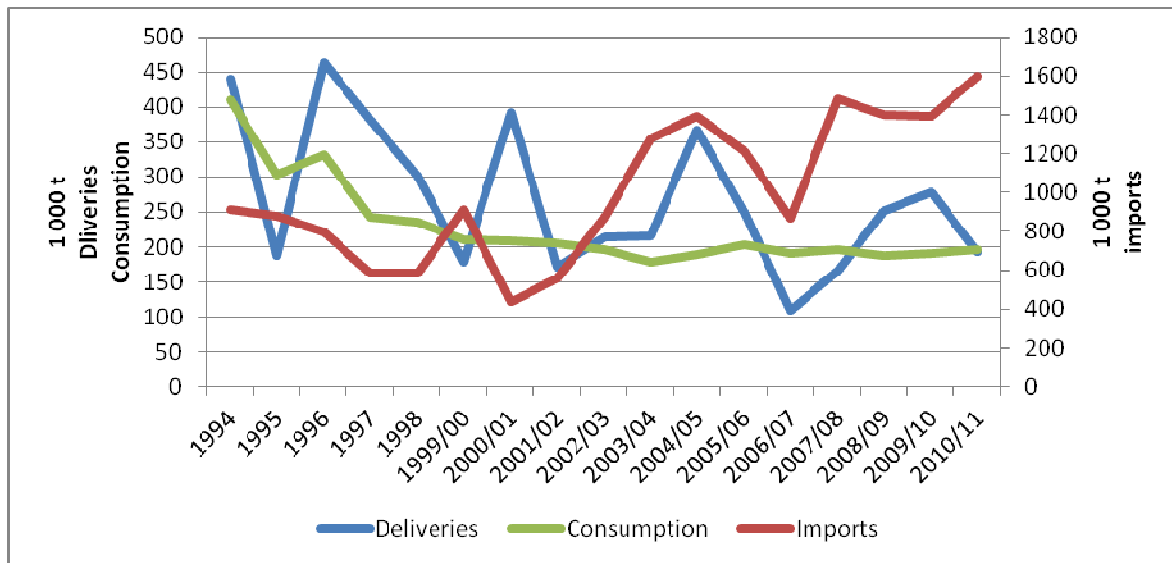


Figure 12.1.1: Deliveries of wheat, total consumption and imports of wheat (1994/05-2010/11)

Source: Agricultural Abstract 2010; USDA, 2011

Figure 12.1.1 is an illustration of deliveries of wheat in South Africa and on the same graphs the imports of South African wheat. It must be kept in mind the South Africa is a net importer of wheat. In the graph, it is clear that wheat production has declined from 1994 to 2011 and the imports of wheat have increased over the last number of years. The imports of wheat to South Africa are mostly from eastern European countries. This is mostly lower grade wheat and it is mixed with South African higher-grade wheat in order to get the sufficient standards for baking purposes. One of the reasons of the decrease in production of wheat in South Africa is production risk and the increase in imports.

In Figure 12.1.2 the average price of wheat is shown in nominal terms. It can be seen in Figure 12.1.2 that prices increased over the last number of years; the reason for the sharp increase in prices is mainly due to a shortage of wheat in South Africa, meaning the price of wheat moved to import parity.



Figure 12.1.2: Nominal prices of wheat from 1997 to 2011  
 Source: GrainSA (2010)

The Free State Province is one of South Africa’s largest producers of wheat. Over a period from 1994 to 2010, the Free State Province produced an average 702 000 tons of wheat per year, and over the last ten years, an average of 665 000 tons per year. In Figure 12.1.3 it can be seen that the Free State Province is one of the largest producers of wheat in South Africa. The Western Cape province was the largest producer, but since the transport differential became a problem for these farmers, the eastern Free State regions became the largest producer of wheat.

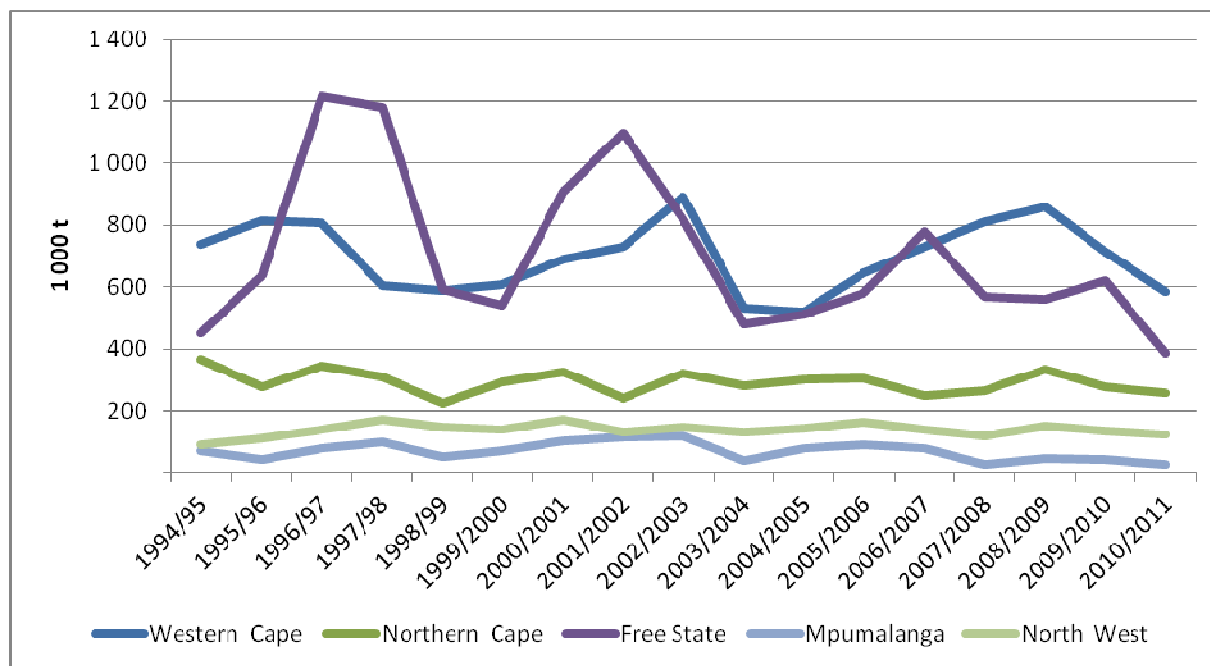


Figure 12.1.3 Production of wheat in South Africa  
 Source: Agricultural Abstract 2010

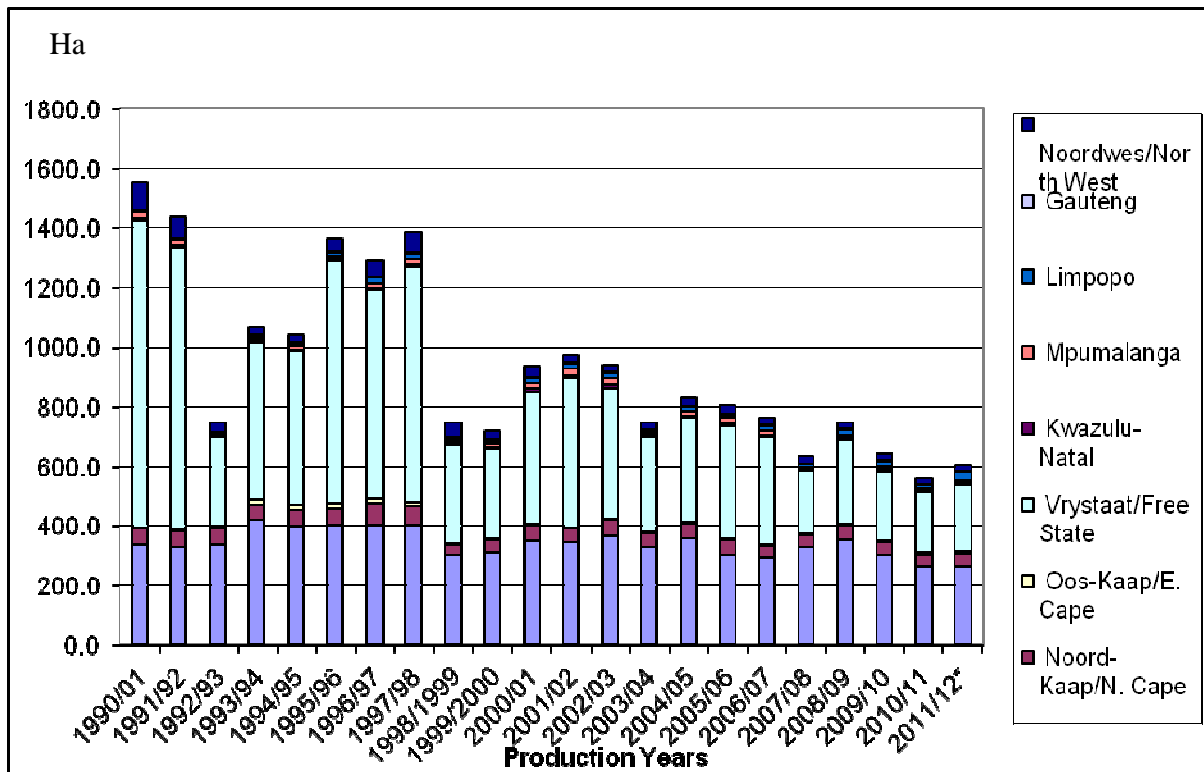


Figure 12.1.4 Area planted to wheat in South Africa. (in 1000 of ha)  
Source: GrainSA (2010)

The total area planted is shown in Figure 12.1.4; as previously noted, the production in South Africa decreased over the last number of years. This can also be seen in Figure 12.1.4 as the total number of hectares decreased; however, it can be seen that wheat farmers have become more efficient, by producing more on less hectares.

### Wheat Exports

South African wheat flour exports into the SACU and the SADC regions have shown a slow increase, particularly from the year 2000, due to low-priced imported flour from the West and East either in the form of subsidized imports or donations. This situation was further aggravated by wheat imported from outside the SACU region subject to a rebate on import duty.

The exports declined dramatically between the years 2002 and 2006 mainly as a result of declining levels of local production and increasing local consumption of wheat products. During the same period, greater volumes of wheat and wheat products were exported at lower values. The value of wheat exports regained during 2008 when about 150000 tons of wheat were exported to the world at higher values.

Exports of wheat are mainly from the Gauteng, KwaZulu-Natal and Western Cape Provinces; with the Gauteng Province commanding the greatest share in the value of wheat exports between 2000 and 2009. The value of wheat exports from the Gauteng Province increased steadily between 2000 and 2001. Wheat export values from the Gauteng Province then experienced a drastic decline until 2006. On average, the value of wheat exports from the other three provinces has been below R100 million during the entire period under review. Exporters who are mainly situated in the Gauteng Province source out wheat from the major wheat producing provinces such as the Western Cape, Northern Cape and the Free State provinces. Furthermore, the presence of the Randfontein grain market also accounts for the greatest share in Gauteng's wheat exports.

Table 12.1.1: Share of Provincial wheat exports to the total RSA wheat exports (%)

<i>Year</i>	2002	2003	2004	2005	2006	2007	2008	2009
<i>Province</i>								
<i>Western Cape</i>	0.14	0.85	0.00	0.00	10.43	56.33	5.76	20.16
<i>KwaZulu – Natal</i>	2.11	12.51	32.19	6.05	0.02	1.19	0.83	16.77
<i>Gauteng</i>	59.25	50.83	67.80	93.93	89.54	42.46	93.39	60.81
<i>Mpumalanga</i>	38.48	35.79	0.00	0.00	0.00	0.00	0.00	0.00
<i>Limpopo</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41

Source: DAFF 2011

Table 12.1.1 above indicates that between the periods 2002 and 2009, the Gauteng province commanded the greatest share of wheat exports with the exception of the 2007 year when the Western Cape Province commanded 56% of wheat exports from South Africa. Smaller wheat export values were also recorded from the KwaZulu-Natal province during the same period with

irregular intermittent exports occurring through the Mpumalanga province. This observation is in contrast to the trends in wheat production domestically, since wheat is produced mainly from the Western Cape, Free State, and Northern Cape and North West provinces of the country. It stands to reason that wheat produced in these provinces is moved to the Gauteng Province where the major exporters are situated and due to the trading of grain that occurs through the Randfontein grain market, the greatest %age of wheat is recorded as originating from the Gauteng Province.

## **12.2 Maize**

Maize is the most important grain crop that is produced in South Africa. The advantage of maize is that it is being used as both a major feed grain and a staple food for the majority of the South Africa population (DAFF, 2007). The greater part of the maize that is produced in the country consists of white maize that is being used for human consumption (60%). The other 40% is made up of yellow maize that is used for the animal feeding industry (DAFF, 2007). South Africa produces over 12 000 000 tons of maize per year, according to DAFF (2010); in Figure 12.2.1 the consumption of maize and the volume exported is shown. It can be seen that South Africa is a net exporter of maize by exporting surpluses of maize that is not consumed within South Africa.

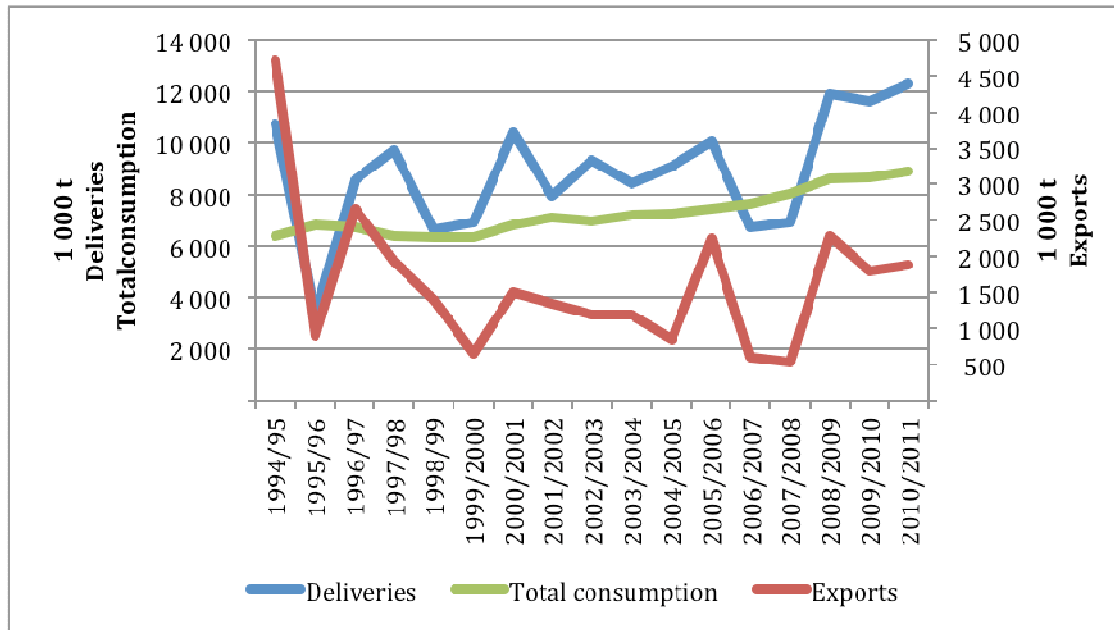


Figure 12.2.1. Deliveries of maize, total consumption and exports of wheat (1994/05-2010/11)

Source: Agricultural Abstract 2010

The price of maize increased tremendously from 1997 onwards, Figure 12.2.2 illustrates this increase in prices of white and yellow maize. This increase in prices started after the markets were deregulated and the market changed to a free market system.

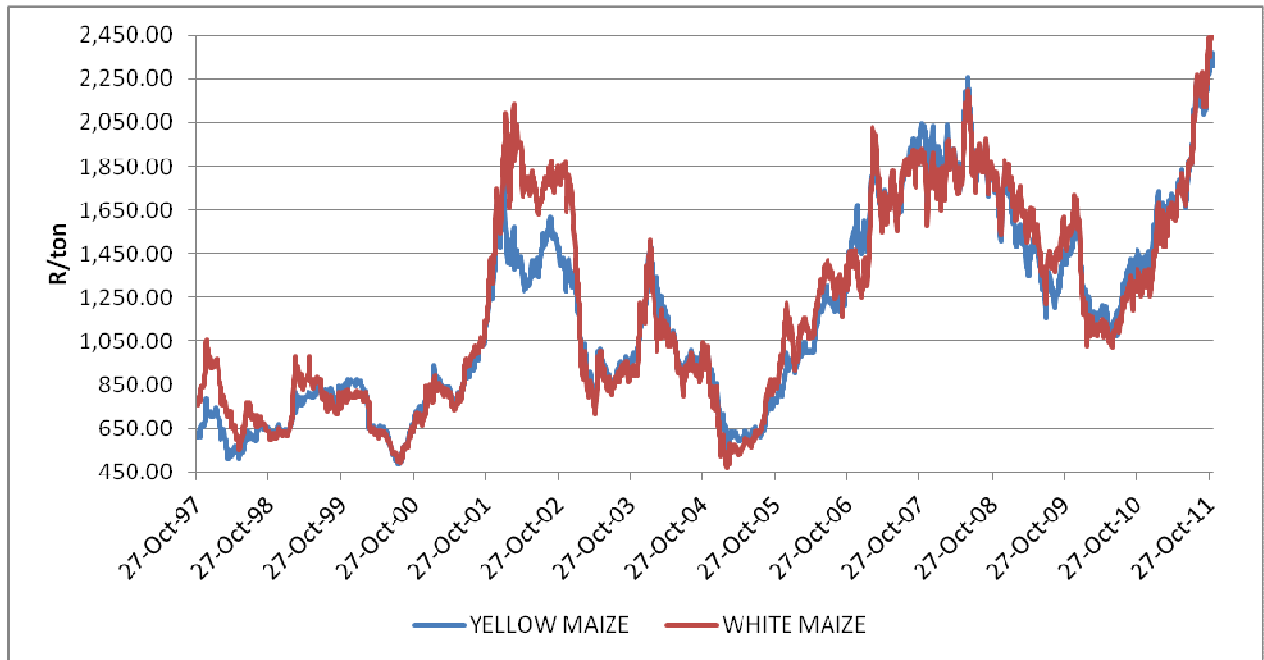


Figure 12.2.2: Nominal prices (SAFEX) of yellow and white maize from 1997 to 2010

Source: GrainSA (2010)

As previously noted, the Free State Province is one of the largest producers of white and yellow maize. The Free State Province produces an annual amount of 3 336 000 tons of maize over the last number of years. Figure 12.2.3 shows to what extent the Free State Province contributes to the total production of South African maize.

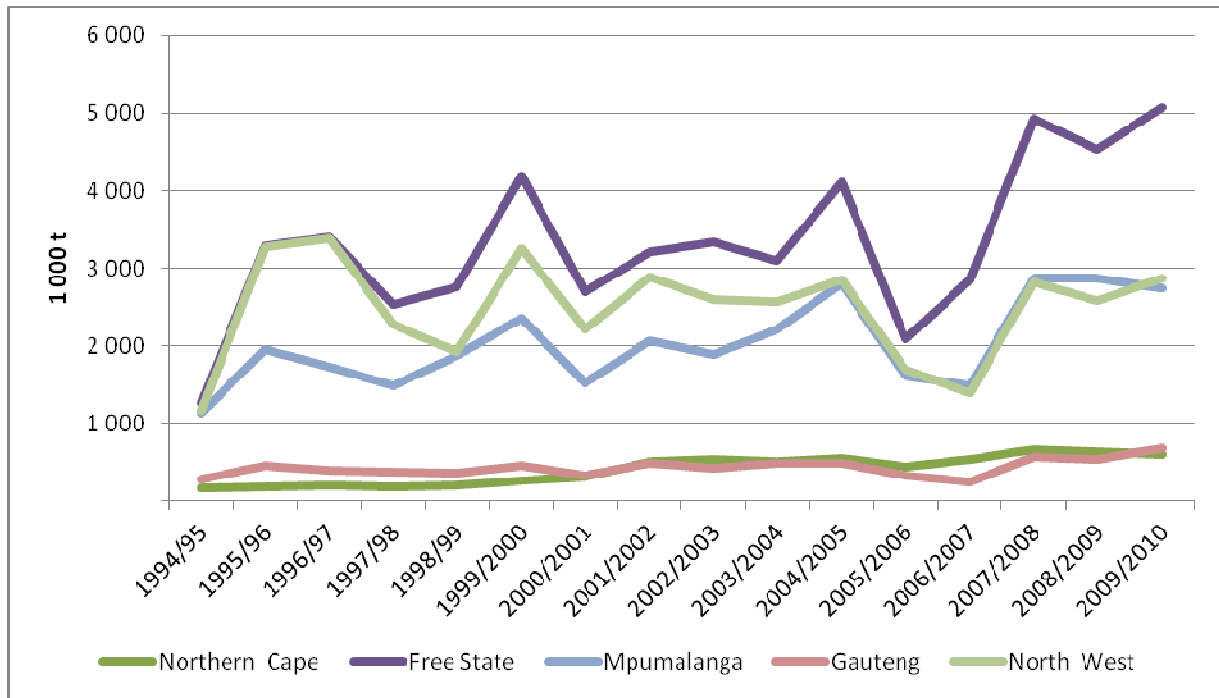


Figure 12.2.3. Production of maize in South Africa  
 Source: Agricultural Abstract 2010

Although the production of maize increased over the period from 1994, the total land utilized for production of maize decreased. One of the main reasons for this is that farmers have become more productive and farmers are only utilizing higher quality land. Figure 12.2.4 shows this decrease in land used for the production of maize.

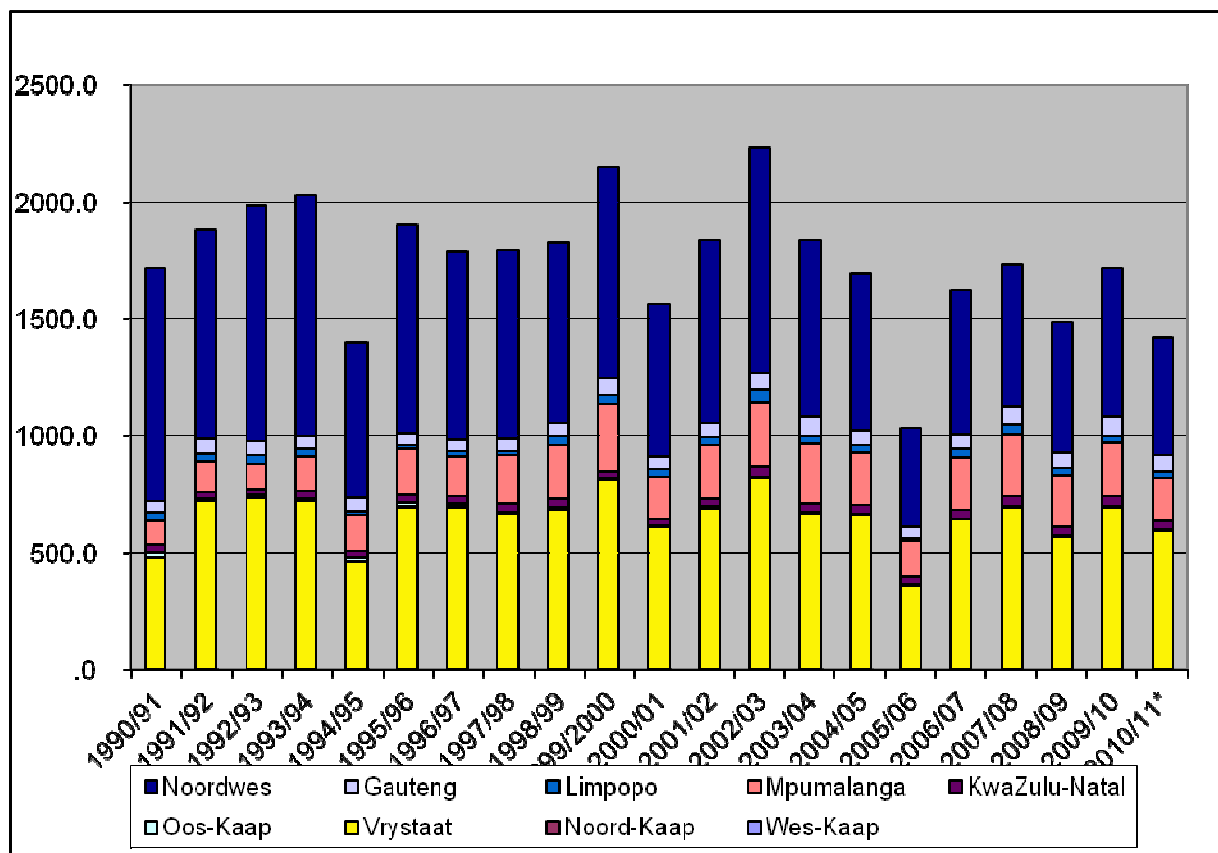


Figure 12.2.4 Area planted to maize in South Africa.  
Source: Grain SA (2010)

### Maize Export

The maize industry is an important earner of foreign exchange through the export of maize and maize products. KwaZulu-Natal and Gauteng have recorded high export values between the periods 2000 and 2009. This can be attributed to the fact that the major maize producing regions (which are the Free State, North West and Mpumalanga) are not exit points for maize exports. Most maize is exported either through the Durban harbour, or through the use of the SAFEX grain market in the Gauteng Province. However, in the Free State province exports of maize are mainly from the Lejweleputswa and Northern Free State Districts with high values recorded during the years 2009. There were no exports of maize from the Free State province between the year 2005 and 2008.

**Table 12.2.1: Share of Provincial maize exports to the total RSA maize exports (%)**

<i>Year</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>
<i>Province</i>								
<i>Western Cape</i>	10.68	7.45	2.84	0.88	0.09	5.82	1.86	9.04
<i>Eastern Cape</i>	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
<i>Northern Cape</i>	1.63	0.80	1.31	0.07	0.62	3.79	0.20	0.31
<i>Free State</i>	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.03
<i>KwaZulu-Natal</i>	12.74	27.78	21.92	15.73	12.59	28.55	16.72	9.64
<i>North West</i>	0.00	10.40	1.11	1.39	1.88	2.79	1.42	1.99
<i>Gauteng</i>	74.37	52.30	72.79	81.87	84.64	58.90	79.78	78.67
<i>Mpumalanga</i>	0.51	1.17	0.00	0.00	0.13	0.12	0.01	0.21
<i>Limpopo</i>	0.03	0.06	0.00	0.00	0.02	0.00	0.00	0.11

Source: DAFF 2011

From Table 12.2.1 above, it can be inferred that the Gauteng Province commands the greatest share of South African maize exports followed by KwaZulu-Natal and Western Cape Provinces. This is in spite of the fact that the Free State, North West and Mpumalanga Provinces are the major maize-producing provinces in the republic. This is mainly due to the fact that most exporters of maize are situated in the Gauteng Province and the greatest proportion of maize trading occurs through the SAFEX grain market. Furthermore, maize is also exported through two major harbours namely, Durban and Cape Town. The above scenario raises concerns about the availability of marketing infrastructure and agro-logistics in the major maize producing provinces of South Africa, because Gauteng is not a major maize-producing region and yet the greatest share of South African maize exports are exported through this province.

### **12.3 Sorghum and soya beans**

Grain sorghum is another commodity largely produced in the Free State Province, with an annual production of 141 000 tons on average per year. Grain sorghum is planted in the summer months in the Free State Province and usually competes with maize and other summer grains. Figure 12.3.1 explains the total production, consumption and exports of sorghum. A decrease can be seen in the production of sorghum over time, but producing more than the total consumption of sorghum.

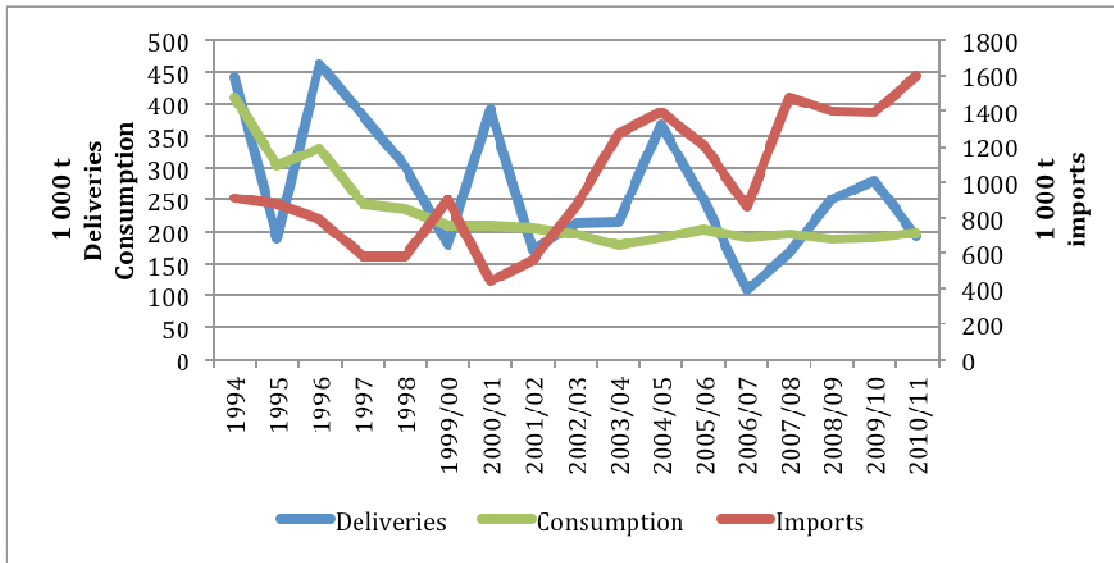


Figure 12.3.1 Deliveries of sorghum, total consumption and exports of sorghum (1994/2011)  
 Source: Agricultural Abstracts 2010

The price of grain sorghum also increased over time due to the fact that the two commodities are 95% correlated. The price of grain sorghum is shown in Figure 12.3.2

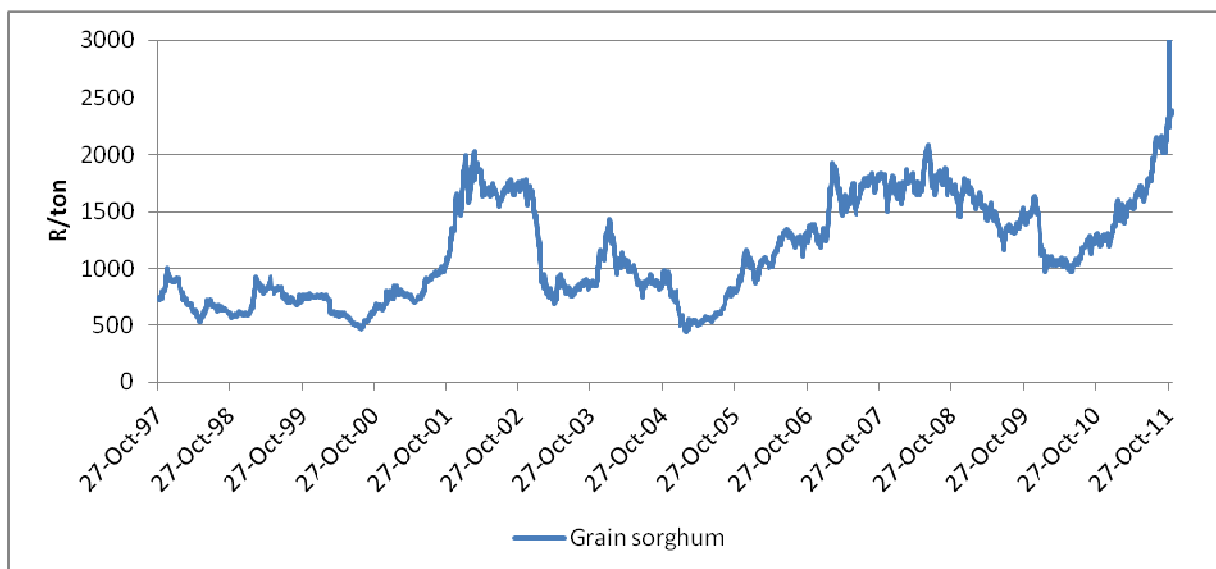


Figure 12.3.2 Nominal prices of grain sorghum from 1997 to 2011  
 Source: GrainSA (2010)

The Free State Province is the largest producer of grain sorghum in South Africa by producing more than 140 000 tons per year as shown in Figure 12.3.3. As seen in Figure 12.3.3, the production in terms of hectares of sorghum also decreased over the last number of years.

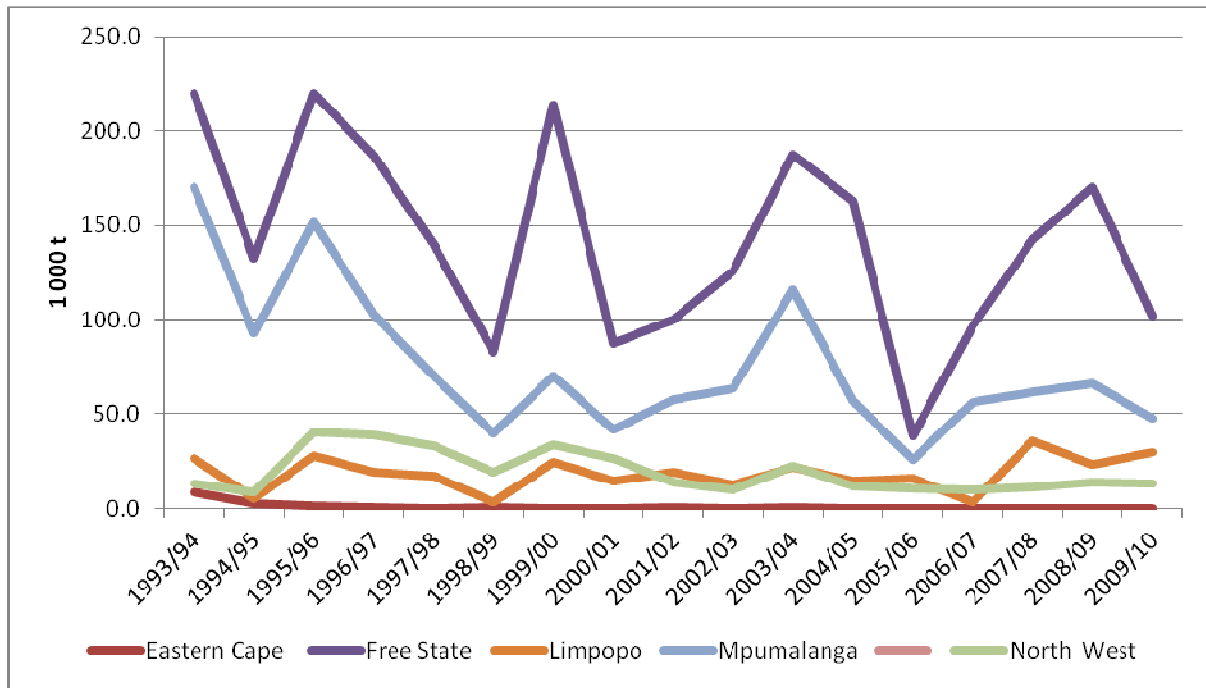


Figure 12.3.3 Production of grain sorghum in South Africa.  
Source: Agricultural Abstracts 2010

Soya bean production has increased over the last number of years as shown in Figure 12.3.4. Processing of soya beans over time is closely linked to the production of soya beans. Exports of soya beans were also closely linked to the production and exporting only surplus produce. There are no soya bean imports to South Africa. The only exception is the importation of soya bean oilcake.

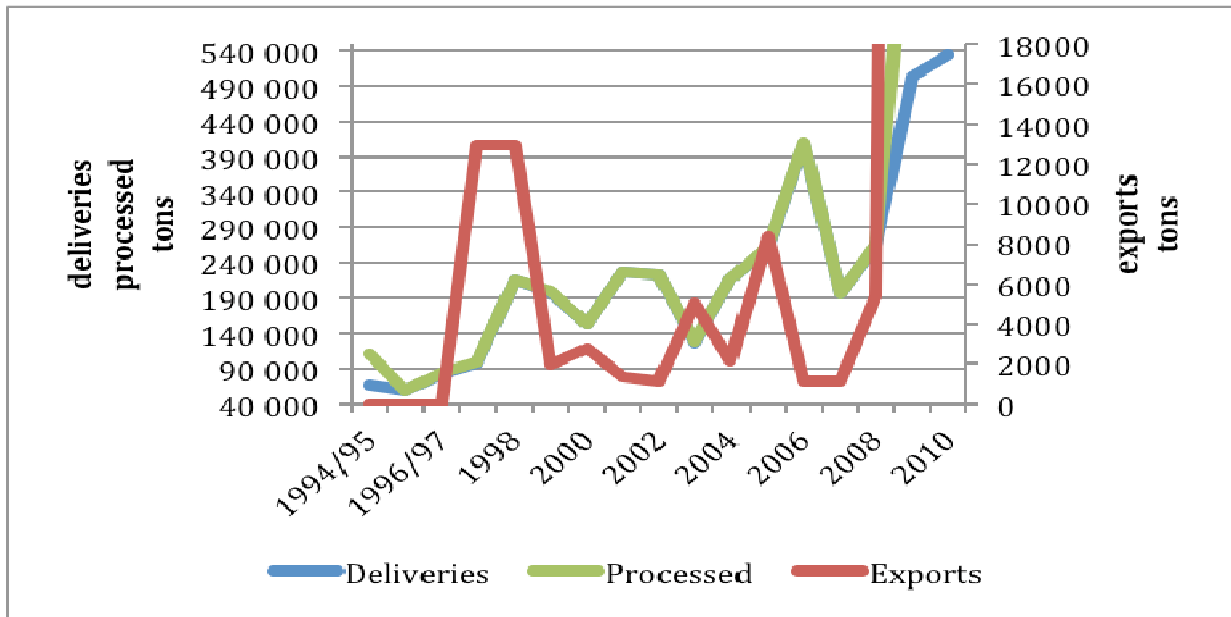


Figure 12.3.4. Deliveries of soya beans, total processing and exports of soya beans (1994/05-2010/11)

Source: Agricultural Abstracts 2010

The Free State Province is not the largest producer of soya beans in South Africa, but has shown an increase in production in the last 2 years. Figure 12.3.5 illustrates the different volumes of production per province.

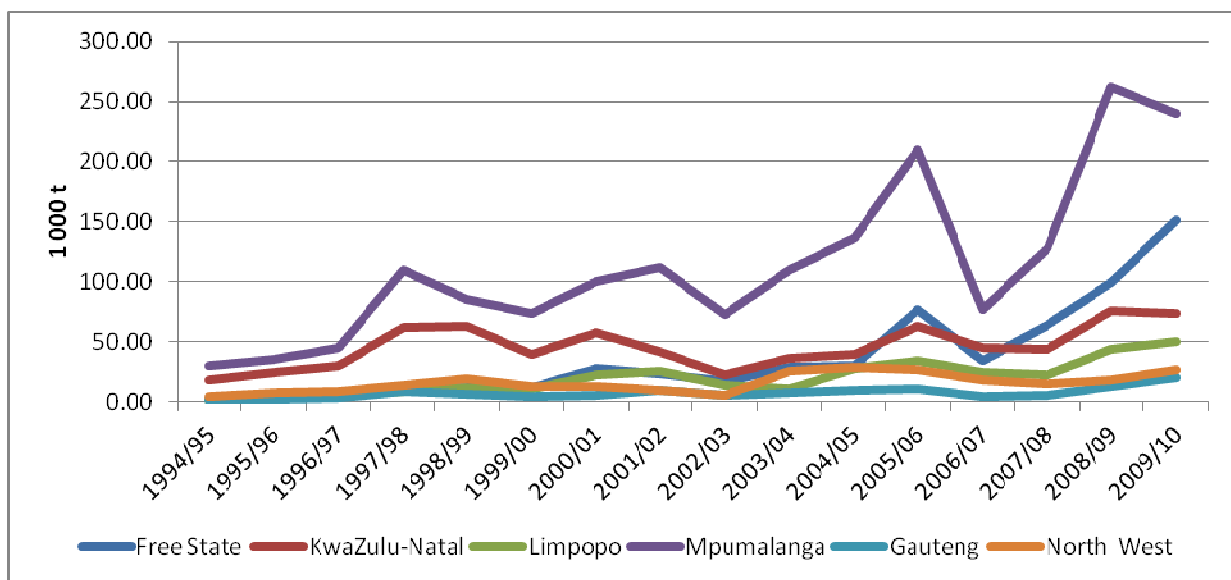


Figure 12.3.5: Production of soya beans in South Africa.

Source: Agriculture Abstracts 2010

The price of soya beans has increased over time as shown in Figure 13.3.6; prices started to rise from 2007 onwards, and production also increased from this period onwards.

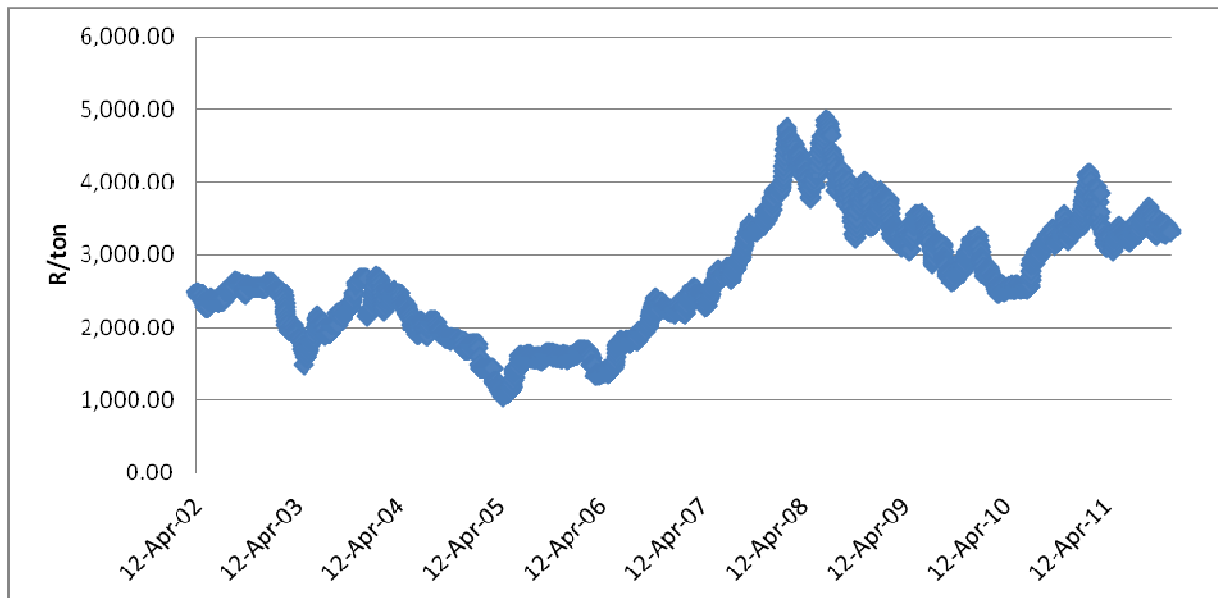


Figure 12.3.6. Nominal prices of soya beans from 2002 to 2011  
Source: GrainSA (2011)

### 12.3.1 Remarks

- Agriculture in South Africa contributes to about 3% of South Africa's Gross Domestic Product (GDP) and about 8% of the formal employment.
- The Free State Province produces more than a third of South Africa's wheat and maize.
- In terms of volume of production, wheat is the second most important field crop that is produced in South Africa, by producing 250 000 tons of wheat per year; however, it must be kept in mind that South Africa is a net importer of wheat; importing 1 100 000 tons of wheat per year.

- Prices increased over the last number of years, the reason for the sharp increase in prices is mainly due to a shortage of wheat in South Africa, meaning the price of wheat moved to import parity.
- The Western Cape Province was the largest producer, but since the transport differential became a problem for these farmers, the eastern Free State regions became the largest producer of wheat.
- Maize is the most important grain crop that is produced in South Africa. Over 12 000 000 tons of maize is produced per year.
- Maize production in South Africa exceeds the total consumption of maize, which makes South Africa a net exporter of maize.
- The price of both white and yellow maize increased tremendously from 1997 onwards. This increase in prices started after the markets were deregulated and the market changed to a free market system.
- Free State Province is one of the largest producers of white and yellow maize by producing an annual amount of 3 336 000 tons of maize over the last number of years.
- Although the production of maize increased over the period from 1994, the total land utilized for production of maize decreased. One of the main reasons for this is that farmers have become more productive and farmers are only utilizing higher quality land.

- Grain sorghum production has decreased over the last number of years, while the prices increased.
- Soya bean production has increased in the Free State Province, while prices have also increased in the same period.
- One fact must be kept in mind when one looks at the export of grains. As previously shown, the majority of exports per province shows that the Gauteng Province exports a large proportion of field crops, but do not produce a large numbers of crops. This is mainly due to the fact that the majority of trading houses is situated in this province.

#### **12.4 Livestock**

The large and small stock industry plays a major role in the South African agricultural sector. The South African red meat sector contributed 14.8% to the total gross value of agricultural production during the 2008/2009 production season with cattle being the main contributor at 10.1% and sheep contributed 2.4% during the same period (DAFF 2010). The long-term average contribution of the red meat industry to the total gross value of agriculture production (from 1996/1997 to 2008/2009) accounts for 13.2 % and that of beef, 9.4 % and sheep, 2.4 % during the same period (DAFF 2010).

Given the natural resources of South Africa, approximately 80% of the land surface is used for agricultural purposes and almost 70% is suitable for raising livestock. This makes the livestock sector one of the most vital agricultural sectors in South Africa.

The Free State Province of South Africa comprises approximately 11.7% of the total farmland in South Africa; of this 52% (7 538 677ha) is utilized for grazing purposes (DAFF 2011). One of the other main agricultural sectors is production of field crops (including the by-products of this industry) that makes finishing of large and small stock very popular, by back-grounding stock or in a feedlot situation.

The average, large and small stock number is illustrated in the figure below for South Africa as a whole and comparing the total numbers with the Free State Province. According to DAFF (2011), total large and small stock for South Africa contributed to 13 830 622 head of cattle and 30 936 783 of small stock (including sheep and goat) for the November 2010 estimate (only for commercial numbers).

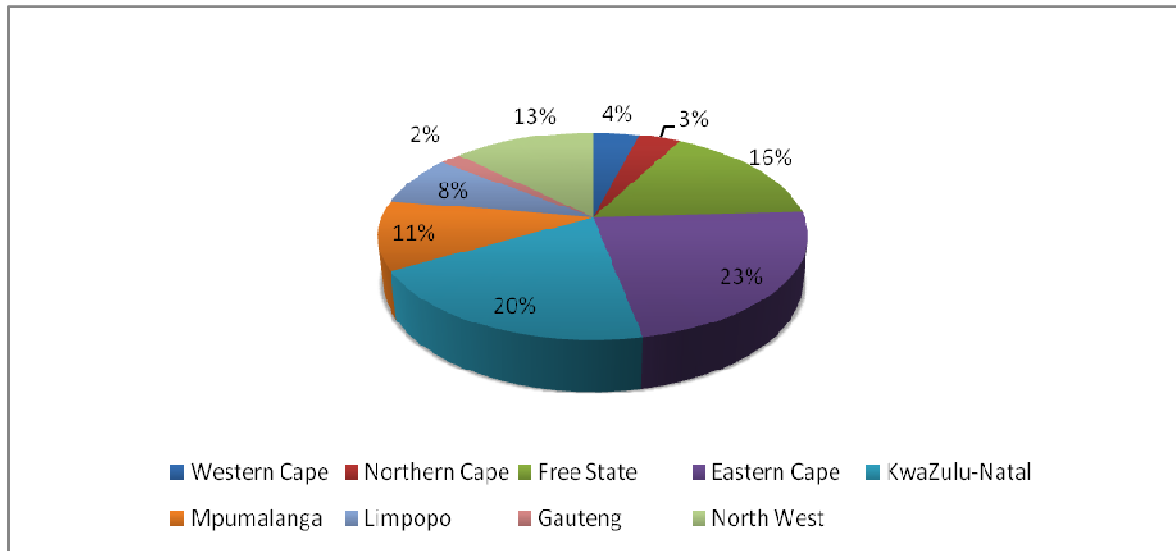


Figure 12.4.1 Provincial breakdown of the total cattle herd of South Africa  
Source: DAFF 2011

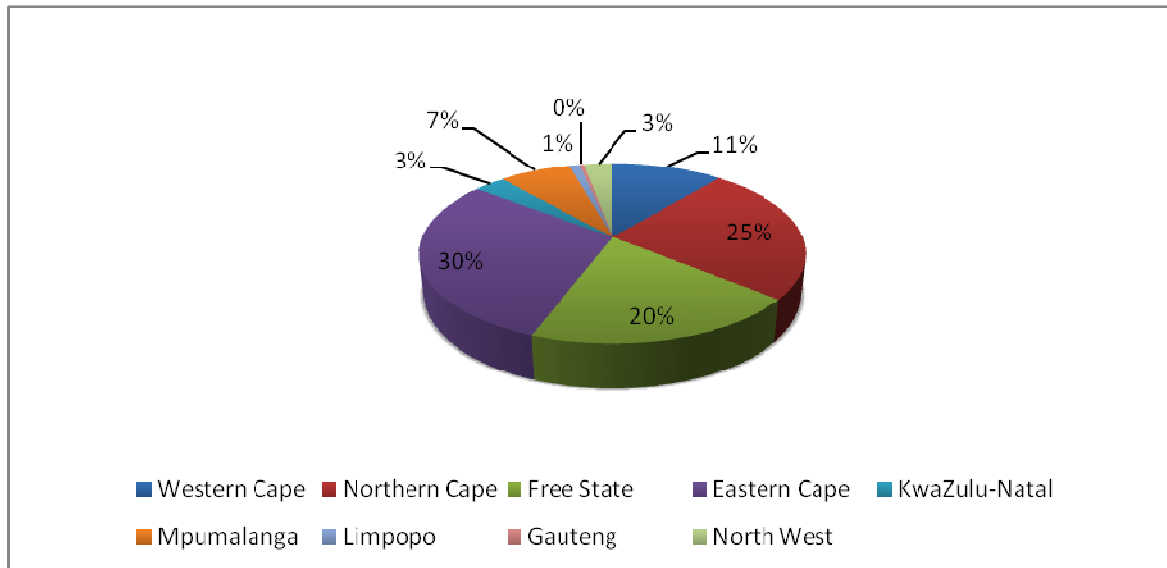


Figure 12.4.2 Provincial breakdown of the total sheep and goat herd of South Africa  
 Source: DAFF 2011

When looking at Figure 12.4.1 and Figure 12.4.2 it is clear that the Free State Province plays an important role in the livestock sector of South Africa; contributing 16 % of the total cattle numbers and 17% of the total small stock sector.

Over time the national cattle herd has remained relevantly constant for the whole of South Africa from 1996 to 2010. However, the Free State Province shows a proportional increase in stock growth in the same period. In the case of the national sheep flock herd, a decrease could be seen from 1996 onwards. These trends in national and provincial herd numbers for beef and sheep can be seen in Figure 12.4.3 and Figure 12.4.4.

Due to a number of reasons, the total national herd (large and small stock) has decreased over the last number of years. The reasons include animal deceases, stock theft and drought that will be explained at a later stage.

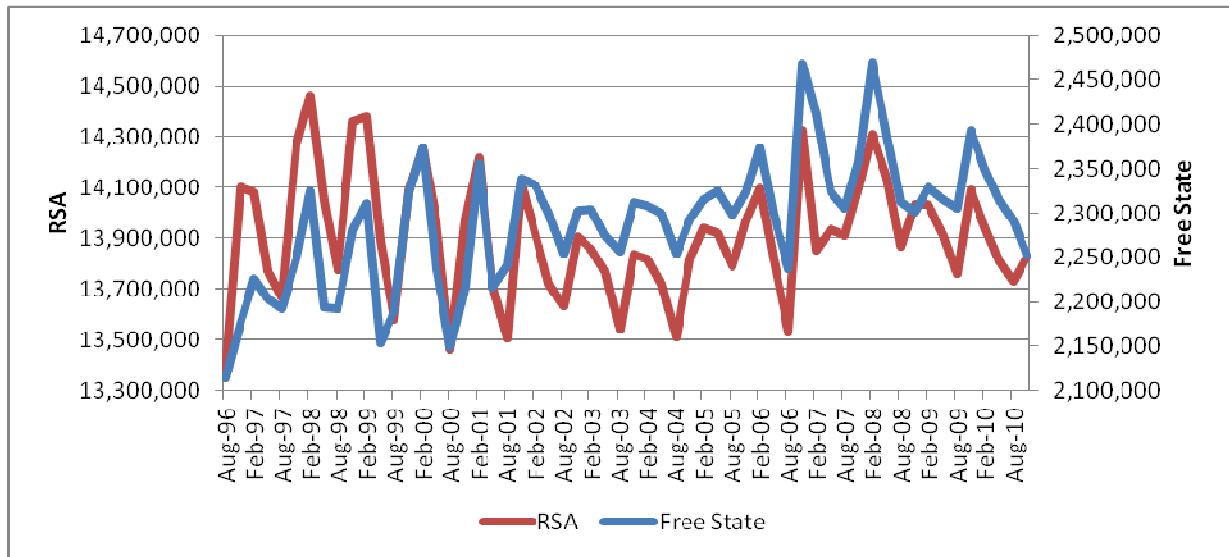


Figure 12.4.3 National and Provincial (FS) cattle numbers 1996-2010.  
Source: DAFF 2011

The decrease in stock numbers over the last number of years is experienced across South Africa and not by specific provinces as seen in Figure 12.4.4.

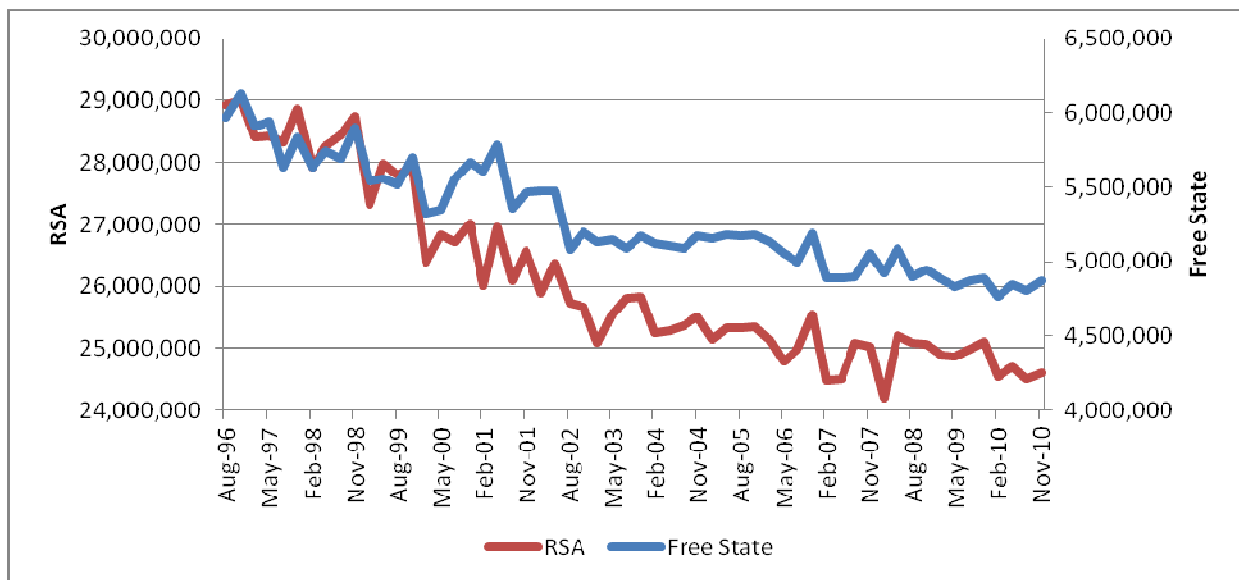


Figure 12.4.4: National and Provincial (FS) sheep numbers 1996-2010.  
Source: DAFF 2011

The decrease in stock numbers in South Africa, mainly due to animal deceases, stock theft, predation and drought, caused a sharp increase in prices of livestock over the last year. Prices for

cattle and sheep are shown in Figure 12.4.5. The prices for livestock are given in c/kg for carcass prices (prices were made real in order to compare prices over time). From 1994 onwards an ascending trend can be seen in the real prices of beef and sheep. This ascending trend can be seen particularly in the price of sheep in proportion to beef.

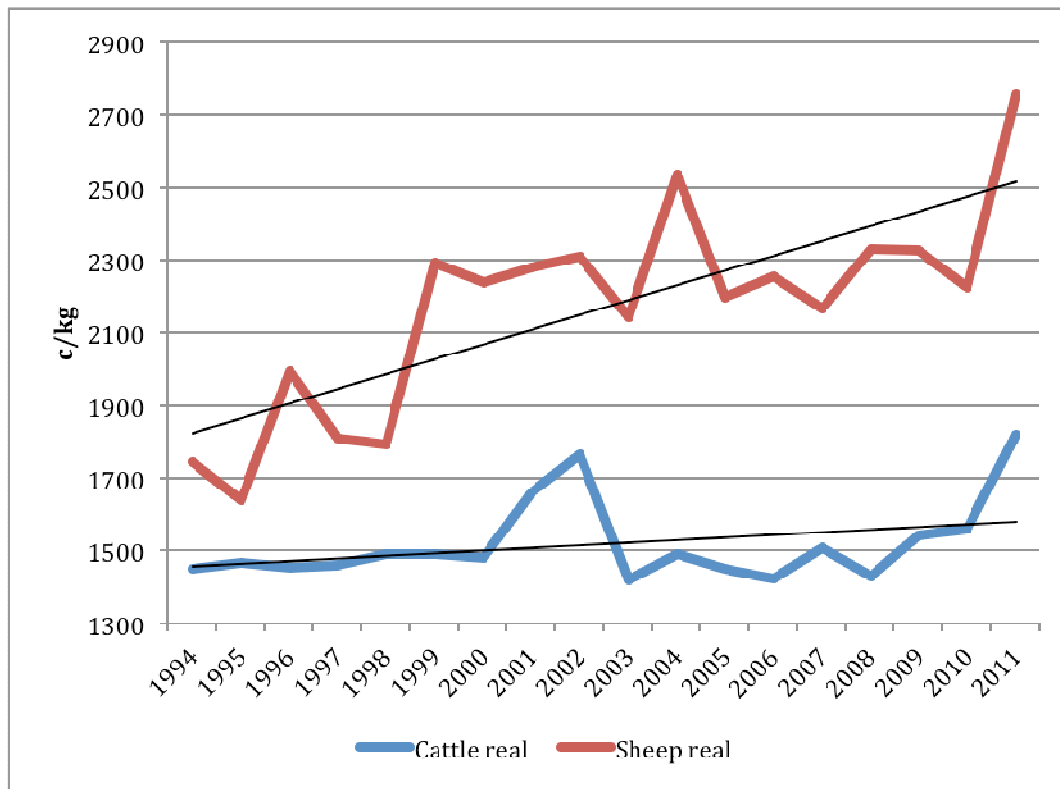


Figure 12.4.5 Average prices (c/kg) for cattle and sheep  
Source: AMT 2011

In conclusion, the meat industry is looking very attractive at the moment for investments but stock levels are low which could have inflated prices. This decrease in stock is mainly due to animal diseases such as Rift Valley Fever. Other factors that contribute to this problem are predation by damage-causing animals, stock theft, veld-fires and drought. All of these factors make it difficult for farmers to build their stock numbers for production purposes. When investing in this industry, these factors will have to be monitored in order to increase the success rate of investment projects.

## Beef exports

South Africa exported approximately 4.6 million kilograms of beef in 2009 yielding an export value of R 185 million. There was an increase of 34% in the quantity of beef exported and 204% of export value in 2009 compared to 2000.

Table 12.4.2: Share of Provincial beef exports to the total RSA maize exports (%)

Year	2002	2003	2004	2005	2006	2007	2008	2009
Province								
Western Cape	12.45	12.36	7.67	8.20	19.56	12.30	21.25	22.11
Eastern Cape	2.98	1.55	3.27	1.48	0.00	0.11	0.00	0.00
Northern Cape	9.54	6.26	22.65	0.54	3.42	7.95	2.34	17.69
Free State	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
KwaZulu-Natal	3.51	6.63	0.92	5.23	8.04	9.98	2.33	1.97
North West	0.26	0.00	0.00	0.00	0.00	0.00	0.00	4.44
Gauteng	63.90	50.30	37.57	78.03	66.48	67.11	61.84	40.50
Mpumalanga	7.299	22.76	27.92	6.52	2.42	2.55	12.24	13.27
Limpopo	0.10	0.13	0.00	0.00	0.00	0.00	0.00	0.00

Source: Quantec (2011)

From Table 12.4.2 above, Gauteng Province commands the greatest share of South Africa's beef exports followed by Western Cape Province. This is mainly due to the fact that most exporters of beef are situated in Gauteng Province and the greatest proportion of beef was exported to neighbouring countries and Gauteng Province is the main exit point. Northern Cape, KwaZulu-Natal, Eastern Cape and Mpumalanga provinces were regular exporters while Free State, North West and Limpopo registered fractional exports of beef.

### 12.4.1 Remarks

The South African livestock sector has seen many challenges over the last number of years. Drought, animal diseases, stock theft and predation have become a growing problem for farmers. As previously noted, the total livestock numbers have declined over the last number of years. Farmers want to reduce risk in farming; meaning that there is a tendency to move from small livestock to large livestock. Predation and stock theft are some of the main reasons. Predation in the Free State amounts to almost 6% of total stock per year and stock theft increased by almost

9% of small stock in South Africa (RPO, 2011). Due to a combination of all of these factors, an under-supply of meat, especially sheep, has occurred. This shortage has had an effect on the price of meat - over the last 3 years an increase of prices can be seen.

## 12.5 Poultry & Eggs

The poultry industry is a fast-growing industry in South Africa, with production predicted to increase by 40% over the next ten years (National Planning Commission, 2011). This is evident in the fact that in 2000 the per capita consumption for broiler meat was 19.7kg and in 2009 it was 31.83kg per person (National Department of Agriculture 2011). Most of the broiler production occurs in the following provinces: Limpopo and Mpumalanga (22.6%), North West (24.3%), Western Cape (20.6%). Free State is very small in comparison with 5.3% of broilers produced. In South Africa, 13 producers supply 70% of the broilers in the market, while small-scale farmers produce the other 30%. Poultry accounts for 49% of the per capita consumption of animal protein while beef and veal (26%), mutton and goat (5%), pork (7%) and egg (13%), according to SA Poultry (2010). In the egg industry, distribution is as follows: Gauteng (24%), Western Cape (19%), KwaZulu-Natal (13%) and Free State (17%). This shows that the industry is growing and that currently it is the biggest source of protein to the consumer. According to the National Department of Agriculture (2011), the only broiler meat exports that occurred in the Free State was in 2008 from the Motheo district; this was to the value of R 708 554 and in 2009 the value increased to R111 097 585, which is indicative that this is still a relative new industry in the Free State and that there is scope for further growth. This increase in 2009 resulted in the province contributing 49% to broiler meat exports in the country.

The broiler industry is influenced by various factors like the exchange rates, CBO, local maize crop size, SAFEX, diseases as well as imports. On the demand side, consumer preferences are a major influential factor. In the egg industry, the biggest obstacle is making a profit with continuously increasing costs, but the industry should continue growing in 2010/2011. The biggest cost that producers have is the cost of feed and thereafter electricity. The producers' margins can be improved if they can lower their input costs. An option to investigate is farming with maize that can be used as feed; this will create jobs and value-adding opportunities for the producer.

Table 12.5.1 Poultry Statistics per province 2010

Province	Total Broiler birds	%of Broilers	Total Layer birds	%of layers	Total number of birds	%of Total birds
Eastern Cape	6 781 075	6.3%	910 178	3.4%	7 691 253	5.7%
Free State	5 669 563	5.3%	4 584 275	17.1%	10 253 838	7.6%
Gauteng	5 657 647	5.3%	6 595 820	24.6%	12 253 467	9.1%
KwaZulu-Natal	16299120	15.2%	3 920 367	14.6%	20 219 487	15.1%
Limpopo & Mpumalanga	24 220 194	22.5%	2 777 146	10.4%	26 997 340	20.1%
North West	26 010 602	24.2%	2 584 047	9.6%	28 594 649	21.34%
West & Northern Cape	33 809 000	21.2%	5 410 921	20.2%	28 219 921	20.3%

Source: SA Poultry 2011<sup>3</sup>

## 12.5 Remarks

This is a growing industry in the province with scope for value-adding.

Some of the risks that should be taken into account are:

- Low priced imports
- High feed costs
- Lack of finance, as this is a capital-intensive industry where volume produced is important.

## 12.6 Dairy

The dairy industry is moving towards fewer producers producing more milk, therefore economies of scale are important. Most of the milk is produced in the Western Cape with 25.2% of total production and the Free State with 22.1% and the North West province is on 14.4%.

<sup>3</sup>Still awaiting data from 1994

Demand and supply is very close to each other and there are seldom shortages, even though the number of producers has decreased from 3665 to about 1800 producers in South Africa. The future for the industry looks good as there are various school milking schemes in association with Government in establishing a market for small-scale producers, but it will be the producers optimizing their economies of scale who will be the main suppliers to major retailers. The industry is focusing towards being more capital intensive, high quality and sustainable volumes and it will be those producers who master these factors who will be sustainable. As a result of low prices and decreasing margins, commercial producers are adding value to their milk or gaining economies of scale by forming cooperatives and other marketing structures. Table 12.6.1 shows the number of producers per province; overall there has been a decline of 53% and in the Free State province the decline from 1997 to 2010 has been 31% (1204 to 835).

Table 12.6.1 Number of milk producers per province

Province	December 97	January 2006	January 2007	January 2008	March 2010
Western Cape	1 557	878	827	815	754
Eastern Cape	717	422	420	407	354
Northern Cape	133	39	37	34	45
KwaZulu- Natal	648	402	385	373	348
<b>Free State</b>	<b>1 204</b>	<b>1067</b>	<b>987</b>	<b>919</b>	<b>835</b>
North West	1 502	619	596	549	507
Gauteng	356	275	245	228	212
Mpumalanga	866	407	357	302	248
Limpopo	74	45	45	38	29
Total	7 077	4 184	3 899	3 665	3 332

Source: MPO Statistics

When comparing this decline in the number of producers contributing to milk production in the provinces (See table 12.6.2) from 1997 to 2009, the Free State has lost some market share by declining from 18% to 14% of South African production. It is evident that provinces like the Western Cape, Eastern Cape and KwaZulu-Natal have established themselves as the milk

producing capitals of South Africa. Better climate conditions, access to markets and major transport routes have contributed to this. Table 12.6.2 also shows the average number of cows owned by each producer and as mentioned above, farmers are more specialised and herds are bigger to take advantage of the economies of scale and decrease in per litre produced.

Table 12.6.2 Milk Production and cows per producer

Province	% Distribution of milk production		Number of Cows per producer 2009	
	December 97	Sept 2009	Mean	Median
Western Cape	22.9	27.1	203	150
Eastern Cape	13.8	25	468	313
Northern Cape	1.2	0.4	141	100
KwaZulu- Natal	15.7	19.8	367	310
<b>Free State</b>	<b>18</b>	<b>14</b>	<b>113</b>	<b>82</b>
North West	12.6	5.3	96	77
Gauteng	4.4	3.4	99	62
Mpumalanga	11	4.5	116	88
Limpopo	0.4	0.3	175	71
Total	100	100	209	145

Source: MPO Statistics

## 12.6 Remarks

The industry is more specialised; if producers want to be sustainable they will have to do the following:

- Lower per litre cost of production - one way is to produce own feed.
- Be situated near major transport routes and access to a market
- Produce on a sustainable basis a high quality product

- Value-adding in the industry will not always be the best option as the biggest market is comprised of those who buy fresh milk and not processed; especially since this industry is about economies of scale and lower input costs
- Cooperatives may serve as a vehicle in assisting small-scale farmers to gain economies of scale and access to markets, but then it is vital that the management of the cooperative will encourage the production of a quality product and sustainable volumes.

### 13. Risk Identification

This section briefly identifies the risks in agriculture of which producers should be aware of. These risk factors influence many aspects of agricultural growth in South Africa and if identified early and managed well, it may be avoided or transformed into opportunities for the producers or investors in agriculture. Many risks are beyond the control of the producer or cannot be predicted. These risks are difficult to manage by either individuals or markets and, therefore, can have a catastrophic effect on the output of the producer (OECD, 2009). Producers can decide to pool their risks and share the outcome and diversification, to use their resources on different activities instead of focusing it on one asset/activity.

- **Production uncertainty** – the yield and quality obtained from a given bundle of production decisions are not known with certainty. Weather conditions play a vital role and are not controllable by producers.
- **Price uncertainty** – production decision have to be made far in advance of realizing the final product. The prices of the commodity are not known by the time the producer makes any production decisions. The inelasticity of demand with regards to agricultural products has been cited as the main reason.
- **Technology uncertainty** – the decrease in research and development in agriculture has led to a decrease in the production of certain commodities, as it is just not profitable anymore, for example wheat. New technologies are also not researched at farm level but rather at input supplier level, which prolongs the producer's access to the technology.

- **Policy uncertainty** – factors like interest rates, taxes, and exchange rates also increase uncertainty but the main contributing factor is Government intervention and policies, which may lead to a decrease in agricultural investments.

The factors below lead to an increase in risk due to uncertainty in the market. These factors can either lead to production-, price-, technological- or policy uncertainty. Access to information is important in trying to predict the impact of these uncertainties once they occur and to manage the industry to be sustainable through these uncertainties.

- **Gross Domestic Product**

World economic growth and South Africa's economic growth has been revised downwards, which means that consumers and businesses are still struggling. The demand for goods and services has not recovered to the levels of before 2007/2008 and therefore production has not increased either. Many countries have high budget deficits, which are also hampering the demand for products. The main countries are found in Europe, which is one of our main export markets, especially for fruit and wine. Therefore, not only is our economic growth out of danger but our export markets are also demanding less of our exports.

- **Household Consumption Expenditure& Interest Rates**

Interest rates are currently at the lowest level than what they have been in the past 30 years. This creates an opportunity for producers to invest in the economy and, therefore, also in agriculture which is not currently happening. The weakening of the Rand against the Dollar could be the reason, but also the decrease in the agribusiness confidence index and the increased talk of nationalization, as well as the Green Report may lead to higher risks associated with investing in the industry. Overall, the outlook seems to be improving, but access to finance is still an obstacle for investors.

- **Inflation rates**

Inflation rates are still within the targets of the Reserve Bank but the low interest rates will start seeping through and push inflation up. Food inflation is predicted to increase to 15% in the next year, which will decrease HCE and put pressure on consumers.

- **Exchange rates**

Still very unstable and the slightest shock in the markets has an effect. The Rand was strong against the Dollar for a while but that was not because South Africa was doing so well, but because the United States of America was that bad. They are slowly recovering, but it is starting to show in the weakening of the Rand. The debt crises of the EU has also affected the exchange rates and increased volatility in the market.

- **Agricultural Commodity prices**

Very unstable and unpredictable droughts in the Red Sea area and in the south of the US, floods in the northern parts of US, Australia and Asia have a dramatic effect on commodity prices across the world.

- **Oil**

With the uncertainty in currency, many investors have invested in oil but the political situation in the oil producing countries have made it very volatile and easy to lose money. Prices are set to rise again, which again puts pressure on the margins of the farmers, which makes it difficult as producers cannot decide whether they are not producing or if they are producing less, they still have fixed costs that will have to be covered.

- **Input prices**

They are set to increase because of seasonality and various other factors. The big commercial producers either buy in bulk ahead of time to obtain a special discount and then store it, or they mix their own fertilizer, etc. to decrease cost. The availability of information will also be helpful to assist producers to strategically plan their procurement and use of inputs.

- **Climate**

Discussed at the beginning of the document. Very dry and hot which will affect the growing of the plants. Water catchment and the effective use of water will help to decrease their price even further.

- **Political**

Unstable and after the downgrading Moody's it will lead to uncertain times.

## Macro economic Risk Identification Matrix

Table 13.1.1 is a summary of the major macro economic and other risk factors that farmers should consider. These risks are not precisely predictable but if anticipated it can be to the benefit of the farming business. The risk factors are as follows:

Table 13.1.1 Macro economic Risk identification matrix

<b>Risk factors</b>		<b>GDP</b>	HCE	<b>Interest</b>	<b>Inflation</b>	<b>Exchange rates</b>	<b>Agricultural Commodity prices</b>	<b>Oil</b>	<b>Input prices</b>	<b>Climate</b>	<b>Political</b>
<b>Drivers</b>	<i>Intern</i>	▶	▶	▶	▲	\$ /€	▶	▶	▶	▶	?
	<i>Local</i>	▶	▲	▶	▲	▲	▶	▶	▲	▶	▶
<b>Scenario</b>	<i>Intern</i>	Slow	Slow	Slow/down	Slow	\$ Volatile	Risky	Stable	Volatile	Risky	Unstable
	<i>Local</i>	Slow	Improve	Sideways	Slow up	Stable	Sideways	Stable/Lower	Sideways	Risky	Stable
<b>Implications</b>			Slow growth in Western economies / Agricultural exports struggle to Europe. Asian markets continue to grow - increasing commodity demand (minerals and raw materials)								
	Rand to remain relative strong, potential volatility, interest rate low into 2012, slow investments										
			International economic risks remain volatile especially exchange rates. Depending on capital flows.								
<b>Actions</b>	Exchange rate risk, slow credit, and slow upswing in economic cycle/cost push.										

Source: Adapted from Prof Willemse (2011)

**Below Table 14, concludes with a summary of the problems identified and recommendations made throughout the document.**

Recommendations

Factor identified	Area	Action
Infrastructure	Improving infrastructure throughout the province	<p>Build dams for irrigation to produce specific products for local processing/packaging etc.</p> <p>Improve road conditions to facilitate local processing and supply.</p> <p>The availability/affordability of electricity.</p> <p>Ensure that railways are linked to silo's and maintain these railways especially silo's designated for export or to specific mills.</p>
Research, extension and training	<p>Throughout province and focus on the largest agro industries.</p> <p>Especially areas where high-value crops are produced for export and can be further processed (Fruit and vegetables)</p>	<p>Training the youth not only in farming practices, but also in the services farmers need and for the processing and service industries.</p> <p>This will assist them in starting their own businesses, bringing skilled people back to the area and economic growth of the area.</p> <p>Example: mechanic (repairing vehicles and machinery), livestock managers, tractor and machinery operators, electricians, welders etc. Dedicated training facility on basic skills for farming and processing industries.</p>
Electronic Communication	<p>Improve throughout the province</p> <p>Especially areas where production for processing and exports are growing</p>	<p>Installation of internet, Telkom lines to facilitate transactions</p> <p>Provide producers with access to information and allow them to seek better markets. Facilitating connection/interaction between local processors and local producers (grain, livestock and vegetables)</p>
Increase cherry production	Setsoto, Dihlabeng	<p>Assist with research, training and extension to the industry and by training new farmers.</p> <p>Create "agricultural hubs" where these producers can pool resources and process/package in volumes.</p>

		<p>Create a regional brand – linked to the area of production</p> <p>Expand on the Cherry Festival in driving the expansion and marketing of the brand name.</p>
Adding value to local produced grains and oilseeds.	Throughout Free State	<p>We are the highest maize-producing province.</p> <p>Adding value to the commodity is the next step. Intensive livestock production linked to feed mills and local processing units. These units/hubs need to be close to inputs (silos, feed manufacturers, water, electricity and labour) and close to a market.</p> <p>The Free State is ideally situated and focussed attention to link local production to processing and markets, will stimulate economic growth and employment.</p>
Agricultural losses	Throughout the Free State	<p>Producers lose the bulk of their income due to theft, predators and fires.</p> <p>Increase security in the rural areas</p> <p>“Oranjejag” was an organisation that hunted caracals in order to keep their numbers low. If revived, this will create many jobs.</p>
Value-adding	Identified areas for high-value products. Mangaung, Matjhabeng and Metsimaholo	<p>Training of the producers in marketing, production practices. Provide information to these producers. (Research/extension and dedicated training facilities)</p> <p>Establishing of processing hubs and linking local farmers to local processors and local markets, to facilitate investments and economic growth through the multiplier effects.</p> <p>Linking emerging producers with successful producers in specific target areas.</p>

		In the long term – a brand name for the products sold can be established, linking it to the area in which it is produced.
Research, extension and training	Free State	<p>Improved and focussed research in local issues, i.e. improving wheat, soybeans and sunflower cultivars and production practices for the Free State, will increase production and efficiency and contribute to economic growth through the multiplier effects</p> <p>Research, extension and training will provide employment opportunities in the smaller towns and rural areas.</p> <p>Will capacitate producers and provide them with a channel to go to with production-associated questions/problems that can be researched and solved in the long term.</p> <p>These research facilities can also be used as training hubs to equip the youth and unemployed with basic skills and in farming practices. In addition it can be through this channel where new investments can be made in upcoming young producers who show potential and have undergone certain training modules.</p>

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## Appendix: A

### A1. Arable land classes in terms of capability

Table 16: Arable land classes in terms of capability	
Class	Concepts
I	Land in class one has few limitations that restrict its use; it may be use safely and profitably for cultivated crops; the soils are nearly level and deep; they are easily worked and are either fairly well supplied with plant nutrients or are highly responsive to inputs of fertilizer; when used for crops, the soils need ordinary management practices to maintain productivity; the climate is favourable for growing many of the common field crops.
II	Land in class two has some limitations that reduce the choice of plants or require moderate conservation practices; it may be used for cultivated crops, but with less latitude in the choice of crops or management practices than Class I; the limitations are few and the practices are easy to apply.
III	Land in class III has severe limitations that reduce he choice of plants or require special conservation practices, or both; it may be used for cultivated crops, but has more restrictions than class II; when used for cultivated crops, the conservation practices are usually more difficult to apply and to maintain; the number of practical alternatives for average farmers is less than that for soils is class II.

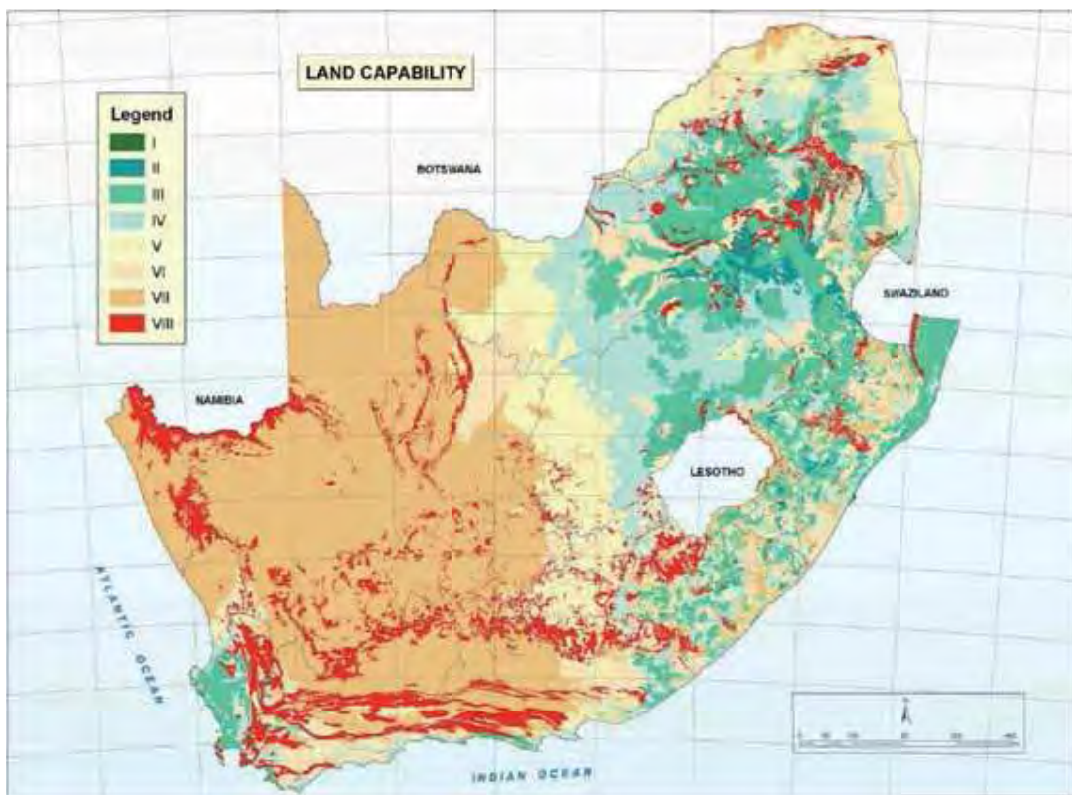


Figure 70: Land capabilities of South Africa

Source: AGIS, 2008

## Appendix B

B1. The detail of these investment projects for 2009/2010 and 2010/2011 were provided by the Free State department of Agriculture.

Project phase	Nearest Town	Jobs Created - Permanent	Type of Land	Preliminary CASP Budget	Outputs
1	Jacobsdal Bethulie	12	FALA LRAD	R 1 165 000,00	2 * 1 ha Dragline irrigation systems Planning of 60 ha pivots Planning development of 20ha pivot 6 ha pivot
1	Bethulie Springfontein Zastron	3	LRAD Commonage	R 470 000,00	Stock handling facilities
1	Zastron Edenburg Reddersburg Luckhoff Philippolis Koffiefontein Jacobsdal Petrusburg Oppermansdorp	65	LRAD Commonage	R 3 368 000,00	Stock water reticulation system

1	Edenburg Reddersburg Luckhoff Philippolis Koffiefontein Petrusburg Oppermansdorp Bethulie	48	LRAD Commonage	R 1 032 000,00	Fencing
4	Petrusburg	10	FALA	R 380 000,00	
2	Springfontein Zastron	7	LRAD	R 513 233,40	1000 unit layer house Renovation of shed for layers Renovation of outbuilding for layers Roadside marketing stall for layers and vegetables
2	Zastron	3	LRAD	R 580 000,00	Renovate dairy parlour
1		8		R 330 000,00	2 Trailers, shearing equipment for two teams
Planning	Koffiefontein / Jacobsdal	30	LRAD	R 100 000,00	Survey Pre-planning
1	Bethulie	6		R 150 000,00	Shed & launching pad - for boat Fish processing - abattoir

<b>Project phase</b>	<b>Nearest Town</b>	<b>Jobs Created - Permanent</b>	<b>Type of Land</b>	<b>Preliminary CASP Budget</b>	<b>Outcomes</b>
Phase 1	Bloemfontein	3	Private	R 170 000,00	Fencing,water reticulation
Phase 1	Bloemfontein	0	Private	R 200 000,00	Water reticulation, pasture establishment
Phase 1	Hobhouse	0	Private	R 210 000,00	Water reticulation ,pasture establishment
	Excelsior	0	Private	R 120 000,00	Water reticulation
Phase 1	Excelsior	0	Commonage	R 200 000,00	Fencing,water reticulation
	Tweespruit	0	Commonage	R 100 000,00	Layer structure,layers and feeds
	Hobhouse	0	Commonage	R 65 000,00	Layers and feeds
Phase 2	Van Stadensrus	0	Municipality	R 250 000,00	Water pumps,fence ,irrigation system,produce inputs
Phase 1	Wepener	0	Private	R 250 000,00	Water reticulation,fencing and pasture establishment
Phase 1	Dewetsdorp	0	LRAD	R 250 000,00	Water reticulation,shed,handling facility
phase 1	Dewetsdorp	0	LRAD	R 250 000,00	Water reticulation,pasture establishment
	Van Standensrus	0	Municipality	R 90 000,00	Layers,feeds and cages
	Dewetsdorp	0	Municipality	R 10 618,00	Seed pack
Phase 1	Bloemfontein	01	LRAD	R 130 000,00	Handling facilitiesand fence 2km
PHASE1	Bloemfontein	1	Private	R 200 000,00	Water reticulation and repair existing piggery structure
2nd	Thaba Nchu	0	Communal	R 70 000,00	Fencing
2nd	Thaba Nchu	0	Communal	R 270 000,00	Fencing and Pasture establishment

Project phase	Nearest Town	Created	Permanent	Type of Land	Preliminary CASP Budget	Outcomes
1st	Thaba Nchu	0		Communal	R 560 000,00	Stock watering
1st	Thaba Nchu	1		Communal	R 100 000,00	Construction of tunnel structure
1st	Thaba Nchu	1		Communal	R 80 000,00	Installation of tank, pipe, stand and sprayers
2nd	Thaba Nchu	10		Communal	R 40 000,00	Fencing and irrigation
1st	Thaba Nchu	0		Private	R 100 000,00	Planning phase
1st	Thaba Nchu			Communal	R 364 841,00	Auction kraals
1st	Botshabelo	0		SLAG	R 320 000,00	Fencing & Water reticulation
	Botshabelo			LRAD	R 220 000,00	Fencing & water reticulation
1st	Botshabelo	0		SLAG	R 190 000,00	Fencing ,water
	Botshabelo	0		SLAG	R 80 000,00	Goats
	Botshabelo	0		School	R 100 000,00	Tunnels and production inputs
2nd Phase	Ladybrand	8		LRAD	R 150 000,00	Fencing
3rd Phase	Ladybrand	7		LRAD	R 37 774,40	Water reticulation
2nd Phase	Ladybrand	5		LRAD	R 210 000,00	Water reticulation and vet
2nd Phase	Ladybrand	1		Private owned	R 200 000,00	Water reticulation and vet
3rd Phase	Tweespruit	3		Private	R 1 800 000,00	Essential oils
1 st	Thaba Nchu	3		Private	R 150 000,00	Fencing
1st	Thaba Nchu	3		Private	R 150 000,00	Water reticulation and Fencing
Phase 2	Bloemfontein	0		SLAG	R 100 000,00	Production inputs
Phase 2	Thaba Nchu	0		Private	R 200 000,00	Pasture establishment

<b>Nearest Town</b>	<b>Jobs Created - Permanent</b>	<b>Type of Land</b>	<b>Preliminary CASP Budget</b>	<b>Outcomes</b>
Wesselsbron	5	Private	R697 000,00	3 Broiler Houses (1000 capacity each)
Winburg	7	LRAD		2 Broiler Houses (1000 capacity each) + electricity supply
Allanridge	24	SLAG	R697 000,00	3 Broiler Houses (1000 capacity each)
Soutpan	6	Plot	R520 000,00	4 Broiler Houses (500 capacity each) & cold storage
Welkom	15	Commonage	R1 000 000,00	Abattoir, cold storage & a multi-purpose storage shed
Bothaville	10	Commonage	R1 000 000,00	3 Broiler houses (1000 capacity each) & an abattoir
Soutpan	10	LRAD	R709 000,00	3 Broiler houses (1000 capacity each) Electricity reconnection
Bothaville	9	Commonage	400 000	Cold storage + egg sorting machine
Welkom	All poultry projects, present and future	?	250 000,00	Market research & confirmation report, site identification & acquisition of land, EIA, water source development & designs, incl quality & quantity report. Detailed business plan, specifications & design drawings
Hoopstad	10	Commonage	R1 500 000,00	Construct -1000 ton silo, and a Multipurpose storage shed
Bulfontein	7	Commonage	R596 600,00	Irrigation Equipment, Electricity supply, Shed & processing equipment

<b>Description</b>	<b>Project phase</b>	<b>Nearest Town</b>	<b>Jobs Created - Permanent</b>	<b>Type of Land</b>	<b>Preliminary CASP Budget</b>	<b>Outcomes</b>
Mixed farming		Harrismith		Land reform	R100 000,00	Planning
Livestock farming	2 <sup>nd</sup> Phase	All Towns in the District		LRAD / Private	R3 500 000,00	Water provisioning
Mixed farming	2 <sup>nd</sup> Phase	Senekal		SLAG	R3 500 000,00	Beef cattle, establishment of pasture, water reticulation, handling facilities, project manager
Livestock farming	1 <sup>st</sup> Phase	Lindley, Reitz		LRAD / Private	R800 000,00	Fencing 40 km
Livestock farming		Clocolan, Ficksburg, Senekal		Commonage	R800 000,00	Large stock handling facilities
Maize seed multiplication		Phuthaditjhaba		LRAD	R300 000,00	Seed multiplication centre

## REPORT 2

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## Appendix

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## Section 2. The social accounting matrix and the multiplier analysis

### 2.1. The social accounting matrix

In section one, the theoretical perspective of the economic growth and development and the role of agriculture was discussed with reference to the situation in the Free State Province. The objective of this section is to empirically analyse the role of agriculture by determining whether it is still capable of stimulating economic growth and development in the province. To achieve this objective, the 2004 Social Accounting Matrix (SAM) of the Free State was used as both a database and the logical framework to capture the interrelationships and interdependence of the various sectors in the economy. Basically, this involves the use of the SAM multiplier framework to link micro and macro issues. The macro issue of concern in this instance is the explicit decline of agricultural output and the consequent reduction in the growth and development of the sector and of the entire regional economy which is the case scenarios that motivated this study. At the micro level, the major interest is to measure the impact of the decline in macro aggregate on employment and household income as a result of a decline in agricultural productivity. To achieve this, the study investigates the linkages amongst various sectors by exogenously stimulating endogenous sectors and noting the impacts on employment and household income. The method of generating the exogenous shocks, the shock parameter and the multiplier effects are discussed later in this section.

The rest of the section is structured as follows. In the next section, a brief description of the concept of SAM is given. This is followed by an overview of the Free State economy in a SAM perspective, such that, the flow of activities in the SAM is depicted as a representation of the Free State economy. Then, an economy-wide multi-sectoral SAM multiplier models are employed to measure linkages among the entities in the model. This is followed by a sector-wide impact of exogenous shocks, how this shock affects the macro aggregates and, how it is transmitted to households through factor employment and incomes.

### 2.1.1 A description of a SAM

An economy is made up of the producers and the consumers (institutions). The productive sectors are involved with the productions of goods and services. To produce one unit of an output, the producers make use of factors of production such as labour, land and capital, which they obtain from the factor market. The goods and services produced are distributed through the commodity and services markets sectors that are driven by trade and commerce. The major participants in the market economy are the business enterprises, households, and the government, often referred to as the institutions. The activities of these institutions are solely governed by their ability to generate sufficient income albeit, constrained, to enable them to consume goods and services, invest and / or save. In an open economy, there is a flow of transaction to and fro the rest of the world in form of imports and exports, and foreign remittances. These flows of activities continue in circles from year to year – thus, the circular flow of transactions.

In order to fully depict this circular flow of transactions, economists use the concept of SAM. A SAM is used to capture all transfers and real transactions between sectors and the institutions. It captures the monetary values of these transactions in form of a square matrix organised in series of rows and columns, where each row and column is called an “account”. The elements of the SAM itself refers to the value of the transactions between these accounts. Entries in the rows represent receipts or revenue for that account while column accounts are outlays or expenditures. In a stable or equilibrium state of an economy, inflows and outflows should balance. Therefore, in the SAM, all receipts and payments must also balance thus; when the row and column totals of a SAM are balanced the SAM is said to be in equilibrium in order to conform with the Walras’ law which states that *“the total value of all account receipts must equal the total value of all account outlays”*. Thus, if all accounts but one are known to be in balance, then the remaining accounts must also be in balance (see Robinson and Lofgren, 2005). The question is how many accounts or levels of disaggregation are to be included in a SAM. The number of rows and columns (i.e., the level of disaggregation) in a SAM varies from one SAM to another and is often determined by the nature of the economic activities prevalent within a specific economy and / or the purpose for which the SAM was made. There are six major types of accounts that form the basis for a SAM, these include; the production activity, commodity, factor, institutions, capital and the

rest of the world accounts. The flow of transaction shown in Table 1 can be explained as follows.

The productive or activity account purchases labour, land and capital inputs from the factor market and intermediate inputs from the commodity market which they use as factors of production. They pay factors wages, rents and distribute the profits they generated during the production process. This payment constitutes the value added entry in the SAM (R3-C1). The activity expenditure (C1) covers the purchase of intermediate inputs, payment of factors, and taxes paid to the tax account of the government. The column total for the activities account is the aggregate expenditure or the gross output for the economy for the particular SAM reference year. In order to generate income for further production, the production activities sell goods and services to the domestic and export commodity markets.

The commodity account buys goods obtained through domestic supplies or imports and sells them to the demanders; which consist of, intermediate demand by activities (R2-C1) and the final demand (Household private consumption spending (R2-C5), government consumption or the recurrent government expenditure (R2-C6), gross capital formation or investment demand (R2-C7) and export demand (R2-C8)). The factor account receive income from the sale of their services to the production activities in the form of wages, rent and the net factor income received from abroad. They distribute their income to households as labour income and distributed profits. Factor incomes not distributed are retained as undistributed profits to enterprises.

The institutional account consists of the household, enterprise and the government accounts. Households are the owners of the factors of production. Their income comes from the remunerations they receive for factor supply. In addition, transfers from other institutions and inter-household transfers constitute part of their income. Household expenditure consists of payment for the consumption of goods and services purchased from the commodity market. Other household expenditures are; the payments for direct/income taxes and savings. Enterprises receive profits and transfers, and often pay taxes to the government account after which any surplus is saved. The government account earns income from taxes and transfer payments they receive from the rest of the world (ROW). Its expenditure consists of the transfers it makes to the households, the ROW and the payments for the goods and services it consumes. The difference between government income and expenditure is the fiscal surplus or deficit. When expenditure exceeds income, the government experiences a deficit and when

income exceeds expenditure there is a fiscal surplus. The surpluses saved by different institutions are used to finance investment demand or gross capital formation which constitutes the capital account.

For an open economy, transactions take place with the ROW through imports, exports and transfers. Imports are a form of leakage because good and services are paid for with local currency to the ROW, while exports are inflows of foreign exchange. In addition, foreign exchange is earned from factor income and transfers from abroad, including capital transfers. For an economy to maintain equilibrium, a balance between different entities in the SAM is required. For example, total domestic savings must equal total domestic investment demand, and in order to maintain a current account balance of the balance of payment, total outflows to the ROW should equal the inflows. As a result of this, the difference between the total domestic savings and total investment demand is equivalent to the capital inflows from abroad, which is also the same as the difference between foreign exchange receipts and expenditure.

### **2.1.2 The characteristic of the Free State 2004 SAM**

The 2004 SAM for Free State is chosen for this study because the 2006 SAM is considered to be unbalanced because it contains multiple accounts of residual errors that are included in the residual rows and column of the SAM. Since the aim of the study is to use both the SAM and the Computable General Equilibrium (CGE) models as a tool to model the Free State economy, it will not serve the purpose if unbalanced 2006 SAM is used. Besides, there are no major structural changes in the Free State economy during these periods; therefore the 2004 SAM is a good representation of the Free State economy.

The 2004 SAM consist of 37 productive activities and 37 commodity account. Some activities appear as a single account while others are subdivided. For example, agriculture is subdivided into commercial and subsistence agriculture, mining has two sub-accounts; the gold mining and other mining activities. The level of disaggregation of activities is highest in the manufacturing sector, which is subdivided into 19 sub-accounts. The factor account has two sub-accounts, the labour and the capital accounts. The SAM consists of 44 labour accounts classified into 11 skill levels per population groups; the Africans, Coloured, Asian/Indians

and the Whites). For the purpose of this study, these accounts were aggregated into three main skill levels; the skilled labour (representing, the legislators, professional and technicians), semi-skilled labour (Clerks, service workers, skilled agricultural workers, crafts workers, plant & machinery operators) and the unskilled labour (Elementary occupation and the domestic workers). The capital account includes the gross operating surpluses for the public, private, Taxi and the informal business enterprises.

The household income and expenditure account consists of 48 entries classified according to population group and the expenditure categories called %iles (12 %iles are recorded per population group). These accounts were aggregated into 5 expenditure strata (The low income; low middle; high middle and the high income groups). Other accounts include the four spheres of government (National, provincial and the local government), the savings-investment account, the rest of South Africa (RSA) and the rest of the world (ROW) account. The savings and investment account consist of the investments by the government and other corporate sectors and households. The trade account in the SAM shows that there is a significant flow of transaction between the province and the ROW as well as with the RSA.

Using these accounting matrices, a description of the characteristics of the Free State economy during the 2004 SAM reference year was made by examining the transactions that occur within the different components of the economy namely; the productive sector, trade, factor market, the commodity market, income and expenditure. These accounts are discussed as follows.

### **a) The Production activities**

- *GDP shares*

The nature of production across productive sectors and the shares of factors in the sectoral value added are shown in Table 2. The GDP share is shown in column 2. The agricultural sector (including subsistence agriculture) contributes 7.1 % to the Gross domestic product (GDP) at factor cost (Rows 1 & 2). The mining (rows 3 &4) and manufacturing (rows 5-23) are the largest contributors with 14.1 and 14.5 % respectively. In the services sector, trade (row 28) is the largest contributor with 11.6 percent, insurance 9.9 % (row 32), transport, 7.1 % (row 30) and other services 8.2 % (row 37). Agro-processing (rows 5-8)

account for 2.4 % of the GDP. Because of the disaggregation, the contribution of the individual manufacturing sector is small compared to the mining and agriculture.

- *The Value-added shares*

The value-added shares gives an indication of the contribution of the factors of production to each sector's GDP. In other words, it indicates the intensity of factor use by sector. The shares of the factors in the value-added activity of the different sectors are shown from column 3 to 9 in Table 2. About 10.1 % of the value added in commercial agriculture is contributed by unskilled labour, 9.7 % by semi-skilled labour and 3.3 % by skilled labour (row 1). In the subsistence agriculture, 18.3 % of the value added is contributed by unskilled labour while 17.1 % is by semi-skilled labour (row 2). This shows that the subsistence sector uses more semi-skilled and unskilled labour than the commercial agriculture and more value added from this sector is contributed by semi-skilled and unskilled labour than the commercial agriculture.

According to the SAM, the activity/services sector (row 37, col 3) is more skilled-labour intensive than other sectors. The general government services (row 35, col 4), and the publishing and printing sectors (row 13, col 4) are the highest for semi-skilled labour. They distribute more than 54 % of their value added to semi-skilled labourers whereas the subsistence agriculture distributes the most to the unskilled labourers (row 2, col 5). Overall, the Publishing (87.8 %), government services (86.8 %) and the activities/services (83.2 %) sectors are more labour intensive than others.

The commercial Agriculture (row 1, col. 7) and real estate (row 33, col 7) are the most single capital intensive sectors in the SAM. Capital from the taxi enterprise contributes solely to the transport sectors whereas; capital from the informal business contributes the most to the subsistence agriculture. This implies that capital accumulation in the informal enterprise will benefit the sector.

- *The gross output shares*

As discussed in section 2.1.1, the activity total is the gross output, which was produced by combining factors and intermediate inputs. In this section, the share of the intermediate inputs in the value of the gross output was calculated. This is the same as determining the activity

production technologies used to achieve the desired level of gross output per unit of input. The calculated share of all the commodities in each sector's output is shown in Table A.1 of the appendices. From Table A.1, it can be seen for example, that in the agricultural sector, intermediate inputs from the activities/services sector (row 37, col 1) accounts for 22.3 % of the value of agricultural output. This implies that for each R100 worth of agricultural output, R22.3 must be spent on intermediate inputs from the activity/services sector. Other sources of intermediate inputs for the values of agricultural output are, trade 1.2 % for commercial agriculture (row 28, col 1) and 7.56 % for subsistence agriculture (row 28, col 2) and transport, 5 % for both commercial and subsistence agriculture (row 30, cols 1 & 2). and chemicals industry, 6.43 % (row 14, col 1).

The same interpretation is applied to other sectors as well. For example, agricultural intermediate inputs are needed for mining and the manufacturing activities. For example, in the food-manufacturing subsector, agricultural intermediate inputs contribute 35.88 % of the value of output (row 1, col 5). Others include, the dairy products, 23.24 % (row 1, col 6), and the grain mills, 31.14 % (row 1, col 7). This illustrates the strong backward linkages agriculture has with the manufacturing sector especially the agro-processing sectors. The mining sector requires 26.27 % intermediate inputs from transport (row 30, col 4) and (3.3 to 5.3%) from chemical (row 14, col 4). This shows the heavy reliance of the mining sector on transport and chemicals. Others are, machinery 3.5 % for gold mining and 2.25 % for other mining (row 19, cols. 3 & 4) and electricity 3.96 % for gold mining (row 24, col.3) etc.

Even though the results showed the interrelationship and interdependence among sectors, one striking observation can be made. The intermediate inputs-use within one sector in some of the sectors is low across the table. For instance, commercial agricultural intermediate inputs accounts for only 2 % of the value of commercial agricultural output whereas more manufacturing intermediate inputs were used for commercial agricultural output. There is no intermediate input use from subsistence agriculture to both commercial and subsistence sectors. **This implies a decrease in the productive use of agricultural intermediate inputs to produce more agricultural outputs.** This does not mean that intermediate inputs from other sectors should not be demanded rather, there should be efficient use of intermediate inputs from non-agriculture but increased intermediate demand by agriculture for agricultural inputs. By so doing, agricultural output will expand with the same amount of inputs (intermediate, labour and capital). Unlike agriculture, the intermediate inputs within other

sectors especially the manufacturing sectors are high. For instance, the paper industry's intermediate inputs account for 31.93 % of the value of its output (row 12, col. 12). Others includes, chemical, 32.29 % (row 14, col. 14), Basic and structural metal sector 60.20 % (row 17, col.17), manufacturing of transport equipment sector 49.66 % (row 22, col. 22), etc.

## **b) Factor market**

This section discusses factor shares across sectors and their share in the value of the total gross output. Factor demands across sectors are shown in Table 3. Services are more capital-intensive than other sectors (rows 28 to 38, col. 6& 8). Other capital-intensive sectors are agriculture (Commercial (rows 1, col. 6) & subsistence (row 2, col. 8)), gold mining (row 3, col 6) and chemical industry (row 14, col. 6). Even though agriculture and mining are capital intensive like the services sector, they differ from it in that they are low-skilled labour-intensive. Mining is the largest employer of low skilled-labour with 22.2% for semi-skilled labour (row 3, col. 3) and 25.6% for unskilled labour (row 3, col. 4). Commercial agriculture is the second largest employer of unskilled labour accounting for 13.5% of the available labour stock. This means that investment in the primary sectors would benefit the rural economy where more than 70% of the low-skilled people reside.

Next, the share of factors in the value of the total gross output was determined. This is the same as determining factor use within sectors and the activity factor cost employed to achieve the desired level of gross output per unit of input. In order to produce one unit of output, commercial agriculture spent 5.4% of its resources to engage unskilled labourers, 5.2% for semi-skilled labour and 1.8% for skilled labour. Capital utilization constitutes 41% whereas, 46.6 % were spent on intermediate inputs out of which, as discussed above, 23.3% come from activities / services, 1.2% from trade, etc. To achieve its total gross output, the subsistence agriculture spent 7.7% of its resources to engage unskilled labour and 7.2% for semi-skilled labour. The value of capital input was 27.4% whereas, intermediate inputs constitutes 57.7%. Overall, about 62.3% of the total activity costs of production were spent on intermediate inputs (row 38, col 10). The remnants are the total labour use of 18.4 %, total capital utilization of 19.2 % and production taxes of about 0.16 % (row 38, col 9).

In the context of the economy-wide modelling, it was observed that the sectors with high capital-intensities are also factor-intensive. For example, agriculture, mining, chemical and the services sectors are capital intensive and factor-intensive as well (Table 3). These sectors have lower share of intermediates in the total output (Table 4, col. 10). On the other hand, sectors with a larger share of intermediates tend to be more labour-intensive and less capital-intensive. For example, the manufacturing sectors (Table 4, rows 5 to 23, and col. 10) have high intermediates but are more labour intensive compared to the capital intensity (Table 3, rows 5 to 23, and cols. 2 to 8).

### c) Trade

Trade between the Free State economy and both the rest of South Africa (RSA) and the rest of the world (ROW) is shown in Table 5. The table sheds light on export intensities (EI) and import penetration ratio (IPR) between the province and its trading partners. Export intensities is the share of export in the value of gross output, i.e. the proportion of the commodity production that is exported whereas, the IPR is defined as the share of imports in the value of total demand, which means the proportion of final demand that is imported. The results show that 54% of the commercial agricultural produce and most of the manufacturing products are exported to the RSA. Gold mining products are mainly exported to the ROW. **Agriculture has low import penetration, while the manufacturing sector has high import penetration from the rest of South Africa.** Overall, it can be seen from the table that more trade flows occur between the province and the RSA than the ROW.

### d) Household consumption, income and expenditure

The characteristics of the Free State households as depicted in the SAM are discussed in this section. The aim is to know what forms part of their income and expenditure bundles in order to establish the patterns prevalent therein. This is important because it serves as a guide to strategic household policy development. The consumption patterns, income and expenditure of households calculated from the SAM are shown in Tables 6, 7 & 8. Columns 2 to 7 show the shares of each commodity in the household consumption of goods and services.

- *Household consumption*

Agriculture has a very small share of the consumption spending across the different household categories. It can be seen from Table 6 that manufactured food has the largest share in the household consumption spending for the lower income households (rows 5 to 9, cols 2 to 4). Meat, fruits & vegetables (row 5) together with beverages & tobacco (row 9) have the largest share. The pattern in the consumption of services is mixed. Larger income groups have larger shares in insurance (row 32, cols 5 & 6), real estate (row 33, cols 5 & 6), health & social work (row 36, cols 5 & 6), and the general services, (cols 5 & 6). Interestingly, it is observed that the low-income groups have more consumption spending on trade and transport than the higher income groups (rows 28 & 30).

The results show that households consume less of agricultural goods but more of manufacture and services. It also indicates that lower households spend more on manufactured foods than trade and transport, but less on services. The smaller share of agriculture and the large manufacturing share are somehow surprising because it is a fact that poorer households usually spend most of their income on food. Indirectly, this is still the case because increased demand for manufacturing is a derived demand for agricultural foods through its backward linkage with the agro-processing sector. Since agriculture has backward linkage with the manufacturing sector in terms of supply of raw materials for the agro-food processing, policies that lead to increase in the agricultural output will stimulate the manufacturing and other sectors.

The implication of the increased demand for manufacturing is that household will benefit from lower import prices of manufacturing products depending on how import sensitive they are. **Because most manufacture products have high import demand elasticities, they will benefit from lower import prices.** The larger demand for trade and transport among lower income group implies that improving market infrastructure will improve their lives through improvement in the quality of services they will receive.

Another way of looking at household consumption pattern is to look at the share of household income in the consumption bundles of individual commodity. Columns 2 to 7 of Table 6 show the shares of household incomes groups in the commodity consumption bundle. The same pattern explained prior is observed with higher shares of income spent for example, among lower income groups in the manufacturing sector than the higher income groups.

- *Household expenditure*

With regards to household expenditure, the pattern remains the same as shown in Table 7. Poorer households spend large portion of their income on manufactured products, (meat, fish, vegetable, grains, dairy and beverages) but less on primary agricultural produce. Trade and transport claim a higher proportion of the poorer household expenditure than the richer ones. On the other hand, richer households spend more of their income on services such as, insurance, real estate and the consumption of health services.

Household savings and investment also constitutes expenditure. It is observed from Table 7 that the savings and investment demands are low across all the households. In total, the poorer households spends more than 98% of their income on the consumption of goods and services whereas, the richer household spends about 96 to 97% of their income on consumption.

- *Household income*

Household income in the SAM is mainly from labour returns and non-factor incomes example, government transfers and foreign remittances. Table 8 shows the household income from each source of income as a share of total household income. It can be seen that labour income accounts for 62.85% of the total income for the middle income households, 37.15% are transfer incomes from the South African government, the RSA and the ROW. The low-middle income group (col 3) earn 30.65% of their income from labour income whereas; 20.03% for the low income group is their labour income. Government transfers and transfers from the RSA and ROW make up the rest of the income that accrue to the five income categories. However, remittances from the ROW for the high-middle and the high income groups are a net negative transfer and thus income in this column is difficult to interpret.

### **e) Government consumption, income and expenditure**

Part of the government's responsibility is to supply public goods, pay public servants, provide basic amenities and maintain law and order. To cater for these public consumption

expenditures, the government needs to generate income. The consumption, income and expenditure pattern of the Free State government is shown in Tables 9 & 10. The Tables show the three sphere of government (National<sup>4</sup>, provincial and the local government) and the departments within the provincial government namely, Education, Health, Welfare, Economics and others. It can be seen from Table 9 that manufacturing and services have larger shares of the government expenditure across the three spheres and the departments. The provincial education department spends most of its income on manufacturing and transport services while the local government consumes most of manufacturing and utilities. Table 9 also show that 34.81% of the manufacturing is consumed by the national government in the province, 32.82% by provincial education and 17.5% by local government. The local government has the largest share of utilities consumed (23.95%) in the province.

Of the total income generated by the national government in the province, 14.8% are direct taxes, 21.6 % other indirect taxes whereas; government transfers constitute 51%. The provincial and the local governments do not collect taxes therefore the only source of income is transfers and property income in the case of local government. Consumption expenditures constitute 26.87% of the local government expenditure, 6.78% for the provincial government and 3.48% for the national government. For the 2004 SAM reference year, the national and provincial governments spend a little above 4% of their incomes on savings.

## **2.2 The SAM-based multiplier model**

In section 2.1, the characteristics of the Free State economy as represented by the SAM were discussed. In this section, the question is how to link the production activities, the distribution of value added generated by each production activity to each of the factors of production and the income distribution among the institutions. The basic approach to this problem is to use the SAM-based multiplier models to compute: the technical coefficients which represent the technical structure of the economy and the accounting or matrix multipliers analogous to Leontief input-output model.

As stated prior, the receipt and payment in a SAM must balance. Since receipt and payment (row-column balance) also represent demand and supply balance, to determine the equilibrium state of the model, some accounts should be exogenous while others are

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<sup>4</sup>The national government constitutes the national departments that operate within the Free State province.

endogenous. To achieve this, the SAM needs to be partitioned into endogenous and exogenous accounts so that the impact of a change in the exogenous demand on the endogenous accounts and its distributional effects are observed. With this specification, it is assumed that the endogenous accounts become a linear function of the values of the exogenous accounts thus causality runs (shocks are transmitted) from exogenous to the endogenous account and not vice versa. The exogenous accounts specified in the SAM multiplier model are government consumption, investment demand and net export. Exogenous demand shocks are deemed to be the demand shocks arising from the changes in the autonomous government expenditure, investment demand and the demand for export. This study simulated the impact of exogenous increase in the export demand for some selected sectors, say agriculture.

Only one exogenous demand component was simulated because of the following reasons. i) For the sake of brevity, ii) The shares of government expenditure in the primary commodity sector especially agriculture (which is the focus of the study) is lower compare to the secondary and tertiary sectors. The three spheres of government spend most on manufacturing, services and utility sectors than the primary sectors and, iii) Investment demand cannot be investigated because the FS SAM 2004 does not have payment from investment account to agriculture.

### **2.2.1 Methodology: The accounting/multiplier matrix**

This section describes the accounting or multiplier model that was used in the study. The schematic representation of a SAM showing the summarised version of the transaction flows between the endogenous and exogenous accounts is shown in Figure 1. As in a typical SAM (example, see Table 1), receipts are row accounts while expenditure represents column account. The endogenous account receive payment from endogenous accounts, say,  $T_{mn}$ , and from exogenous injection,  $T_{nx}$ , where,  $y_n$  is the total income accruing to the endogenous account. Expenditures from the endogenous to endogenous account are summed up as  $n$  while the sum of injection is  $x$ .

		Expenditure			Totals	
		Endogenous	Sum	Exogenous		Sum
Receipts	Endogenous	$T_{mn}$	$n$	Injection $T_{nx}$	$x$	$y_n$
	Exogenous	Leakages $T_{xn}$	$l$	Residual balances $T_{xx}$	$t$	$y_x$
Totals		$y'_n$		$y'_x$		

Figure 1 Schematic representation of endogenous and exogenous accounts in a SAM

Source: Adopted from Defoury and Therbeck (1984)

Summing the total income receive by both accounts we have,

$$y_n = n + x \quad (1)$$

$$y_x = l + t \quad (2)$$

Where,  $y_n$  is the total income received by the endogenous account and  $y_x$ , the total income received by the exogenous account.

Dividing the elements of the matrices  $T_{mn}$  and  $T_{xn}$  by their column sums we have average expenditure propensities

$$T_{mn} = A_n \hat{y}_n, \quad (3)$$

$$T_{xn} = A_1 \hat{y}_n, \quad (4)$$

Where,  $\hat{y}_n$  is a diagonal matrix whose elements is  $y_i, i = 1, \dots, n$ . Given equation (3) and (4),  $n$  and  $l$  can be expressed as

$$n = A_n y_n, \quad (5)$$

$$l = A_1 y_n \quad (6)$$

Combining (5) and (6) we have,

$$y_n = A_n y_n + x = (1 - A_n)^{-1} x = M_a x \quad (7)$$

Where  $y_n$  is the endogenous income obtained by multiplying injections  $x$  by the accounting or the multiplier matrix  $M_a$ .

### **2.2.2 Assumptions of the SAM-based multiplier models**

The basic widely applied multiplier model is the accounting or the multiplier matrix explained in section 2.2.1, others models emerged from attempts by researchers to relax some of the unrealistic assumptions of the SAM-based multiplier model. Some of these assumptions are:

First, the model assumes that prices are fixed: any changes in demand will lead to changes in physical output rather than prices. Secondly and implicitly, there is excess capacity in all sectors: the economy's factors resources are unlimited or unconstrained, so that any increase in demand is equally matched with an increase in supply. Thirdly, the model assumes that linkage effect among actors in the SAM is linear and there is no behavioural change. This means that each actor in the SAM behaves according to a fixed (column) coefficient. For example, producers (activities) demand inputs in fixed proportion, (i.e., fixed input-output coefficient), commodities are made up of domestically produced and imported goods in fixed proportions, factor income is distributed to household in fixed proportion, households consume and save in fixed shares of total income etc. (Robinson & Lofgren, 2005). Fourthly, Prices are exogenous: the column coefficients are the real input-output coefficients or expenditure shares (in the absence of the real counterparts, as the case for transfers between institutions).

By relaxing some of the above assumptions, other multiplier models can be developed. For example, supply constrain was imposed on the multiplier model equation 7 and the impact on the other sectors was examine. An additional shock parameter was developed by fixing the levels of output in the constraining sectors. This requires adjusting the multiplier model equation (7) to derive a constrained model. The results are discussed in the next section.

### **2.2.3 Application, results and discussions: unconstrained multiplier models**

Using the Free Sate 2004 SAM, equation 7 was used to calculate the impact of an exogenous increase in the export demand of each sector in the SAM by one unit (R1 million) on the

endogenous accounts. (Figure 2, scenario 1). This scenario implies that there is a change in export demand of a sector, and that this change is transmitted into the economy as a demand-side shock. The impact of the shock has both direct effects, (i.e., the direct impact on the sector that is shocked), and an indirect effects (i.e., the effects on other sectors that have linkages with the sector). For example, an exogenous increase in the demand for the Free State agricultural export has a direct impact on the agricultural sector and an indirect impact on other sectors through agriculture's production and consumptions linkages.

Accordingly, production and consumption linkages could be forward or backward. A backward production linkage arises when a sector such as agriculture, demands intermediate input from other sectors in order to produce a unit of output. Forward linkage occurs when an increased supplies of inputs such as agricultural inputs is needed for further production in the upstream industries such as the agro-processing industries. On the other hand, expansion of production in the productive sector may stimulate consumption demand by institution such as household, corporate and government institutions. For example, expansion of production in the agricultural sector would generate incomes for farmers and farm workers who would then consumer goods and services produced by other sectors. However, consumption multiplier will be small if the demand for the commodity is weakened by increased demand for import by households or if direct/ indirect taxes and savings constitute higher proportion of the household incomes. This is because; imports, taxes and savings are leakages. Other factors that affects consumption linkages and hence consumption multiplier are; the proportion of factor incomes that are distributed to household; the share of household income in the total commodity consumption and the share of commodity in the total household expenditure

The combined effect of the direct and indirect linkages gives a measure of the multiplier effect. The multiplier effects calculated by simulating an increase in the export demand for tradable commodities assuming there is no supply constrain is given in Table 11. Note that the calculated multipliers include all the forward and backward linkages summed together. The results in column 1 indicate that raising agricultural export demand by R1 million, causes agriculture output to increase by R2.09 million, agro-processing (R0.13 million), manufacturing (R0.50 million), private services (R0.74 million) and public services (R0.67million). This implies that R1 million increase in agricultural exports more than doubles agricultural output. The same interpretation applies to other sectors as well. It can also be seen that increases in the export demand for manufacturing (Col 4), private services

(Col 8) and public services (Col 9) also lead to a high increase in the output of the respective sectors.

The results show to a great extent that agriculture has a strong linkage to all sectors. This can be seen from rows 10 to 18. For example, the change in the demand for agricultural commodities as a result of R1 million increase in agricultural export demand is R2.21 million (Row 10, col 1); for mining it is R0.07 million (row 11, col 1); agro-processing R0.27 million (row 12, col 1); manufacturing R1.03 million (row 13, col 1); Utility R0.07 million and so on. On the other hand, the change in the demand of agricultural commodity following an increase in the export demand for other sectors is lower compared to the change observed when agriculture export demand was increased with the same margin. For example, the change in mining export resulted in the change of only R0.05 million (row 10, col 2) change in the demand for agricultural commodities compared to that of agriculture of R0.07 million (row 11, col 1). For a change in manufacturing export demand, agriculture demand changed by R0.37 million (row 10, col 4) compared to R1.03 million change in manufacturing resulting from increased agricultural export demand. The same applies to all other sectors, for private services, agriculture demand changed by R0.23 million (row 10, col 8) compared to R0.86 million (row 17, col 1), for public services, the change in the demand for agricultural commodities was by R0.15 million (row 10, col 9) compared to R0.81 million (row 18, col 1). The results show that increasing export demand for agriculture generates larger multiplier effects in all the sectors than they do with agriculture. This implies that the economy can be stimulated just by stimulating agricultural sector because of its strong linkages with all sectors.

The results in Table 11 further give insight on the relationship between total demand and the resultant change in output. The results have so far shown that increasing export demand for a sector, say agriculture generates increased demand for agricultural commodities. The problem is whether the increased demand for the sector's product translates into an equal change in output. In other words, how much of the total demand is for domestically produced goods and how much was from import? From the Table 11, it can be seen that increasing export demand generates increased demand for goods, but this does not translate equally into increased domestic output. This is true for all sectors, whereby the change in total demand following increased export demand is larger than the change in each sector's domestic output. For example, in agriculture, due to R1 million increases in export demand, an additional R2.21

million was generated (see row 10, col. 1) however, the change in domestic output was only R2.09 (row 1, col. 1). For mining, increased export demand generated R2.05 million (row 11, col.2), but domestic mining output grew only by R1.34 million (row 2, col.2).

Similarly, the change in total demand for manufacturing products grew by R18.5 million (row3, col.4), whereas, the change in domestic output increased by R5.93 million. The situation is the same for all sectors. The reason for this is simple; imports are leakages and thus greatly reduce the capacity to expand domestic output. The impact is greatest in those sectors that have high import intensities such as, manufacturing (row 13, col.4) and services (rows 17 & 18, cols. 8 & 9). The effect of an exogenous increase in export demand on households is shown from rows 23 to 27 of Table 11. It can be seen that households benefits almost in a similar way irrespective of the household categories.

The model results for scenario 1 as shown in Table 11 are further summarized into; total output multiplier, GDP multiplier and income multiplier. The total output multiplier shows the combined effects of all production and consumption linkages that accrued from an exogenous increase in the export demand across sectors. The GDP multiplier measures the total change in the value-added or factor incomes caused by direct and indirect effects while the total income multiplier measures the total change in income. The results show that a one-unit (i.e., R1 million) increase in exogenous export demand leads to an increase in total outputs multipliers (measured along the respective columns cells of each activity account from row 1 to row 9); an increase in GDP (a measure of the value added labour and capital accounts (rows 19 to 22)) and an increase in the incomes of the five categories of households (rows 23 to 27). The total multiplier effects of expanding export demand resulted in a larger total output multiplier effects in the manufacturing and services than in agriculture. This result was not as expected but nonetheless, it is not surprising because as observed in subsection (d) of section 2.1.2, households consume less of agricultural goods but more of manufacture and services. In order to expand the economy, household expenditure pattern must be shifted towards greater affinity for agricultural products than import-intensive manufacturing and services because of the larger stimulatory potential exhibited by the agricultural sector in the multiplier model discussed previously. Besides, consumption linkages which include the distributional impacts of factor incomes and household consumption are found to outweigh production linkages in almost all the sectors of the Free

State economy as represented by the 2004 SAM. This was calculated by summing the total production and consumption multipliers (i.e., rows 1 to 9 and rows 10 to 18), respectively.

The impact of the exogenous export demand on the total person year equivalent employment in all the sectors was also calculated. The results show that the total person year equivalent in agricultural sector following an increase in the exogenous demand by R1 million is 10. Others include; manufacturing (22), mining (9), agro-processing (9), Utility (8), construction (4), trade (6), private services (52) and public services (27).

#### **2.2.4 Application, results and discussions: constrained multiplier models**

In section 2.2.3, the impact of an exogenous increased in the export demand was examined using unconstrained multiplier models, in this section, the results from the application of the constrained multiplier models are discussed. The same scenario discussed in section 2.2.3 was tested but in this case supplies in certain sectors were constrained. The various scenarios are listed in figure 2. Scenario 1 is based on unconstrained multiplier model and has been discussed in section 2.2.3. This scenario serves in this study as the base scenario on which the impact of other scenarios to a great extent is measured.

In scenario 2, the Government consumption, net export, and investment demand are the exogenous component of demand, but in the supply component of the model, government services was constrained. The aim of this scenario is to see how changes in the supply of government services will affect the endogenous sectors given an exogenous increase in export demand. The result shows that there is a general increase in the production and consumption multipliers resulting in an increased total output, GDP and income multipliers, but generally, there was a decline in all cases when compared to the situation in scenario 1. This implies that constraining the government services reduced the multiplier effect compared to when it was not constrained, as was the case in scenario 1.

The question is if constraining government services reduced multiplier effect, what will be the impact if in addition to that the government sector becomes endogenous. This was investigated in scenario 3. The result shows that there was an increase in the production and consumption multipliers leading to increased total output, GDP and income multipliers.

Recall that the government sector is part of the exogenous demand component, so endogenising the sector implies increased consumption spending for the endogenous sector including the government sector and this will lead to higher aggregate multiplier effects as shown in Table 12.

With the exception of scenario 3, the exogenous increases in export demand across the constrained models resulted in increases in total output, GDP and income multiplier, but decreases compared to scenario 1. The question is what is the relative proportion of the decline (increase) in the output, GDP and income multipliers across the aggregate sectors? In other words, if constraining a sector leads to a decline in the total multipliers, to what extent did this affect other sectors? To answer this question, the percentage changes from the base (i.e., considering scenario 1 as the base) for all scenarios was calculated. Figures 3 to 8 shows the %age change from the base for scenarios 2 to 7.

Figure 3 shows the impact of an exogenous increase in the export demand by R1 million for the aggregate sectors with the supply of government services constrained and government consumption, net export and investment demand being the exogenous demand component of the model. There was a decline in the %age change in all the sectors. The largest decline in total output, GDP and income multipliers were in agriculture and the public services sectors. In the public services sector these macro aggregates declined by more than 30 %. Aggregate household income in the agricultural sector was the most affected. The result shows that an exogenous increase in the export demand for agriculture when government services is constrained will result in more 35 % decline in the aggregate income of the households. This implies that the supply of government services to agriculture is crucial for the performance of the sector, including the supply of income to households.

In Figure 4, government services are constrained and government consumption is made endogenous. As explained previously, there was a general increase in aggregate output, GDP and income across the sectors. The largest increase was the GDP, which increased more in those sectors that receive the largest share of government consumption expenditures as explained in sub-section (e) of section 2.1.2. These are the manufacturing, services and construction. In the manufacturing sector, the increase was the largest, increasing by more than 120 %. The larger increase in GDP relative to total output and income of

households means that value adding activities of production will increase if government consumption increases.

In Figure 5 agriculture was constrained while government consumption, net export and investment demand were the exogenous component of demand. The aim of this scenario is to see the impact on other sectors since agriculture has previously been found to have the largest linkage effects on the economy compared to other sectors. The result in Figure 5 shows that constraining agricultural sector will impact greatly on manufacturing and agro-processing because of the strong backward and forward linkages agriculture has with manufacturing and agro-processing sectors respectively. **Recall that agriculture has a large gross output share (shares of the intermediate input demand) in manufacturing and agro-processing sectors as explained in section 2.1.2 (see Appendices A.1). If agriculture is constrained, the model shows that the output, GDP and the income multipliers for manufacturing and agro-processing sectors will decline from the base scenario. The largest decline was in the agro-processing sector - an indication of a very strong linkage between agriculture and agro-processing.**

The result from scenario 5 is shown in Figure 6. In this case, the supply of mining is constrained. Government consumption, net export and investment demand constitute the exogenous demand component in the model. The result shows that constraining the supply of mining results in the larger reduction of output, GDP and income multipliers in the construction, utility and manufacturing. The result of scenario 4 showed that agriculture has strong linkage with agro-processing hence constraining agriculture impacts on the agro-processing sector. In scenario 6, agro-processing is constrained and the result shows that the aggregate multipliers (i.e., output, GDP and income) in the agriculture, mining, and manufacturing declined. The result for scenario 7 is shown in Figure 8. In this scenario, the manufacturing sector was constrained. Like other sectors, the manufacturing has strong linkages with sectors that showed large decreases in the aggregate output, GDP and income multiplier such as, mining and construction. On average, the decline in the total output, GDP and income for all sectors was more than 10% but highest with construction which is more than 20%.

## Section 3. The computable general equilibrium model and simulations

In this section, the result from fitting a computable general equilibrium (CGE) model of the Free State is presented. The results in this section will augment that obtained with SAM multiplier models in section 2 even though both are derived under different approaches and assumptions. The main objective is to determine the role of agriculture in the Free State economy through its economy-wide linkages with other sectors. SAM multiplier models were used in section 2 to show how linkages occur between agriculture and other sectors. In this section, CGE models are calibrated and solved with the Free State SAM 2004 database. The results and interpretations of the CGE model may be consistent with that of SAM multiplier in principle but in concept, the approach differs because of the differences in the model features, scope and underlying assumptions. The model features and assumptions of the CGE models used are explained in sections (3.1.1.) and (3.1.2) while results are presented in section (3.1.4).

### 3.1 The computable general equilibrium model

To save space, the details of methodology of CGE modelling and its structural features are omitted in this report. Brief description of the model, model simulations and the results are given as follows.

#### 3.1.1 The model features

The core model is the International Food Policy Research Institute's (IFPRI) standard model described in Lofgren *et al.*, 2001. The model was adjusted to express the transaction flows in the Free State 2004 SAM and subsequently calibrated using the values therein. Sets of simultaneous linear and non-linear equations are solved following the disaggregation inherent in the factors, activities, commodities and institutions in the SAM. The equations describe the behaviour and interaction of these agents using rules consistent with economic theory that are captured by the fixed coefficients thus ensuring equilibrium in the model through imposed non-linear first-order optimality conditions. To ensure micro and macro balances in

the control totals of the factor and commodity markets; the saving-investment sector; the government account and the current account balance of the rest of the world, macroeconomic constraints are set. The model constraint sets can be adjusted according to the structure of the economy, thereby ensuring varied options and flexibility to modellers.

Sets of assumptions govern CGE modelling. In the model, producers are assumed to maximise profits subject to the available production technology, output price and factor wages. First they decide on the factor proportion and the intermediate inputs to use, second, they decide on how to combine the various factors of production given constant elasticity of substitution function (CES). It is assumed they adopt Leontief's fixed proportion in allocating intermediates and factors. Institutions include households, enterprises, government and rest of the world. Household choose their consumption bundles to maximise utility subject to income constraint determined by market prices and factor endowment. Households can consume both domestic and imported goods, however, the ratios of imports and domestic goods consumed are determined by their relative prices and the imperfect elastic substitution of Armington function. There is no consumption of homegrown commodities in the model. Income accrued to households is as a result of their factor endowment and transfers from other institutions.

Enterprises receive income from the production factor capital together with transfers from other institutions. It is assumed in the model that enterprises do not consume. Government receive income from taxes, they also consume goods and services and make CPI-indexed transfers to other institutions such as households and rest of the world. In the core model, it is possible for a single activity to produce a number of commodities but in the Free State model, activities are mapped one on one, that is, one activity produces one commodity hence there is equal number of activities and commodities in the model. The CGE model is solved to first replicate the base year data and then simulation files were developed to determine the impact of a change in one or more of the exogenous variables.

### **3.1.2 Model simulation**

Before presenting the results, it is important to discuss the points of departure between SAM multiplier models and CGE models. The differences in approach and methodologies between

SAM multiplier models and CGE models stem from the various assumptions that underlie them. These assumption and limitations of the two applied models are discussed as follows.

- Although both models used in this study are static, the CGE models have advantage over SAM multiplier models because SAM multiplier models do not show detailed behavioural and transactional relationships among agents. The flow of transactions in a SAM multiplier model is a linear function of the interactions among agents, whereas the behavioural relationships in a CGE model are a mix of non-linear and linear relationships that govern how the model agents respond to exogenously determined changes in the model parameters and /or variables.
- In SAM multiplier models, prices are assumed fixed, therefore, relative prices are not taken into account in determining value added and the demand generated by consumers, which is subject to their income. In contrast, in the CGE model prices are not fixed. For example, producer's decision is determined by input prices, output prices and factor wages, which are not fixed. Income of households is determined by market price of goods and services. The decision to consume import or domestic goods by institutions is determined by their relative prices.
- The SAM model is not supply constraint, demand is matched by supply. Though this assumption can be relaxed, it does not improve the model beyond the above-mentioned points. On the other hand, the CGE model imposes constraints that have to be satisfied for macroeconomic consistency. The macro constraints used in the simulations are discussed below.

### 3.1.3 The macro constraints

The following macro constraints are imposed in the model:

- **The numeraire:** the consumer price index (CPI) is the numeraire and it is fixed while domestic producer index (DPI) is flexible.

- **Savings-investment closure:** Investment is saving driven; this implies that the level of investment will adjust to ensure that it equals the level of savings as determined by fixed marginal propensities to save for each domestic non-government institution.
- **Government closure:** government savings are fixed while there is a uniform direct tax rate point change for selected institutions
- **Rest of the world closure:** foreign savings are fixed while exchange rates are flexible.
- **Factor market closures:** labour is unemployed and mobile; capital is fully employed and activity specific

### 3.1.4 The micro simulation, results and discussions

In section 2, SAM multiplier models were used to simulate the impact of an increased exogenous export demand for commodities produced by different sectors. Because of the limitations of the SAM multiplier model discussed in section 3.1.2, price changes cannot be modelled. Therefore in this section, the impact of changes in relative prices and its effects on production, consumption and income distribution was examined. This was achieved by increasing the world price of export for agricultural commodities by 10%. The major aim was to directly introduce changes in the relative world price of agriculture commodities in order to determine how the agricultural sector will respond and the impact on other sectors.

With this scenario, it is assumed that producers will respond to the increased world price if commodity prices are above parity by increasing agricultural export. Increased export increases the level of activity in the sector (see row 1&2, col.9) and a decrease in the level of activity in the non-agricultural sector because the demand for agriculture will increase relative to non-agriculture (rows 3 to 23; col.9). It is also expected that the decreased level of activities in the non-agricultural sector will lead to increased output price of non-agriculture and a decline in output price of agriculture. The result shows that the reverse is the case (col.2), the only explanation for this is that because of the forward and backward linkages between agriculture and other sectors the price effect is offset and the output price of the sectors with the strongest linkages with agriculture increases as agricultural output increases. The sectors are the agro-processing sector (row 5 to row 9; cols.2) and the government and services sector (row 35 to row 37; cols.2). The same interpretation applies to the demand

price of commodities produced and sold domestically (col.3), the supply price of commodities produced and sold domestically (col.4); the average output price of commodities (col.5) and the price of intermediate aggregate (col.7). The result shows that the activity price of agriculture is increased instead of decreasing, therefore if the demand is high, the quantity of composite agricultural goods supplied domestically will drop by 2.33% (row1; col.11) as producers shift towards export. But this does not affect all sectors as the quantity of composite agro-processing commodities still increases (rows 10 to 14; col.11) due to indirect and induced impacts.

Due to increased productivity, agricultural producers will demand more factors of production hence the quantity of factor supply increases by 0.25% for skilled labours (Table 14, row1, col.3); 0.01% for semiskilled (Table 14, row 2, col.3) and unskilled labour by 1.44% (Table 14, row 3, col.3). Because of the assumption of full employment, the level of supply of capital remains fairly constant but positive (Table 14, row 4; col.3).The increased factor demand will translate into increased household income. Source of income for households includes, transfers from institutions, distributed income from factors and income from inter household transfers. Table 14 shows household income as a result of expanding agriculture (rows 12 to 16; col.3). The income for low income group increased by 0.15% (row 12; col.3), high middle income increased by 1.07% (row 15; col.3) while income for the high income group increased by 1.5% (row16; col.3). The income distributed to households depends on their factor endowment. Table 14, rows 18 to 32 show the income that accrued to households from different factors. It should be noted that agriculture is more endowed with unskilled labour than skilled and semiskilled labour. The income earned and distributed from unskilled labour to households is 1.42%; skilled labour earned and distributed 0.28% while semiskilled labour distributed 0.02%.

## Section 4. The contribution of agricultural sub-sector to GDP and employment

The impact of expanding agricultural sector has been simulated in the previous two sections using the SAM multiplier model in section 2 and the CGE model in section 3, in this section, cognisance is taken of the fact that sub-sector macro impacts have been neglected. Therefore the aim of this section is to simulate the economy and decompose impacts to the agricultural sub-sector levels. In others words, the strength of the sub-sectors in terms of contribution to GDP and employment subject to investment project or cash injection into agriculture is examined.

To achieve this objective, a SAM-based macroeconomic multiplier model was used. The model is based on the concept of accounting multiplier matrix similar to the type used in section 2 but differs as follows:

- The production activity due to a project or cash injection is determined outside the model and linked to the accounting matrix.
- Exogenous shock to the model is calculated based as the product of the production/sales/revenues and the closed and /open inverse accounting matrices.

First, production in the sector (agriculture) was determined based on the intermediate demand for factors and capital formation. Second, export, imports, direct and indirect taxes were appropriated from the SAM. Outputs were estimated by using SAM multiplier and imposing cash injection of R10 million into the model. After calculating all parameters, accounting matrix was shocked and impacts on GDP and employment were determined. The aggregated result was then decomposed into agricultural sub-sector impacts using data obtained from the statistics South Africa's 2007 labour force survey for Free State obtained from super web. Gross production value and some employment figures were obtained from the 2007 census of commercial agriculture. The results of the simulations are shown in tables 15 and 16.

Table 15 shows the contribution of agricultural sub-sectors to GDP. The result shows that for every R10 million injection into agriculture, the livestock sub-sector contributes 46.68% to the agricultural GDP, field crops contribute 44.64%, and horticulture contributes 8.63%. Beef cattle, poultry, sheep and goat play major roles to the GDP of the livestock sub-sector. Beef cattle contribute 33.10% to the GDP of the sub-sector, sheep and goat contributes 7.03 % while the poultry sub-sector contributes 4%. The major contributors in the field crop sub-sector are maize with 29.44%; wheat, 8.34%; and sunflower, 2.42%. Apart from potato, the contributions of other sub-sectors in the horticulture sub-sector are evenly distributed. Potato contributes 7% whereas others contribute less than 1%. The contribution of aquaculture and forestry are minimal compared to other sub-sectors. Both will contribute less than a % to the GDP of the agriculture if there is a R10 million injection into the sector.

The potential for job creation due to a cash injection into the agricultural sector is shown in Table 16. The table shows that field crop will contribute 58.01% to employment; horticulture 24.25% while livestock sector contributes 17.64% if there is cash injection into the agricultural sector. Most jobs are created in the field crop, with maize contributing 27.33%, wheat, 14.85%, sunflower, 6.33%, legumes, 3.6% and fodder, 2.05%. Similar trend is observed in the horticulture with potato contributing the most 22.57 % while contributions by other sub-sector are evenly spread. The contributions to employment in the livestock are beef cattle, 12.49%; sheep and goat, 2.65% and poultry, 1.51%. Overall, the total employment due to a cash injection in the agricultural sector is calculated to be 80.15. This implies that a R10 injection into agriculture will generate a year equivalent job of approximately 80.15.

It should be noted that this results obtained in this section about employment is consistent with the result obtained in section 2. Recall that in section 2.2.3, the impact of the exogenous export demand on the total person year equivalent employment for all sectors was calculated. The result showed that the total person year equivalent in the agricultural sector for an increase in the exogenous demand by R1 million was 10. Therefore for a R10 million increase in exogenous export demand, the total person year equivalent employment will be approximately 100. The result obtained in this section is 80.15 which is approximately consistent with the result obtained before. The differences in the results may be due to rounding errors as the result is calculated at sub-sector level in this section.

## Summary, Conclusion and Recommendation

In this section, the SAM and CGE models were used to empirically analyse the role of agriculture by determining whether it is still capable of stimulating economic growth and development in the province. The following in the bullet format are the major findings from report 2.

- The results show that the subsistence sector uses more semi-skilled and unskilled labour than the commercial agriculture and more value added from this sector is contributed by semi-skilled and unskilled labour than the commercial agriculture
- There is a great demand for agricultural intermediate inputs from the non-agricultural sectors especially the agro-processing sectors
- In the agricultural sector, intermediate inputs from the activities/services sector accounts more (about 22.30 %) to the value of agricultural output than other sectors. The results show that for each R100 worth of agricultural output, R22.3 must be spent on intermediate inputs from the activity/services sector. This is an indication of backward linkages. The result also shows that others sectors such as transport, trade, the chemical and grain sectors have strong backwards linkages with agriculture. **(See table A.1).**
- Strong forward linkages are shown between agriculture and manufacturing sectors, especially the agro-processing sub-sectors. This is because the greatest demands for agricultural intermediates are in this sector **(See table A.1).**
- There are few or limited intermediate input use from subsistence agriculture to both commercial and subsistence sectors. This implies a decrease in the productive use of agricultural intermediate inputs to produce more agricultural outputs.
- Agriculture in the Free State as depicted in the SAM analysis is both capital and labour intensive but they are low-skilled labour intensive.
- Agriculture has a very small share of the consumption spending across the different household categories while agro-processing - manufacturing have the largest share.
- For instance, manufactured food has the largest share in the household consumption spending for the lower income households. The results show that households consume less of agricultural goods but more of manufacture and services.
- Low-income households spend large portion of their income on manufactured products, (meat, fish, vegetable, grains, dairy and beverages) but less on primary agricultural produce.
- Household income in the SAM is mainly from labour returns and non-factor incomes example, government transfers and foreign remittances
- Labour income accounts for 62.85 % of the total income for the middle income households, 37.15 % are transfer incomes from the South African government, the RSA and the ROW.

- The low-middle income group earn 30.65 % from labour income whereas the low income group earn 20.03 from labour other incomes are transfers and remittances.
- Manufacturing and services have the largest shares of the government expenditure across the three spheres and the departments (National, provincial and local).
- The provincial education department spends most of its income on manufacturing and transport services while the local government consumes most of manufacturing and utilities
- About 34.81 % of the manufacturing is consumed by the national government in the province, 32.82 % by provincial education and 17.5 % by local government
- The local government has the largest share of utilities consumed (23.95 %).
- Agriculture has strong backward and forward linkages with other sectors. The results show that the change in the demand for agricultural commodities as a result of R1 million increase in agricultural export demand generates greater output multiplier effect than vice versa (**See table 11**).
- Recall that agriculture has a large gross output share (shares of the intermediate input demand) in manufacturing and agro-processing sectors. If agriculture is constrained, the model shows that the output, GDP and the income multipliers for manufacturing and agro-processing sectors will decline from the base scenario. The decline is attributed to the use of intermediate inputs from agriculture in this sectors. The largest decline was in the agro-processing sector - an indication of a very strong linkage between agriculture and agro-processing.
- The results show that the total person year equivalent employment in the agricultural sector following an increase in the exogenous demand by R1 million is 10. Others include; manufacturing (22), mining (9), agro-processing (9), Utility (8), construction (4), trade (6), private services (52) and public services (27).
- Because of the forward and backward linkages between agriculture and other sectors the output price of the sectors with the strongest linkages with agriculture (such agro-processing sector) increases as agricultural output increases.
- Increasing agricultural output increases
- Due to increased productivity, agricultural producers will demand more factors of production hence the quantity of factor supply increases
- The result shows that for every R10 million injection into agriculture, the livestock sub-sector contributes 46.68 % to the agricultural GDP, field crops contribute 44.64 %, and horticulture contributes 8.63 %.
- Beef cattle, poultry, sheep and goat play major roles to the GDP of the livestock sub-sector. Beef cattle contribute 33.10 % to the GDP of the sub-sector, sheep and goat contributes 7.03 % while the poultry sub-sector contributes 4 %.
- The major contributors in the field crop sub-sector are maize with 29.44%; wheat, 8.34 %; and sunflower, 2.42 %.
- Apart from potato, the contributions of other sub-sectors in the horticulture sub-sector are evenly distributed. Potato contributes 7 % whereas others contribute less than a %.

- The contribution of aquaculture and forestry are minimal compared to other sub-sectors. Both will contribute less than a % to the GDP of the agriculture if there is a R10 million injection into the sector.
- The potential for job creation due to a cash injection into the agricultural sector is shown as follows: field crop will contribute 58.01 % to employment; horticulture 24.25 % while livestock sector contributes 17.64 %
- Most jobs are created in the field crop, with maize contributing 27.33 %, wheat, 14.85 %, sunflower, 6.33 %, legumes, 3.6 % and fodder, 2.05 %.
- In the horticulture potato contributes the most 22.57 % while contributions by other sub-sector are evenly spread.
- The contributions to employment in the livestock are beef cattle, 12.49 %; sheep and goat, 2.65 % and poultry, 1.51 %.
- Overall, the total employment due to a cash injection in the agricultural sector is calculated to be 80.15.

### **Summary, Conclusion and Recommendation**

In this section, the SAM and CGE models were used to empirically analyse the role of agriculture by determining whether it is still capable of stimulating economic growth and development in the province. The following in the bullet format are the major findings from report 2:

- The results show that the subsistence sector uses more semi-skilled and unskilled labour than the commercial agriculture and more value added from this sector is contributed by semi-skilled and unskilled labour than the commercial agriculture. Growth in this sector will enhance unskilled and semi skilled employment.
- There is a great demand for agricultural intermediate inputs from the non-agricultural sectors especially the agro-processing sectors. Increasing local production that is linked to local processing will increase economic growth.
- In the agricultural sector, intermediate inputs from the activities/services sector accounts more (about 22.30 %) to the value of agricultural output than other sectors. The results show that for each R100 worth of agricultural output, R22.3 must be spent on intermediate inputs from the activity/services sector. This is an indication of backward linkages. Increasing agricultural production in the Free State should be linked to local input suppliers, to gain maximum economic benefit. The result also shows that other sectors such as transport, trade, the chemical and grain sectors have strong backwards linkages with agriculture. **(See table A.1). Stimulating agricultural production will lead to increased outputs in these sectors.**
- Strong forward linkages are shown between agriculture and manufacturing sectors, especially the agro-processing sub-sectors. This is because the greatest demands for agricultural intermediates are in this sector **(See table A.1). Stimulating agricultural production should be linked to local agro processing to gain maximum economic benefit for the region.**

- There are few or limited intermediate input use from subsistence agriculture to both commercial and subsistence sectors. This implies a decrease in the productive use of agricultural intermediate inputs to produce more agricultural outputs. (See pg. 7 and table A.1 -pg. 44, row 1; col.1). Stimulating agricultural production should be done in a balanced way between commercial and subsistence/emerging agricultural to maintain economic growth.
- Agriculture in the Free State, as depicted in the SAM analysis, is both capital and labour intensive, but they are low-skilled labour intensive. This will assist in reducing the unemployment levels amongst unskilled labour.
- Agriculture has a very small share of the consumption spending across the different household categories, while agro-processing - manufacturing have the largest share. This indicates again the importance of processing, as the consumer demand for agricultural products is mostly in a processed form,
- For instance, manufactured food has the largest share in the household consumption spending for the lower income households. The results show again that households consume more processed than unprocessed agricultural products. This means that stimulating agricultural production,(absorbing unskilled workers), while an increase in local processing, will increase the absorption of semi-end skilled labour (Manufacturing and services).
- Low-income households spend large portion of their income on processed products, (meat, fish, vegetable, grains, dairy and beverages) but less on primary, unprocessed agricultural produce.
- Household income in the SAM is mainly from labour returns and non-factor incomes example, government transfers and foreign remittances. Indicating that stimulating labour intensive sectors, like agriculture and agricultural processing, will increase household income.
- Labour income accounts for 62.85 % of the total income for the middle income households, 37.15 % are transfer incomes from the South African government, the RSA and the ROW.
- The low-middle income group earn 30.65 % from labour income whereas the low-income group earn 20.03 from labour; other incomes are transfers and remittances.
- Manufacturing and services have the largest shares of the government expenditure across the three spheres and the departments (National, provincial and local).
- The provincial education department spends most of its income on manufacturing and transport services while the local government consumes most of manufacturing and utilities.
- About 34.81 % of manufactured products are consumed by the national government in the province, 32.82 % by provincial education and 17.5 % by local government.
- The local government has the largest share of utilities consumed (23.95 %).

- Agriculture has strong backward and forward linkages with other sectors. The results show that the change in the demand for agricultural commodities, as a result of R1 million increases in agricultural export demand, generates a greater output multiplier effect than vice versa (**See table 11**).
- Recall that agriculture has a large gross output share (shares of the intermediate input demand) in manufacturing and agro-processing sectors. If agriculture is constrained, the model shows that the output, GDP and the income multipliers for manufacturing and agro-processing sectors will decline from the base scenario. The largest decline was in the agro-processing sector - an indication of a very strong linkage between agriculture and agro-processing.
- The results show that the total person year equivalent employment in the agricultural sector following an increase in the exogenous demand by R1 million is 10. Others include; manufacturing (22), mining (9), agro-processing (9), Utility (8), construction (4), trade (6), private services (52) and public services (27).
- Because of the forward and backward linkages between agriculture and other sectors, the output price of the sectors with the strongest linkages with agriculture (such agro-processing sector), increases as agricultural output increases. This supports the fact that growth in agricultural output, will lead to growth in other sector in the province.
- Due to increased productivity, agricultural producers will demand more factors of production; hence the quantity of factor supply increases.
- The result shows that for every R10 million injection into agriculture, the livestock sub-sector contributes 46.68 % to the agricultural GDP, field crops contribute 44.64 %, and horticulture contributes 8.63 %.
- Beef cattle, poultry, sheep and goat play major roles to the GDP of the livestock sub-sector. Beef cattle contribute 33.10 % to the GDP of the sub-sector, sheep and goat contributes 7.03 % while the poultry sub-sector contributes 4 %.
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- Apart from potatoes, the contributions of other sub-sectors in the horticulture sub-sector are evenly distributed. Potatoes contribute 7 % whereas others contribute less than one per cent.
- The contribution of aquaculture and forestry are minimal, compared to other sub-sectors. Both will contribute less than one per cent to the GDP of the agriculture, if there is a R10 million injection into the sector.
- The potential for job creation due to a cash injection into the agricultural sector is shown is as follows: Field crops will contribute 58.01 % to employment; horticulture 24.25 % while livestock sector contributes 17.64 %.
- Most jobs are created in the field crop sector, with maize contributing 27.33 %, wheat, 14.85 %, sunflower, 6.33 %, legumes, 3.6 % and fodder, 2.05 %.
- In horticulture, potatoes contribute the most, namely 22.57 %, while contributions by other sub-sector are evenly spread.

- The contributions to employment in the livestock are beef cattle, 12.49 %; sheep and goat, 2.65 % and poultry, 1.51 %.
- Overall, the total employment due to a cash injection in the agricultural sector is calculated to be 80.15.

### **Major recommendations**

The major recommendations that stem from the study are as follows:

- Increase productive use of agricultural intermediate inputs to produce more agricultural outputs; This is a simple way of saying make efficient use of intermediates inputs from non-agriculture; use less intermediate from non-agriculture but increase intermediate demand by agriculture for agricultural inputs, thus producing more with the same amount of inputs (intermediate, labour and capital). This indicates that an optimal functioning, integrated agricultural research and extension service in the province, will hugely be to the economic benefit of the Free State economy. This should include a partnership approach between the private and public sector to gain maximum benefit.
- Funding in the province should be targeted at service providers or stakeholders who have, or are more likely to invest in agriculture in the province. This will have large feedback economic effects and minimizes leakages from the province.
- Increasing targeted government expenditure to benefit the agricultural sector will stimulate job creation through increased farm income, household income in the lower income categories and consumption expenditures in the province.
- The study shows clearly that agriculture has been found to have strong linkages with the agro-processing sector; therefore it important to expand agricultural output that will flow through the local agro-processing sector. This can be achieved through the establishment of agro-processing units (linked to local primary production) especially in the sub-sectors with high employment multipliers.
- Increase the efficiency and productivity in the sector through increased research, extension and education training of farmers and farm workers.
- Increase the expenditure in research and development in the agricultural sector in the province. Studies have shown that the output multipliers associated with an increase in agricultural R & D, is significant.

Below the table, concludes with a summary of the problems identified and recommendations made throughout the document. **This table is not exhaustive, but give a good starting point for focussed interventions and targeted subsidies. Most of the actions mentioned could be assisted with targeted provincial subsidies in the initial phases.**

### Recommendations

Factor identified	Area	Action
Infrastructure	Improving infrastructure throughout the province	Build dams for irrigation to produce specific products for local processing/packaging etc. Improve road conditions to facilitate local processing and supply. The availability/affordability of electricity. Ensure that railways are linked to silo's and maintain these railways especially silo's designated for export or to specific mills.
Research, extension and training	Throughout province and focus on the largest agro industries. Especially areas where high-value crops are produced for export and can be further processed (Fruit and vegetables)	Training the youth not only in farming practices, but also in the services farmers need and for the processing and service industries. This will assist them in starting their own businesses, bringing skilled people back to the area and economic growth of the area. Example: mechanic (repairing vehicles and machinery), livestock managers, tractor and machinery operators, electricians, welders etc. Dedicated training facility on basic skills for farming and processing industries.
Electronic Communication	Improve throughout the province Especially areas where production	Installation of internet, Telkom lines to facilitate transactions Provide producers with access to information and allow them to seek better

	for processing and exports are growing	markets. Facilitating connection/interaction between local processors and local producers (grain, livestock and vegetables)
Increase cherry production	Setsoto, Dihlabeng	<p>Assist with research, training and extension to the industry and by training new farmers.</p> <p>Create “agricultural hubs” where these producers can pool resources and process/package in volumes.</p> <p>Create a regional brand – linked to the area of production</p> <p>Expand on the Cherry Festival in driving the expansion and marketing of the brand name.</p>
Adding value to local produced grains and oilseeds.	Throughout Free State	<p>We are the highest maize-producing province.</p> <p>Adding value to the commodity is the next step. Intensive livestock production linked to feed mills and local processing units. These units/hubs need to be close to inputs (silos, feed manufacturers, water, electricity and labour) and close to a market.</p> <p>The Free State is ideally situated and focussed attention to link local production to processing and markets, will stimulate economic growth and employment.</p>
Agricultural losses	Throughout the Free State	<p>Producers lose the bulk of their income due to theft, predators and fires.</p> <p>Increase security in the rural areas</p> <p>“Oranjejag” was an organisation that hunted caracals in order to keep their numbers low. If revived, this will create many jobs.</p>

Value-adding	Identified areas for high-value products. Mangaung, Matjhabeng and Metsimaholo	<p>Training of the producers in marketing, production practices. Provide information to these producers. (Research/extension and dedicated training facilities)</p> <p>Establishing of processing hubs and linking local farmers to local processors and local markets, to facilitate investments and economic growth through the multiplier effects.</p> <p>Linking emerging producers with successful producers in specific target areas.</p> <p>In the long term – a brand name for the products sold can be established, linking it to the area in which it is produced.</p>
Research, extension and training	Free State	<p>Improved and focussed research in local issues, i.e. improving wheat, soybeans and sunflower cultivars and production practices for the Free State, will increase production and efficiency and contribute to economic growth through the multiplier effects</p> <p>Research, extension and training will provide employment opportunities in the smaller towns and rural areas.</p> <p>Will capacitate producers and provide them with a channel to go to with production-associated questions/problems that can be researched and solved in the long term.</p> <p>These research facilities can also be used as training hubs to equip the youth and unemployed with basic skills and in farming practices. In addition it can be through this channel where new investments can be made in upcoming young producers who show potential and have undergone certain training</p>

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## Area for further research

The following are suggested areas for further research

- Efficiency, productivity and profitability in agriculture and whether there has been a change in these outcomes among farmers.
- Determining the impact of intervention agricultural programmes such as comprehensive agricultural support programme (CASP), Land redistribution for agricultural development (LRAD) on the farmer's income, agricultural productivity, rural livelihood etc.
- Determining the agricultural value chain process in the province.

<b>Scenarios</b>	<b>Exogenous shock</b>	<b>Exogenous component of demand</b>	<b>Supply constraint</b>
<b>1</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>No supply constraint</i>
<b>2</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>Government services is supply constrained</i>
<b>3</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Net export, and investment demand are exogenous, while government consumption demand is endogenous</i>	<i>Government services is supply constrained</i>
<b>4</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>Agriculture is supply constrained</i>
<b>5</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>Mining is supply constrained</i>
<b>6</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>Agro-processing supply is constrained</i>
<b>7</b>	<i>Increase in the export of each sectors by one unit (R1m)</i>	<i>Government consumption, net export, and investment demand are exogenous</i>	<i>Manufacturing supply is constrained</i>

Figure 1: Scenario development and testing using SAM multiplier technique

Table 1 The structure of a macro SAM

	1.Activities	2.Commodities	3.Factors	4.Enterprises	5.Households	6.Government	7.Savings & Investment	8.Rest of the World	9.Total
1.Activities		Domestic supply				Export subsidies			Production
2.Commodities	Inter Demand				Household consumption	Government consumption	Investment demand	Export earnings	Total domestic demand
3.Factors	Value added								Total factor income
4.Enterprises									Total enterprise income
5.Households			Factor payments	Transfers		Transfers to Households		Foreign remittances	Total household income
6.Government	Value added tax	Sales tax, import tariffs		Taxes	Direct taxes			Foreign grants	Government income
7.Savings & Investment				Enterprise savings	Household savings	Government savings		Current acc balance	Total savings
8.Rest of the World		Imports		Transfers abroad					Foreign exchange
9.Total	Total gross output	Total domestic supply	Total factor expenditure	Total enterprise expenditure	Total household expenditure	Total government expenditure	Total investment savings	Foreign exchange flow	

Source: Own compilation

Table 2 GDP at factor cost and the shares of factors in the sectoral value added

	Activities	GDP Share	Lab-sk	Lab-ss	Lab-un	Cappube	Caprive	Captaxi	Capinfe	Taxes	Total
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col.7	Col.8	Col. 9	Col.10	Col.11
1	aagco	6.98	3.28	9.65	10.05	0.00	76.95	0.00	0.00	0.08	100
2	aagsb	0.08	0.00	17.10	18.29	0.00	0.00	0.00	64.62	0.00	100
3	agmin	12.89	7.73	34.34	10.36	21.74	25.78	0.00	0.00	0.06	100
4	aomin	1.37	9.36	17.32	2.77	11.08	59.04	0.00	0.00	0.43	100
5	amveg	0.32	19.31	24.47	8.91	0.00	47.18	0.00	0.00	0.12	100
6	adairy	0.37	20.15	25.54	9.30	0.00	44.63	0.00	0.00	0.37	100
7	agrain	0.83	16.25	20.60	7.50	0.00	55.45	0.00	0.00	0.20	100
8	aofood	0.88	14.80	18.76	6.83	0.00	59.43	0.00	0.00	0.19	100
9	abeveg	0.39	9.93	12.59	4.59	0.00	72.55	0.00	0.00	0.33	100
10	Atext	0.45	17.47	40.12	6.92	0.00	35.23	0.00	0.00	0.27	100
11	awood	0.75	18.81	43.20	7.45	0.00	30.35	0.00	0.00	0.19	100
12	apaper	0.11	11.78	27.06	4.67	0.00	56.22	0.00	0.00	0.28	100
13	apubpr	0.21	23.77	54.60	9.42	2.42	9.68	0.00	0.00	0.11	100
14	achem	8.53	19.49	15.53	3.10	9.28	52.57	0.00	0.00	0.03	100
15	arubber	0.02	33.64	26.81	5.35	0.00	29.10	0.00	0.00	5.10	100
16	anmetls	0.36	10.84	17.57	4.48	0.00	66.08	0.00	0.00	1.04	100
17	ametl	0.12	25.95	42.33	5.50	0.00	25.66	0.00	0.00	0.56	100
18	aometls	0.22	21.22	34.60	4.50	0.00	39.13	0.00	0.00	0.55	100
19	amach	0.53	30.58	32.47	3.62	5.21	27.77	0.00	0.00	0.34	100
20	aelctma	0.04	29.03	30.82	3.43	4.99	26.57	0.00	0.00	5.16	100
21	acomeq	0.06	32.35	16.63	2.13	0.00	48.68	0.00	0.00	0.21	100
22	amantr	0.16	23.94	28.18	3.87	6.88	36.64	0.00	0.00	0.49	100
23	aoman	0.14	3.77	28.56	14.19	5.08	27.09	0.00	21.18	0.13	100
24	aelect	2.66	14.70	21.95	1.82	52.23	9.22	0.00	0.00	0.08	100
25	awater	0.66	11.40	14.31	5.17	58.68	10.36	0.00	0.00	0.09	100
26	abuldg	0.87	14.06	36.93	12.58	5.44	28.96	0.00	1.58	0.45	100
27	aoconst	0.92	11.71	30.77	5.88	8.07	43.02	0.00	0.00	0.54	100
28	atrade	11.60	16.00	26.94	5.15	0.00	49.19	0.00	2.54	0.18	100
29	aaccod	1.27	11.19	21.37	6.39	0.00	60.75	0.00	0.00	0.30	100
30	atrans	7.08	12.17	25.61	4.62	8.53	45.46	3.22	0.00	0.39	100
31	acommm	3.49	18.05	12.05	1.47	10.76	57.35	0.00	0.00	0.32	100
32	ainsure	9.92	27.49	15.84	0.83	0.00	55.70	0.00	0.00	0.13	100
33	areste	6.72	4.80	1.34	0.21	0.00	93.51	0.00	0.00	0.14	100
34	abusa	2.71	32.74	17.91	2.17	0.00	46.95	0.00	0.00	0.22	100
35	aggov	2.81	24.92	54.21	7.63	13.09	0.00	0.00	0.00	0.15	100
36	ahswk	5.30	36.54	7.71	4.50	8.07	43.00	0.00	0.00	0.18	100
37	Aacsr	8.16	68.97	7.49	6.75	2.42	12.88	0.00	1.38	0.12	100

Source: Free State SAM 2004

Table 3 Factor demand across sector (%)

	Activities	lab-sk	lab-ss	lab-un	cappube	capprive	Captaxe	Capinfe
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col.7	Col.8
1	aagco	1.12	3.37	13.46	0.00	11.75	0.00	0.00
2	aagsb	0.00	0.07	0.28	0.00	0.00	0.00	10.33
3	agmin	4.87	22.18	25.61	36.54	7.26	0.00	0.00
4	aomin	0.63	1.19	0.73	1.98	1.77	0.00	0.00
5	amveg	0.30	0.39	0.54	0.00	0.33	0.00	0.00
6	adairy	0.36	0.47	0.66	0.00	0.36	0.00	0.00
7	agrain	0.66	0.86	1.20	0.00	1.01	0.00	0.00
8	aofood	0.64	0.83	1.16	0.00	1.15	0.00	0.00
9	abeveg	0.19	0.25	0.35	0.00	0.62	0.00	0.00
10	atext	0.39	0.91	0.60	0.00	0.35	0.00	0.00
11	awood	0.69	1.62	1.07	0.00	0.50	0.00	0.00
12	apaper	0.06	0.14	0.09	0.00	0.13	0.00	0.00
13	apubpr	0.24	0.58	0.38	0.07	0.04	0.00	0.00
14	achem	8.12	6.64	5.07	10.32	9.80	0.00	0.00
15	arubber	0.04	0.03	0.02	0.00	0.02	0.00	0.00
16	anmetls	0.19	0.32	0.31	0.00	0.52	0.00	0.00
17	ametl	0.15	0.25	0.12	0.00	0.06	0.00	0.00
18	aometls	0.22	0.37	0.19	0.00	0.18	0.00	0.00
19	amach	0.79	0.86	0.37	0.36	0.32	0.00	0.00
20	aelctma	0.06	0.06	0.03	0.03	0.02	0.00	0.00
21	acomeq	0.10	0.05	0.03	0.00	0.07	0.00	0.00
22	amantr	0.18	0.22	0.12	0.14	0.12	0.00	0.00
23	aoman	0.03	0.21	0.39	0.10	0.08	0.00	6.04
24	aelect	1.91	2.92	0.93	18.09	0.54	0.00	0.00
25	awater	0.37	0.48	0.66	5.08	0.15	0.00	0.00
26	abuldg	0.60	1.61	2.10	0.62	0.55	0.00	2.75
27	aoconst	0.53	1.42	1.04	0.97	0.87	0.00	0.00
28	atrade	9.06	15.66	11.46	0.00	12.47	0.00	58.53
29	aaccod	0.70	1.36	1.56	0.00	1.69	0.00	0.00
30	atrans	4.20	9.08	6.27	7.87	7.03	100.00	0.00
31	acomm	3.08	2.11	0.99	4.90	4.38	0.00	0.00
32	ainsure	13.31	7.87	1.59	0.00	12.07	0.00	0.00
33	areste	1.57	0.45	0.27	0.00	13.72	0.00	0.00
34	abusa	4.33	2.43	1.13	0.00	2.78	0.00	0.00
35	aggov	3.42	7.64	4.12	4.80	0.00	0.00	0.00
36	ahswk	9.44	2.05	4.57	5.57	4.98	0.00	0.00
37	aacsr	27.47	3.06	10.56	2.57	2.30	0.00	22.35
38	total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Free State SAM 2004

Table 4 Activity production shares: shares of commodities and factors inputs in each other's gross output

	Activity	flab-sk	flab-ss	flab-un	cappube	capprive	captaxe	capinfe	tax	intermediate share of total	Total
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col.7	Col. 8	Col. 9	Col. 10	Col. 11
1	aagco	1.8	5.2	5.4	0.0	41.1	0.0	0.0	0.0	46.6	100
2	aagsb	0.0	7.2	7.7	0.0	0.0	0.0	27.4	0.0	57.7	100
3	agmin	4.8	21.2	6.4	13.4	15.9	0.0	0.0	0.0	38.4	100
4	aomin	5.1	9.3	1.5	6.0	31.8	0.0	0.0	0.2	46.1	100
5	amveg	2.2	2.8	1.0	0.0	5.3	0.0	0.0	0.0	88.7	100
6	adairy	5.1	6.5	2.4	0.0	11.3	0.0	0.0	0.1	74.8	100
7	agrain	3.6	4.6	1.7	0.0	12.3	0.0	0.0	0.0	77.8	100
8	aofood	4.8	6.1	2.2	0.0	19.5	0.0	0.0	0.1	67.3	100
9	abeveg	3.5	4.5	1.6	0.0	25.7	0.0	0.0	0.1	64.6	100
10	atext	4.2	9.6	1.7	0.0	8.5	0.0	0.0	0.1	76.0	100
11	awood	7.9	18.1	3.1	0.0	12.7	0.0	0.0	0.1	58.2	100
12	apaper	3.0	6.8	1.2	0.0	14.2	0.0	0.0	0.1	74.7	100
13	apubpr	9.0	20.7	3.6	0.9	3.7	0.0	0.0	0.0	62.2	100
14	achem	4.8	3.8	0.8	2.3	12.9	0.0	0.0	0.0	75.4	100
15	arubber	9.1	7.2	1.5	0.0	7.9	0.0	0.0	1.4	73.0	100
16	anmetls	3.8	6.1	1.6	0.0	22.9	0.0	0.0	0.4	65.3	100
17	ametl	6.4	10.4	1.4	0.0	6.3	0.0	0.0	0.1	75.3	100
18	aometls	6.3	10.2	1.3	0.0	11.5	0.0	0.0	0.2	70.5	100
19	amach	7.8	8.2	0.9	1.3	7.0	0.0	0.0	0.1	74.7	100
20	aeltma	7.3	7.7	0.9	1.2	6.6	0.0	0.0	1.3	75.0	100
21	acomeq	10.0	5.2	0.7	0.0	15.1	0.0	0.0	0.1	69.0	100
22	amantr	4.2	5.0	0.7	1.2	6.5	0.0	0.0	0.1	82.4	100
23	aoman	1.2	8.7	4.3	1.6	8.3	0.0	6.5	0.0	69.5	100
24	aelect	8.1	12.1	1.0	28.8	5.1	0.0	0.0	0.0	45.0	100
25	awater	4.1	5.1	1.8	20.9	3.7	0.0	0.0	0.0	64.4	100
26	abuldg	2.9	7.7	2.6	1.1	6.1	0.0	0.3	0.1	79.1	100
27	aoconst	3.7	9.8	1.9	2.6	13.7	0.0	0.0	0.2	68.1	100
28	atrade	8.5	14.2	2.7	0.0	26.0	0.0	1.3	0.1	47.2	100
29	aaccod	4.4	8.4	2.5	0.0	23.7	0.0	0.0	0.1	60.9	100
30	atrans	5.3	11.1	2.0	3.7	19.7	1.4	0.0	0.2	56.6	100
31	acomm	7.8	5.2	0.6	4.6	24.7	0.0	0.0	0.1	56.9	100
32	ainsure	17.0	9.8	0.5	0.0	34.4	0.0	0.0	0.1	38.3	100
33	areste	3.1	0.9	0.1	0.0	59.4	0.0	0.0	0.1	36.5	100
34	abusa	14.2	7.8	1.0	0.0	20.4	0.0	0.0	0.1	56.5	100
35	aggov	16.4	35.8	5.0	8.6	0.0	0.0	0.0	0.1	34.0	100
36	ahswk	15.2	3.2	1.9	3.4	17.9	0.0	0.0	0.1	58.4	100
37	aacsr	42.1	4.6	4.1	1.5	7.9	0.0	0.8	0.1	39.0	100
38	total	7.3	8.9	2.2	2.8	15.4	0.0	1.0	0.2	62.3	100

Source: Free State SAM 2004

Table 5 Table showing commodity trades shares and intensities (%)

	Commodities	Import penetration		Export intensities	
		RSA	ROW	RSA	ROW
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5
1	cagco	6.71	1.76	53.83	9.74
2	cagsb	0.00	0.00	0.00	0.00
3	cgmin	0.00	0.00	0.00	94.42
4	comin	53.37	13.99	35.94	33.88
5	cmveg	47.16	12.37	30.59	10.20
6	cdairy	44.65	11.71	60.36	5.70
7	cgrain	32.04	8.40	26.66	6.70
8	cofood	23.78	6.23	30.59	10.20
9	cbeveg	51.89	13.60	0.96	3.82
10	ctext	56.65	14.85	44.07	11.86
11	cwood	18.74	4.91	25.90	7.75
12	cpaper	62.69	16.44	39.10	9.40
13	cpubpr	51.44	13.49	29.65	1.16
14	cchem	9.67	2.53	30.47	7.68
15	crubber	57.00	14.94	22.15	3.68
16	cnmetls	40.47	10.61	29.92	9.31
17	cmetl	61.18	16.04	26.29	5.96
18	cometls	48.86	12.81	41.27	7.73
19	cmach	52.46	13.76	24.66	11.78
20	celctma	71.77	18.82	28.50	5.01
21	ccomeq	69.09	18.12	48.30	3.41
22	cmantr	69.72	18.28	55.46	4.38
23	coman	30.40	7.97	14.39	2.49
24	celect	13.18	3.46	0.00	0.37
25	cwater	9.67	2.54	34.00	0.00
26	cbuldg	38.38	10.06	0.00	0.00
27	coconst	39.05	10.24	0.00	0.06
28	ctrade	0.20	0.05	20.26	7.56
29	caccod	23.16	6.07	32.17	12.97
30	ctrans	0.00	0.00	18.52	7.42
31	ccomm	22.98	6.03	9.66	3.45
32	cinsure	17.66	4.63	48.59	2.83
33	creste	3.49	0.92	10.02	0.00
34	cbusa	9.99	2.62	20.69	3.35
35	cggov	0.00	0.00	14.21	6.95
36	chswk	0.00	0.00	0.00	0.80
37	cacsr	0.15	0.04	1.94	0.00

Source: Free State SAM 2004

Table 6 The household consumption pattern

	Comdties	a. Share of household consumption						b.Share of commodity consumption					
		Linc	Lminc	Mdinc	Hmdinc	Highinc	Total	Linc	Lminc	Mdinc	Hmdinc	Highinc	Total
		Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	Col.8	Col.9	Col.10	Col.11	Col.12
1	cagco	2.62	1.78	1.25	1.10	4.31	11.06	0.72	2.22	2.30	1.65	5.66	12.55
2	cagsb	0.25	0.17	0.12	0.10	0.51	1.16	5.30	15.95	16.14	11.84	50.77	100.00
3	cgmin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	comin	0.04	0.03	0.02	0.01	0.00	0.10	0.02	0.06	0.07	0.03	0.00	0.18
5	cmveg	13.88	11.40	8.53	5.61	2.73	42.15	5.96	22.24	24.46	13.13	5.59	71.40
6	cdairy	4.11	3.56	2.70	1.73	0.85	12.96	4.82	18.98	21.16	11.08	4.76	60.80
7	cgrain	8.24	6.78	4.92	3.18	1.55	24.67	5.34	19.97	21.32	11.22	4.80	62.65
8	cofood	6.54	5.25	3.88	2.57	1.27	19.52	5.28	19.27	20.94	11.31	4.89	61.70
9	cbeveg	11.40	9.11	7.16	4.70	2.33	34.71	7.46	27.06	31.29	16.76	7.26	89.85
10	ctext	5.68	7.17	7.66	7.24	4.77	32.53	2.45	14.02	22.00	16.97	9.78	65.21
11	cwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	cpaper	0.04	0.06	0.04	0.04	0.03	0.21	0.09	0.52	0.59	0.47	0.30	1.96
13	cpubpr	0.04	0.04	0.04	0.02	0.02	0.15	0.09	0.43	0.62	0.34	0.22	1.70
14	cchem	8.59	7.72	8.24	8.97	8.03	41.55	0.84	3.45	5.41	4.81	3.76	18.27
15	crubber	0.03	0.04	0.04	0.03	0.03	0.17	0.13	0.90	1.48	0.94	0.86	4.33
16	cnmetls	0.02	0.03	0.03	0.03	0.03	0.14	0.03	0.21	0.37	0.31	0.29	1.21
17	cmetl	0.02	0.03	0.03	0.04	0.03	0.14	0.03	0.20	0.37	0.33	0.23	1.16
18	cometls	0.20	0.38	0.54	0.61	0.50	2.23	0.40	3.42	7.25	6.59	4.79	22.45
19	cmach	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	celctma	0.15	0.23	0.28	0.28	0.26	1.19	0.10	0.69	1.26	1.02	0.82	3.87
21	ccomeq	0.83	1.10	1.68	2.35	2.04	8.00	0.97	5.76	12.99	14.86	11.25	45.83
22	cmantr	0.54	0.56	1.62	5.67	15.28	23.68	0.18	0.84	3.59	10.24	24.10	38.95
23	coman	0.22	0.22	0.26	0.24	0.23	1.17	0.47	2.11	3.71	2.79	2.29	11.38
24	celect	4.51	3.88	3.00	1.74	0.84	13.97	3.04	11.86	13.51	6.39	2.68	37.49
25	cwater	0.55	0.60	0.54	0.37	0.20	2.26	0.99	4.91	6.50	3.68	1.75	17.83
26	cbuldg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	coconst	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	ctrade	4.92	4.31	3.80	3.62	3.29	19.93	0.85	3.37	4.36	3.39	2.70	14.66
29	caccod	1.20	1.79	2.07	3.19	2.87	11.12	1.18	7.98	13.56	17.08	13.43	53.21
30	ctrans	5.53	4.50	4.15	3.65	2.79	20.62	1.36	5.04	6.83	4.91	3.28	21.44
31	ccomm	3.87	6.87	7.81	6.81	5.13	30.49	1.34	10.80	18.07	12.84	8.46	51.52
32	cinsure	1.48	2.56	4.56	7.32	10.54	26.47	0.28	2.20	5.74	7.51	9.46	25.18
33	creste	7.94	8.21	8.83	8.15	11.36	44.49	2.46	11.56	18.25	13.76	16.75	62.78
34	cbusa	0.88	0.34	0.43	0.59	0.72	2.96	0.37	0.66	1.21	1.36	1.44	5.05
35	cggov	0.23	0.56	0.79	1.23	1.87	4.67	0.21	2.30	4.79	6.10	8.14	21.54
36	chswk	1.84	4.86	7.21	9.45	7.24	30.60	0.56	6.71	14.60	15.63	10.47	47.96
37	cacsr	3.61	5.90	7.76	9.34	8.31	34.92	0.83	6.15	11.88	11.67	9.06	39.58

Source: Free State SAM 2004

Table 7 Household expenditure on each item as a share of the total household expenditure

	Linc	Lminc	Mdinc	Hmidinc	Highinc	Total	
Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	
1	cagco	2.45	1.65	1.12	0.93	3.47	1.77
2	cagsb	0.24	0.16	0.10	0.09	0.41	0.19
3	cgmin	0.00	0.00	0.00	0.00	0.00	0.00
4	comin	0.04	0.03	0.02	0.01	0.00	0.01
5	cmveg	12.99	10.60	7.60	4.78	2.20	6.45
6	cdairy	3.84	3.31	2.41	1.48	0.68	2.01
7	cgrain	7.71	6.31	4.39	2.70	1.25	3.75
8	cofood	6.12	4.89	3.46	2.19	1.02	2.96
9	cbeveg	10.67	8.47	6.38	4.00	1.87	5.33
10	ctext	5.32	6.67	6.83	6.16	3.84	5.88
11	cwood	0.00	0.00	0.00	0.00	0.00	0.00
12	cpaper	0.04	0.05	0.04	0.04	0.02	0.04
13	cpubpr	0.03	0.03	0.03	0.02	0.01	0.03
14	cchem	8.04	7.18	7.34	7.63	6.45	7.21
15	crubber	0.02	0.03	0.04	0.03	0.03	0.03
16	cnmetls	0.02	0.02	0.03	0.03	0.03	0.03
17	cmetl	0.02	0.02	0.03	0.03	0.02	0.03
18	cometls	0.19	0.35	0.48	0.52	0.40	0.44
19	cmach	0.00	0.00	0.00	0.00	0.00	0.00
20	celctma	0.14	0.21	0.25	0.24	0.21	0.22
21	ccomeq	0.78	1.02	1.50	2.00	1.64	1.53
22	cmantr	0.50	0.52	1.45	4.83	12.27	4.56
23	coman	0.21	0.20	0.23	0.21	0.18	0.21
24	celect	4.22	3.60	2.68	1.48	0.67	2.16
25	cwater	0.51	0.56	0.48	0.32	0.16	0.38
26	cbuldg	0.00	0.00	0.00	0.00	0.00	0.00
27	coconst	0.00	0.00	0.00	0.00	0.00	0.00
28	ctrade	4.60	4.01	3.38	3.08	2.64	3.31
29	caccod	1.12	1.66	1.84	2.72	2.31	2.10
30	ctrans	5.17	4.18	3.70	3.11	2.24	3.37
31	ccomm	3.62	6.39	6.96	5.79	4.12	5.77
32	cinsure	1.39	2.39	4.07	6.23	8.47	5.19
33	creste	7.43	7.64	7.87	6.94	9.13	7.86
34	cbusa	0.83	0.32	0.38	0.50	0.57	0.46
35	cggov	0.21	0.52	0.70	1.04	1.51	0.92
36	chswk	1.72	4.52	6.42	8.04	5.82	6.13
37	cacsr	3.37	5.49	6.92	7.95	6.67	6.70
38	govnat	4.17	5.29	9.83	13.01	15.85	10.91
39	govpo	0.01	0.01	0.00	0.01	0.01	0.01
40	govloc	1.75	1.33	0.44	1.04	2.50	1.29
41	s-ioth	0.51	0.37	0.61	0.83	1.30	0.77
42	consumption	97.73	98.30	98.95	98.12	96.12	97.94
43	total	100	100	100	100	100	100

Source: Free State SAM 2004

Table 8 Household income from each source as the share of total household income

		Linc	Lminc	Mdinc	Hminc	Hinc
	Col.1	Col.2	Col.3	Col.4	Col.5	Col.6
1	lab-sk	3.91	9.64	28.04	49.33	105.19
2	lab-ss	11.53	17.99	28.33	39.91	53.37
3	lab-un	6.58	3.03	6.48	10.99	11.25
4	cappube	0.00	0.00	0.00	0.00	0.00
5	capprive	0.00	0.00	0.00	0.00	0.00
6	captaxe	0.00	0.00	0.00	0.00	0.00
7	capinfe	0.00	0.00	0.00	0.00	0.00
8	govnat	6.98	3.37	0.43	0.06	0.01
9	govpo	0.00	0.00	0.00	0.00	0.00
10	govpe	0.00	0.00	0.00	0.00	0.00
11	govph	0.00	0.00	0.00	0.00	0.00
12	govpw	39.78	19.23	2.44	0.32	0.03
13	govpec	0.00	0.00	0.00	0.00	0.00
14	govpo	0.00	0.00	0.00	0.00	0.00
15	govloc	0.00	0.00	0.00	0.00	0.00
16	rsa	4.34	4.70	5.65	6.98	8.22
17	row	26.87	42.05	28.63	-7.57	-78.06
18	total	100	100	100	100	100

Source: Free State SAM 2004

Table 9 Government consumption pattern

a. Shares of government consumption										
		cagr	cmin	cagpro	cman	cutility	ccons	ctatns	Cprvs	Cpubs
	Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	Col.8	Col.9	Col.10
1	govnat	0.50	0.51	0.27	40.89	3.15	5.39	22.45	9.56	17.28
2	govpo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	govpe	1.06	0.25	0.78	48.98	6.67	17.50	17.69	6.11	0.96
4	govph	1.31	0.57	11.53	61.50	3.40	0.21	16.15	1.51	3.82
5	govpw	0.02	0.03	0.11	17.95	3.80	7.83	6.15	63.11	1.00
6	govpec	0.02	0.03	0.11	12.29	1.00	0.08	7.13	29.91	49.43
7	govpo	0.11	0.08	1.42	36.03	4.30	3.25	35.00	4.05	15.76
8	govloc	0.02	0.07	0.12	24.91	37.28	11.26	12.91	13.23	0.20
b. Shares of commodity consumption										
9	govnat	0.12	0.22	0.13	34.81	2.93	1.93	3.89	1.84	4.64
10	govpo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	govpe	0.15	0.06	0.26	32.83	2.98	3.90	1.93	0.79	0.16
12	govph	0.09	0.07	1.83	10.09	0.96	0.02	0.88	0.12	0.76
13	govpw	0.00	0.00	0.00	0.38	0.06	0.05	0.03	0.40	0.01
14	govpec	0.00	0.00	0.00	0.28	0.02	0.00	0.03	0.20	0.18
15	govpo	0.01	0.01	0.28	8.82	1.18	0.38	2.19	0.24	3.06
16	govloc	0.00	0.02	0.06	17.50	23.95	3.20	1.94	1.92	0.06

Source: Free State SAM 2004

Table 10 Government income and expenditure

<b>Shares of total government income</b>			
	Gov-nat	Gov-prov	Gov-local
Direct tax	14.8	0.0	0.0
Activity taxes	0.2	0.0	0.0
Import duties	0.0	0.0	0.0
Other indirect taxes	21.6	0.0	0.0
Personal tax	0.4	0.0	20.5
Enterprise transfer	12.0	0.0	43.7
Gov transfers	51.0	100.0	35.8
Total	100.0	100.0	100.0
<b>Shares of total government expenditure</b>			
	Gov-nat	Gov-prov	Gov-local
Consumption	3.48	6.78	26.87
Household transfer	0.88	8.11	0.00
Savings	4.36	1.03	4.08

Source: Free State SAM 2004

Table 11 The Multiplier effects: Scenario 1

SN	Activities	Cagr	Cmin	Cagpro	Cman	Cutility	Ccons	Ctrad	Cprv	Cpubs
		Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
1	Aagr	2.09	0.05	0.52	0.34	0.05	0.05	0.04	0.21	0.14
2	Amin	0.02	1.34	0.02	0.18	0.06	0.13	0.01	0.07	0.04
3	Aagpro	0.13	0.07	2.01	0.22	0.08	0.03	0.06	0.32	0.22
4	Aman	0.50	0.36	0.44	5.93	0.35	0.25	0.27	1.19	0.87
5	Autility	0.06	0.07	0.06	0.13	2.04	0.04	0.03	0.15	0.09
6	Acons	0.01	0.01	0.01	0.02	0.03	0.81	0.01	0.05	0.02
7	Atrad	0.29	0.15	0.24	0.45	0.15	0.08	1.22	0.88	0.47
8	Aprv	0.74	0.54	0.74	1.53	0.59	0.29	0.54	6.85	1.37
9	Apubs	0.67	0.35	0.51	1.00	0.27	0.15	0.20	1.14	3.99
10	Cagr	2.21	0.05	0.57	0.37	0.06	0.03	0.04	0.23	0.15
11	Cmin	0.07	2.05	0.07	0.40	0.18	0.05	0.04	0.16	0.12
12	Cagpro	0.27	0.16	4.49	0.45	0.16	0.07	0.12	0.65	0.42
13	Cman	1.03	0.80	0.93	18.50	0.84	0.60	0.49	2.42	1.69
14	Cutility	0.07	0.09	0.07	0.16	2.46	0.03	0.04	0.19	0.11
15	Ccons	0.02	0.03	0.02	0.04	0.07	2.18	0.02	0.10	0.04
16	Ctrad	0.29	0.15	0.25	0.46	0.16	0.09	1.29	0.91	0.45
17	Cprv	0.86	0.64	0.89	1.84	0.72	0.36	0.65	8.72	1.59
18	Cpubs	0.81	0.39	0.58	1.14	0.31	0.17	0.22	1.32	4.42
19	Lab-sk	0.37	0.24	0.34	0.81	0.29	0.13	0.22	1.10	1.21
20	Lab-ssk	0.31	0.37	0.29	0.84	0.29	0.16	0.25	0.83	0.84
21	Lab-usk	0.19	0.10	0.10	0.19	0.06	0.04	0.05	0.17	0.20
22	Cap	1.25	0.80	0.94	1.86	0.97	0.35	0.62	3.04	1.39
23	Linc	0.02	0.02	0.02	0.04	0.01	0.01	0.01	0.04	0.04
24	Lminc	0.15	0.12	0.12	0.28	0.12	0.05	0.09	0.37	0.27
25	Mdinc	0.37	0.28	0.29	0.67	0.29	0.12	0.20	0.88	0.69
26	Hmdinc	0.42	0.32	0.34	0.78	0.32	0.14	0.23	1.00	0.82
27	Highinc	0.53	0.39	0.43	1.00	0.42	0.18	0.30	1.31	1.10
28	Ent	0.94	0.63	0.71	1.41	0.80	0.27	0.47	2.30	1.07
29	Gov-nat	0.59	0.39	0.83	2.18	0.51	0.34	0.29	1.60	0.94
30	Gov-prov	0.01	0.01	0.01	0.02	0.01	0.00	0.01	0.03	0.01
31	Gov-loc	0.08	0.06	0.06	0.13	0.07	0.02	0.04	0.20	0.11
32	S-I	0.23	0.13	0.18	0.34	0.11	0.06	0.12	0.56	0.24
33	RSA	0.85	1.12	2.32	9.75	1.02	1.24	0.43	2.85	1.32
34	ROW	0.23	0.30	0.61	2.57	0.27	0.33	0.12	0.76	0.37

Table 12 The total multiplier effect: Scenarios 1 to 9

	cagr	cmin	cagpro	cman	cutility	ccons	ctrad	Cprv	Cpubs
<b>Scenario 1</b>									
Output	4.52	2.96	4.54	9.80	3.62	1.84	2.37	10.86	7.22
GDP	2.81	1.96	2.57	6.04	2.20	1.05	1.49	6.96	4.69
Income	1.49	1.12	1.19	2.76	1.16	0.51	0.83	3.60	2.92
<b>Scenario 2</b>									
Output	3.18	2.29	3.57	7.87	3.10	1.55	2.00	8.65	4.90
GDP	1.94	1.55	1.96	4.83	1.88	0.87	1.25	5.56	3.17
Income	0.96	0.88	0.83	2.05	0.97	0.40	0.69	2.75	1.97
<b>Scenario 3</b>									
Output	4.90	3.20	5.00	10.98	3.95	2.03	2.56	11.85	7.79
GDP	5.05	3.43	5.49	13.64	4.13	2.26	2.59	12.93	8.17
Income	1.77	1.31	1.54	3.66	1.40	0.65	0.97	4.34	3.35
<b>Scenario 4</b>									
Output	4.10	2.85	3.40	9.05	3.51	1.78	2.29	10.41	6.92
GDP	2.54	1.89	1.83	5.56	2.13	1.01	1.43	6.67	4.49
Income	1.35	1.08	0.81	2.51	1.13	0.49	0.80	3.45	2.82
<b>Scenario 5</b>									
Output	4.47	2.92	4.49	9.49	3.49	1.80	2.35	10.74	7.13
GDP	2.78	1.94	2.53	5.84	2.12	1.03	1.47	6.88	4.63
Income	1.47	1.11	1.18	2.66	1.12	0.49	0.82	3.56	2.89
<b>Scenario 6</b>									
Output	4.26	2.80	4.04	9.36	3.47	1.77	2.26	10.26	6.82
GDP	2.66	1.88	2.29	5.79	2.11	1.01	1.42	6.62	4.46
Income	1.42	1.08	1.07	2.65	1.12	0.49	0.80	3.45	2.82
<b>Scenario 7</b>									
Output	3.91	2.40	3.92	7.30	3.13	1.45	2.06	9.31	6.12
GDP	2.47	1.65	2.22	4.70	1.93	0.83	1.31	6.09	4.08
Income	1.34	0.98	1.04	2.11	1.04	0.40	0.75	3.22	2.65

Source: Own calculation

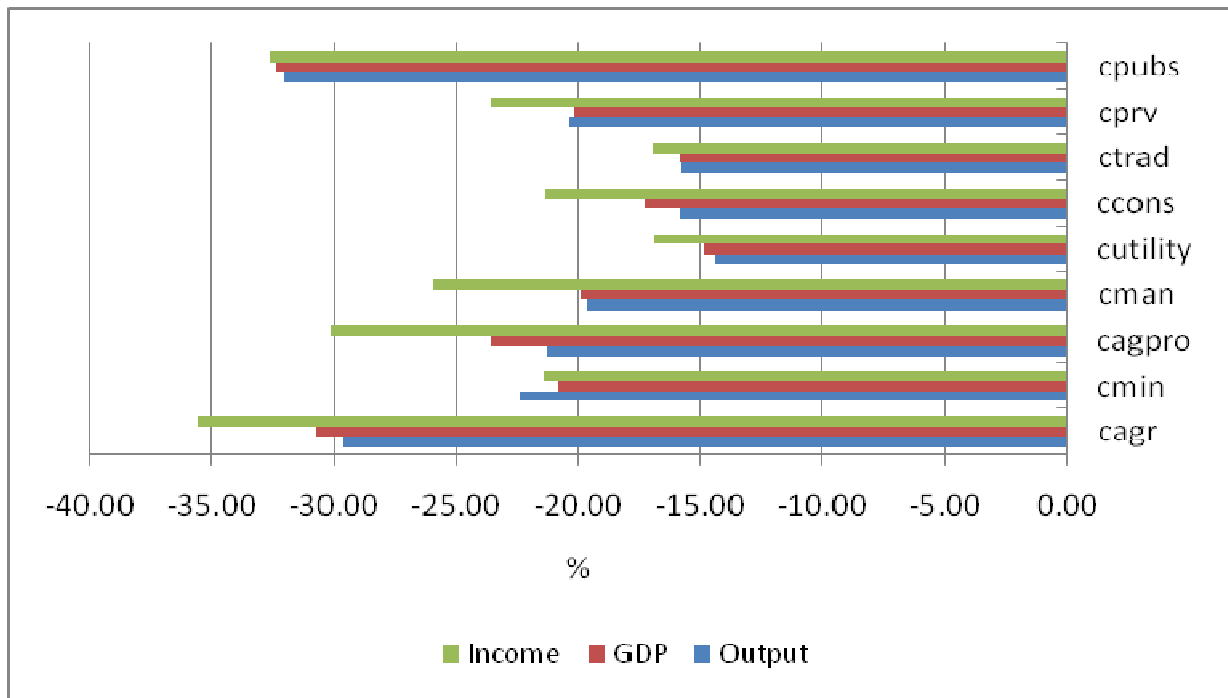


Figure 2: percentage change of scenario 2 from the base scenario (scenario 1)  
 Constrained sector: Government services  
 Source: Own calculation

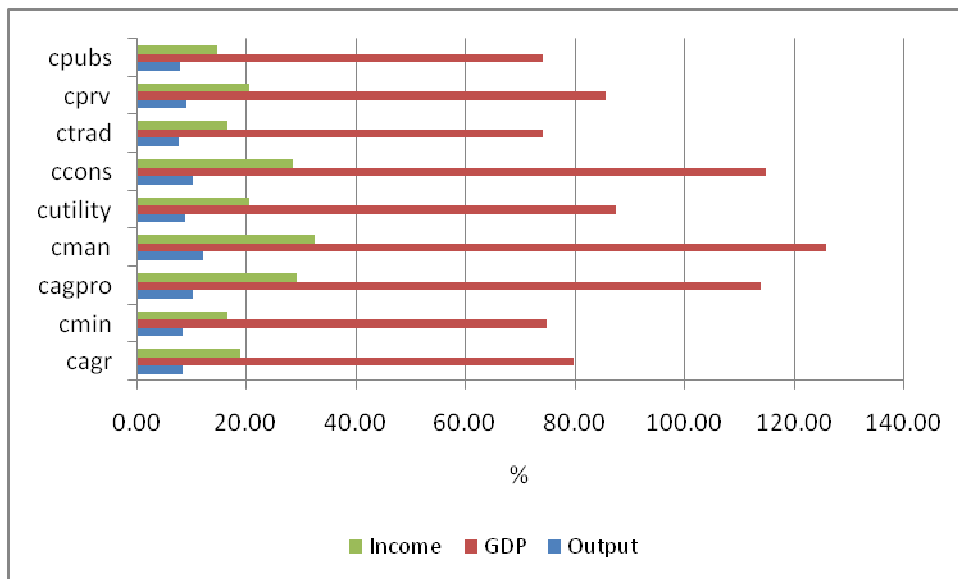


Figure 3: Percentage change of scenario 3 from the base scenario (scenario 1)  
 Constrained sector: Government services and government sector is endogenous  
 Source: Own calculation

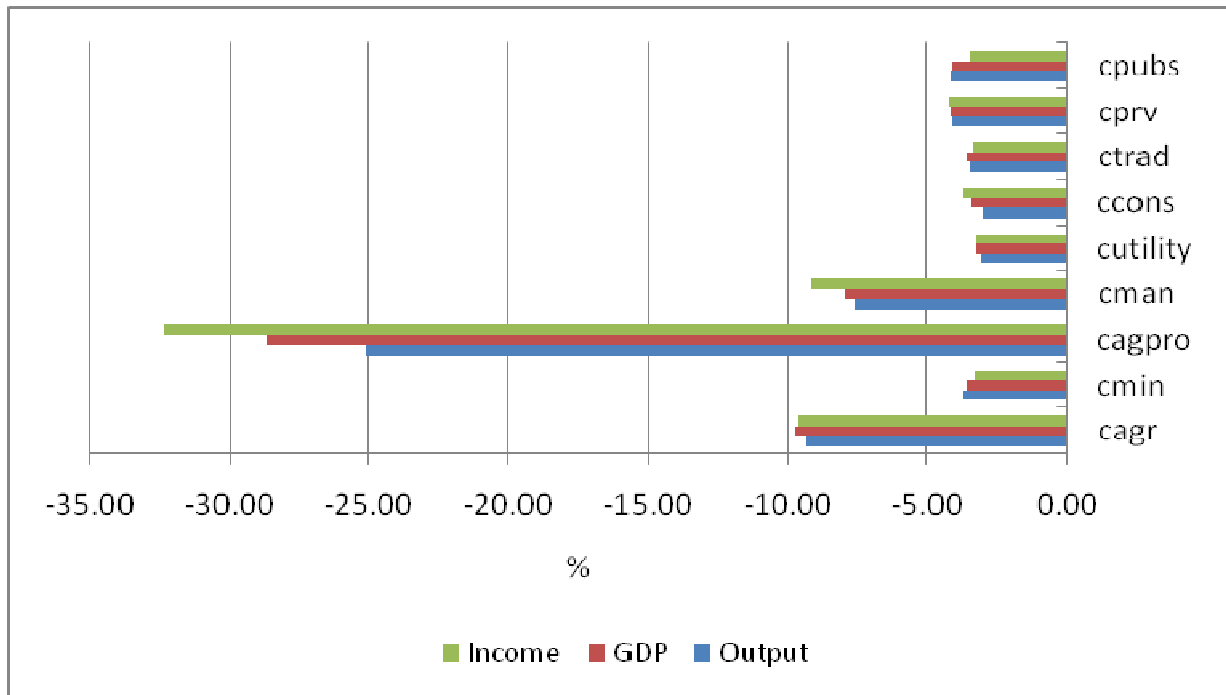


Figure 4: Percentage change of scenario 4 from the base scenario (scenario1)  
 Constrained sector: Agriculture  
 Source: Own calculation

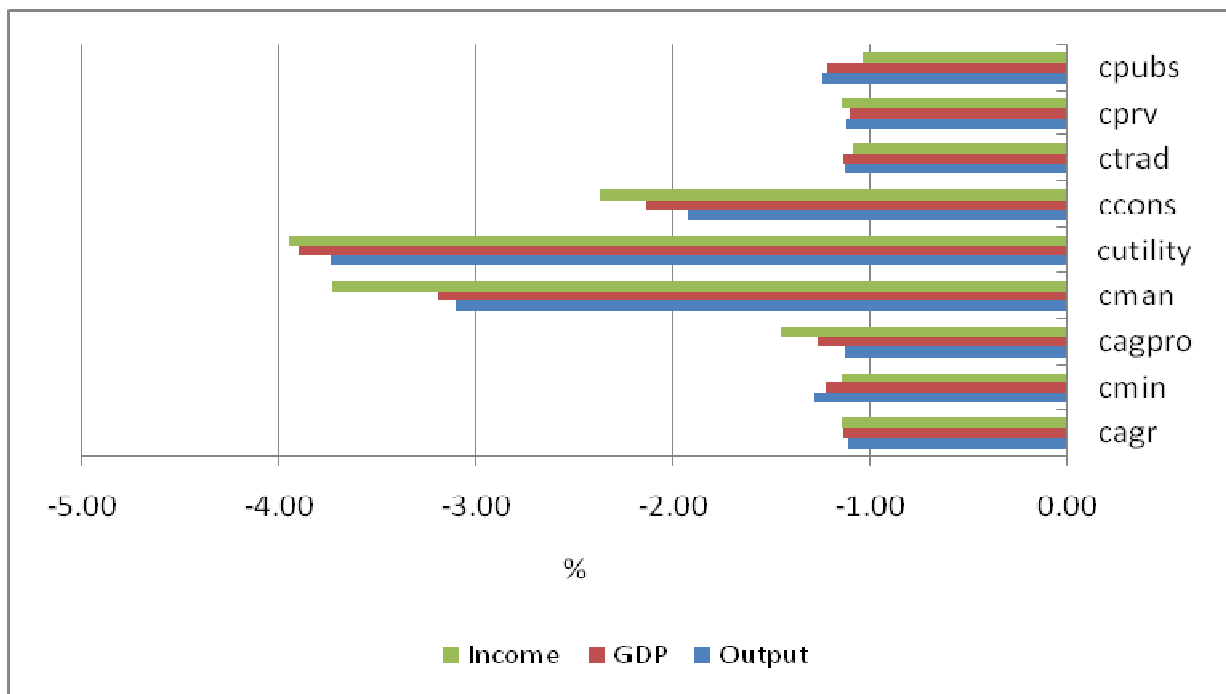


Figure 5: Percentage change of scenario 5 from the base scenario (scenario1)  
 Constrained sector: Mining  
 Source: Own calculation

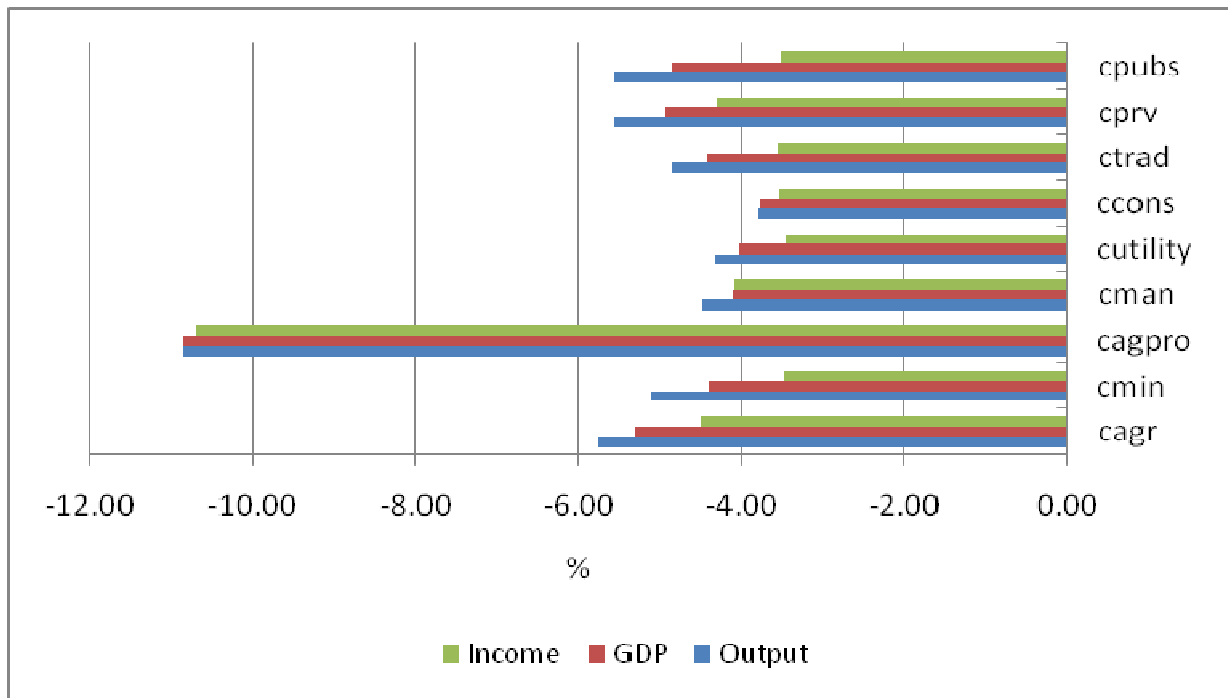


Figure 6:Percentage change of scenario 6 from the base scenario (scenario 1)  
 Constrained sector: Agro-processing  
 Source: Own calculation

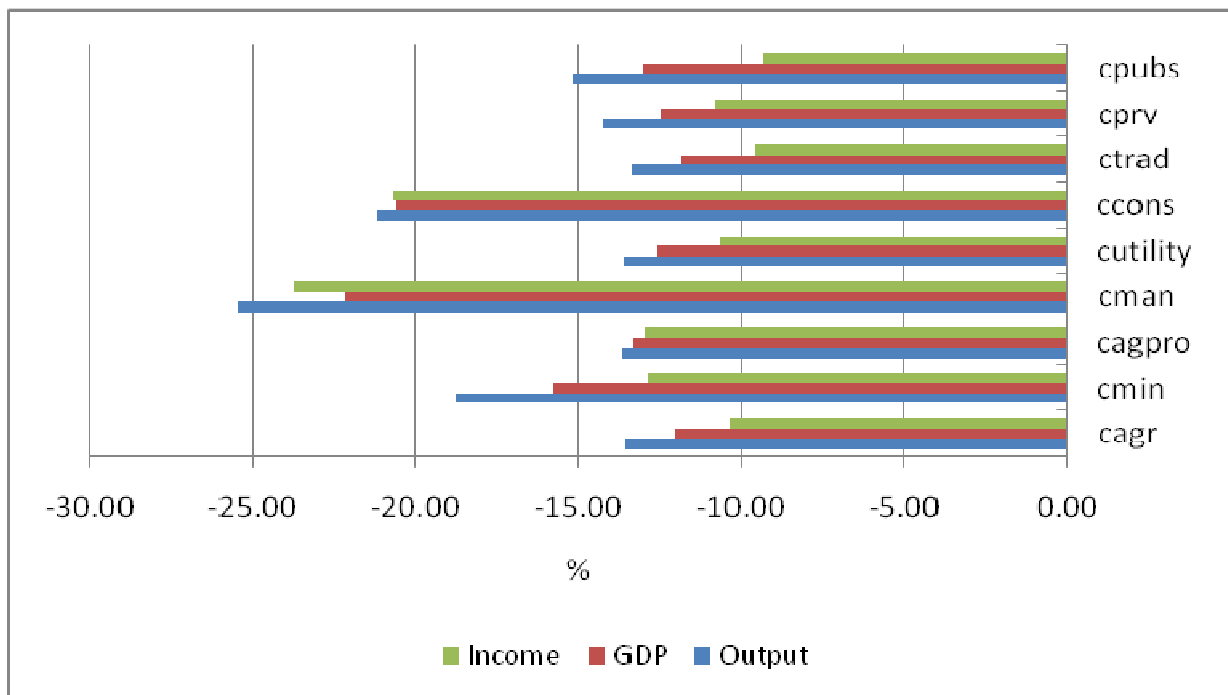


Figure 7:Percentage change of scenario 7 from the base scenario (scenario 1)  
 Constrained sector: Manufacturing  
 Source: Own calculation

Table 13 A 10% increase in export price of agriculture commodities (in FCU)\*

SN	Sectors	BASE	PAXP	PDDXP	PDSXP	PXXP	BASE	PINTAXP	BASE	QAXP	BASE	QQXP
SN	Sectors	Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	Col.8	Col.9	Col.10	Col.11
1	aagrc	1	7.88	4.97	4.97	8	1.06	0.24	7.79	2.81	3.46	-2.33
2	aagsb	1	0.76	0.76	0.76	0.76	1.1	0.68	0.11	0.33	0.11	0.33
3	agmin	1	-0.36	-0.38	-0.38	-0.39	1.07	-0.15	12.45	-0.39	0.00	-0.35
4	aomin	1	-0.37	-0.38	-0.38	-0.38	1.02	-0.06	1.52	-0.19	3.79	-0.16
5	amveg	1	0.58	1.12	1.12	0.49	1.07	1.47	1.67	-5.18	4.18	0.26
6	adairy	1	-0.08	0.38	0.38	-0.23	1.06	1.07	0.87	-3.05	1.28	0.75
7	agrain	1	0.21	0.55	0.55	0.14	1.07	1.45	2.24	-2.36	2.43	0.63
8	aofood	1	0.06	0.32	0.32	0.08	1.05	0.86	1.6	-0.76	2.13	0.32
9	abeveg	1	0.01	0.05	0.05	0.02	1.1	0.36	0.66	-0.17	2.92	0.91
10	atext	1	-0.21	-0.04	-0.04	-0.24	1.09	-0.11	1.13	-0.7	4.37	0.86
11	awood	1	0.03	0.22	0.22	0.01	1.03	0.77	1.07	-1.64	0.98	-0.42
12	apaper	1	-0.29	-0.26	-0.26	-0.33	1.05	0.18	0.25	-0.93	1.01	-0.40
13	apubpr	1	-0.23	-0.21	-0.21	-0.27	1.05	-0.28	0.33	-0.77	0.80	-0.18
14	achem	1	-0.22	-0.16	-0.16	-0.25	1.07	-0.16	20.64	-0.18	13.94	0.26
15	arubber	1	-0.03	0.08	0.08	-0.05	1.08	0.41	0.05	-2.05	0.36	-0.44
16	anmetls	1	-0.33	-0.32	-0.32	-0.35	1.03	-0.19	0.62	-0.2	1.01	0.02
17	ametl	1	-0.31	-0.31	-0.31	-0.33	1.01	-0.35	0.28	-0.39	1.27	-0.13
18	aometls	1	-0.31	-0.26	-0.26	-0.33	1.03	-0.29	0.44	-0.37	0.92	0.13
19	amach	1	-0.24	-0.17	-0.17	-0.26	1.06	-0.27	1.24	-0.21	4.02	0.56
20	aelctma	1	-0.22	-0.16	-0.16	-0.23	1.06	-0.26	0.1	-0.16	3.24	0.70
21	acomeq	1	-0.26	-0.16	-0.16	-0.28	1.08	-0.17	0.12	-0.34	1.82	0.71
22	amantr	1	-0.29	-0.17	-0.17	-0.3	1.06	-0.34	0.53	-0.04	6.43	1.00
23	aoman	1	0.24	0.26	0.26	0.18	1.09	1.27	0.28	-1.3	0.76	0.28
24	aelect	1	-0.07	-0.07	-0.07	-0.07	1.05	-0.25	2.87	0.04	3.35	0.21
25	awater	1	-0.26	-0.2	-0.2	-0.26	1.06	-0.21	1.11	-0.11	0.89	0.18
26	abuldg	1	-0.13	-0.12	-0.12	-0.12	1.07	-0.25	2.48	0.42	5.28	0.84
27	aoconst	1	-0.03	-0.01	-0.01	-0.01	1.07	-0.25	1.72	0.3	5.04	0.84
28	atrade	1	-0.14	-0.06	-0.06	-0.14	1.04	-0.08	13.08	-0.12	9.96	0.13
29	aaccod	1	-0.08	0	0	-0.21	1.1	0.19	1.94	-0.23	1.40	1.01
30	atrans	1	-0.09	0.01	0.01	-0.09	1.07	-0.14	9.71	-0.02	7.07	0.30
31	acomm	1	-0.05	0.01	0.01	-0.05	1.03	-0.13	4.82	0.02	6.09	0.56
32	ainsure	1	-0.23	-0.14	-0.14	-0.28	1.07	-0.01	9.56	-0.2	6.66	0.51
33	areste	1	0.35	0.43	0.43	0.35	1.08	-0.14	6.29	0.03	6.74	0.34
34	abusa	1	-0.21	-0.19	-0.19	-0.23	1.05	0	3.71	-0.37	4.12	-0.18
35	aggov	1	0.04	0.16	0.16	0.04	1.03	0.14	2.54	-0.01	2.00	0.33
36	ahswk	1	0.1	0.1	0.1	0.1	1.06	-0.04	7.57	0.2	7.47	0.21
37	aacsr	1	0.22	0.3	0.3	0.29	1.05	0.06	7.96	1.13	9.80	0.84

\*FCU means foreign currency unit; PAXP = Output price of activity; PDDXP = Demand price of sale; PDSXP = Supply price of domestic sale; PXXP = Average output price; PINTAXP = Price of intermediate aggregate; QAXP = level of activity; QQXP = Quantity of composite goods supplied.

Table 14 A 10% increase in export price of agriculture commodities (in FCU)\*cont

	Affected sectors	Base	%change
	<b>Quantity of factor supply</b>		
SN	Col.1	Col.2	Col.3
1	Skilled labour	12.19	0.25
2	Semi-skilled labour	11.88	0.01
3	Unskilled labour	3.10	1.44
4	Capital	32.23	0.00
5	Household income*		
6	Linc	2.45	0.15
7	Lminc	11.47	0.46
8	Minc	17.71	0.75
9	Hminc	15.16	1.07
10	Hinc	13.88	1.51
11	Household income from factors		
12	Linc < skilled labour	0.09	0.28
13	Linc < semiskilled labour	0.25	0.02
14	Linc < unskilled labour	0.14	1.42
15	Lminc < skilled labour	0.89	0.28
16	Lminc < semiskilled labour	1.66	0.02
17	Lminc < unskilled labour	0.28	1.42
18	Mdinc < skilled labour	3.71	0.28
19	Mdinc < semiskilled labour	0.98	0.02
20	Mdinc < unskilled labour	0.86	1.42
21	Hminc < skilled labour	5.31	0.28
22	Hminc < semiskilled labour	4.29	0.02
23	Hminc < unskilled labour	0.89	1.42
24	Hinc < skilled labour	1.71	0.28
25	Hinc < semiskilled labour	4.61	0.02
26	Hinc < unskilled labour	0.97	1.42

\*Linc = low income; Lminc = low middle inc; Mdinc = middle income; and Hinc = high income

Table 15 The impacts of stimulating agriculture on sub- sector GDP (R'000)

Sectors	Commodities	Direct impact	Indirect impact	Induced impact	Total impact	%of Total
Field crops	Maize grain	R 1,156.38	R 1,053.18	R 1,732.07	R 3,941.64	29.44
	Grain Sorghum	R 40.23	R 36.64	R 60.26	R 137.14	1.02
	Wheat	R 327.53	R 298.30	R 490.59	R 1,116.42	8.34
	Barley	R 4.93	R 4.49	R 7.38	R 16.80	0.13
	Other cereals	R 6.97	R 6.35	R 10.44	R 23.75	0.18
	Sunflower	R 94.94	R 86.47	R 142.21	R 323.62	2.42
	Other oilseeds	R 50.24	R 45.75	R 75.25	R 171.24	1.28
	Legumes	R 30.77	R 28.03	R 46.09	R 104.89	0.78
	Ffodder	R 41.65	R 37.93	R 62.39	R 141.97	1.06
Horticulture	Potatoes	R 275.00	R 250.46	R 411.90	R 937.36	7.00
	Beetroot	R 0.26	R 0.24	R 0.39	R 0.89	0.01
	Tomatoes	R 0.33	R 0.30	R 0.50	R 1.13	0.01
	Onions	R 10.19	R 9.28	R 15.26	R 34.72	0.26
	Pumpkins	R 7.03	R 6.40	R 10.53	R 23.97	0.18
	Carrots	R 5.99	R 5.46	R 8.98	R 20.43	0.15
	Cabbage	R 4.70	R 4.28	R 7.04	R 16.03	0.12
	Green beans	R 2.34	R 2.13	R 3.51	R 7.98	0.06
	Other vegies	R 7.80	R 7.10	R 11.68	R 26.59	0.20
	Fruits and nuts	R 14.94	R 13.61	R 22.38	R 50.93	0.38
	Other horticulture	R 10.31	R 9.39	R 15.44	R 35.13	0.26
Livestock	Dairy cattle	R 49.23	R 44.83	R 73.74	R 167.80	1.25
	Beef cattle	R 1,300.11	R 1,184.09	R 1,947.35	R 4,431.55	33.10
	Sheep and Goats	R 276.13	R 251.48	R 413.59	R 941.20	7.03
	Pigs	R 38.48	R 35.04	R 57.63	R 131.16	0.98
	Poultry	R 157.15	R 143.13	R 235.39	R 535.66	4.00
	Other livestock	R 12.81	R 11.67	R 19.19	R 43.67	0.33
Aquaculture	Aquaculture	R 0.00	R 0.00	R 0.01	R 0.01	0.00
Forestry	Forestry products	R 0.37	R 0.34	R 0.55	R 1.26	0.01
Others	Other products	R 1.45	R 1.32	R 2.17	R 4.94	0.04

Table 16 The impact of stimulating agriculture on sub-sector employment\*(Numbers)

Sectors	Commodities	Direct impact	Indirect impact	induced impact	Total impact	%of total
Field crops	Maize grain	23.59	15.42	19.02	58.03	27.33
	Grain Sorghum	0.82	0.39	0.45	1.66	0.78
	Wheat	6.68	17.20	7.65	31.53	14.85
	Barley	0.10	0.42	0.18	0.70	0.33
	Other cereals	0.14	0.29	0.18	0.61	0.29
	Sunflower	1.94	7.15	4.34	13.43	6.33
	Other oilseeds	1.02	2.52	1.82	5.37	2.53
	Legumes	0.63	3.74	3.28	7.65	3.60
	Ffodder	0.85	2.08	1.43	4.35	2.05
Horticulture	Potatoes	5.61	30.13	12.20	47.94	22.57
	Sweet potatoes	0.00	0.00	0.00	0.00	0.00
	Beetroot	0.01	0.06	0.02	0.09	0.04
	Tomatoes	0.01	0.05	0.03	0.08	0.04
	Onions	0.21	0.41	0.32	0.94	0.44
	Pumpkins	0.14	0.07	0.09	0.31	0.14
	Carrots	0.12	0.07	0.06	0.25	0.12
	Cabbage	0.10	0.06	0.06	0.22	0.10
	Green beans	0.05	0.02	0.04	0.11	0.05
	fruits	0.30	0.01	0.01	0.33	0.15
	Other horticulture	0.37	0.56	0.39	1.32	0.62
Livestock	Dairy cattle	1.00	0.00	0.00	1.00	0.47
	Beef cattle	26.53	0.00	0.00	26.53	12.49
	Sheep & goat	5.63	0.00	0.00	5.63	2.65
	Pigs	0.79	0.00	0.00	0.79	0.37
	Poultry	3.21	0.00	0.00	3.21	1.51
	Other livestock	0.26	0.00	0.00	0.26	0.12
Aquaculture	Aquaculture	0.00	0.00	0.00	0.00	0.00
Forestry	Forestry products	0.01	0.00	0.00	0.01	0.00
Others	Other products	0.03	0.00	0.00	0.03	0.01
Total		80.15				100

\*Note: The figures were not rounded to show even the infinitesimal impacts.

## APPENDICES

### A.1. Shares of commodities in each sector's output (%)

		aagco	aagsb	agmin	aomin	amveg	adairy	agrain	aofood	abeveg	atext	awood	apaper
		Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	Col.8	Col.9	Col.10	Col.11	Col.12
1	cagco	1.99	10.03	0.06	0.02	35.88	23.24	31.14	16.10	8.81	2.27	11.25	7.77
2	cagsb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	cgmin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	comin	0.12	0.09	0.17	0.18	0.38	0.40	0.47	0.48	0.08	0.27	0.04	0.59
5	cmveg	0.00	0.00	0.00	0.00	16.37	1.43	4.43	4.13	0.93	4.65	0.00	0.00
6	cdairy	0.00	0.00	0.00	0.00	0.04	4.73	0.35	1.27	0.18	0.00	0.00	0.00
7	cgrain	3.67	0.84	0.01	0.00	1.88	0.32	8.92	1.40	1.39	0.01	0.00	0.00
8	cofood	0.00	0.00	0.00	0.00	2.96	1.59	1.30	12.44	6.80	0.03	0.00	0.78
9	cbeveg	0.00	0.00	0.05	0.02	0.67	0.21	0.02	0.19	18.74	0.00	0.00	0.00
10	ctext	0.73	0.03	1.48	0.59	0.00	0.08	0.05	0.05	0.00	35.04	0.35	0.08
11	cwood	0.17	0.56	3.22	0.10	0.05	0.09	0.06	0.03	0.05	0.10	17.84	3.75
12	cpaper	0.26	0.00	0.13	0.06	1.65	3.06	0.51	1.03	5.44	0.92	2.42	31.93
13	cpubpr	0.00	0.00	0.03	0.02	0.02	1.14	2.01	0.30	0.03	0.02	0.04	0.03
14	cchem	6.43	0.00	5.27	3.32	4.62	1.78	3.73	2.25	3.06	11.02	3.48	14.55
15	crubber	0.07	0.00	0.35	0.51	0.00	4.42	1.69	0.25	0.00	0.00	0.01	0.01
16	cnmetls	0.14	0.00	0.90	0.24	1.15	0.08	0.12	0.11	0.47	0.52	0.17	0.04
17	cmetl	0.03	0.00	0.54	0.12	0.07	0.14	0.00	1.01	0.00	0.06	0.37	0.24
18	cometls	0.26	0.00	1.50	0.58	1.25	1.16	0.20	0.19	0.70	1.49	0.41	0.03
19	cmach	0.90	0.00	3.50	2.25	1.02	1.62	1.07	0.68	0.44	0.72	0.15	0.75
20	celctma	0.08	0.00	0.81	0.55	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00
21	ccomeq	0.00	0.00	0.34	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	cmantr	1.26	0.00	1.26	1.23	1.15	1.27	1.96	1.57	0.20	0.46	0.05	0.31
23	coman	0.00	15.35	0.08	0.04	0.07	0.00	0.01	0.00	0.05	0.08	0.05	0.08
24	celect	0.24	1.12	3.94	0.86	1.17	0.78	1.10	0.35	0.42	0.78	0.24	0.38
25	cwater	0.07	0.18	0.16	0.10	0.21	0.15	0.08	0.11	0.27	0.12	0.04	0.03
26	cbuldg	0.09	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	coconst	0.09	0.46	1.09	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	ctrade	1.08	7.56	1.21	1.67	3.14	3.38	5.14	0.73	0.62	1.47	3.11	1.00
29	caccod	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.01
30	ctrans	5.11	5.04	0.71	26.27	0.61	0.60	0.56	14.14	0.47	0.79	0.59	1.14
31	ccomm	0.01	0.00	0.16	0.15	0.37	0.55	0.54	0.26	0.30	0.36	0.13	0.41
32	cinsure	0.98	2.38	0.52	0.46	2.61	0.84	1.12	0.97	0.80	1.47	0.38	1.01
33	creste	0.01	0.02	0.06	0.03	1.38	0.63	1.08	0.36	0.73	1.17	0.55	2.00
34	cbusa	0.04	0.09	2.99	0.99	4.18	8.65	5.92	3.06	6.56	5.02	0.81	3.97
35	cggov	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	chswk	0.46	0.28	7.81	5.09	5.80	12.39	4.23	3.81	7.03	7.08	0.73	3.83
37	cacsr	22.30	13.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.98	0.00

Source: Free State SAM 2004

*A.1 Shares of commodities in each sector's output continues (%)*

		apubpr	achem	arubber	anmetls	ametl	aometls	amach	aelctma	acomeq	amantr	aoman	Aelect
		13	14	15	16	17	18	19	20	21	22	23	24
1	cagco	0.02	0.51	11.06	0.23	0.01	0.09	0.24	0.43	2.13	0.29	24.98	0.05
2	cagsb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	cgmin	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.14	0.00
4	comin	0.01	15.01	1.05	14.74	0.38	1.94	0.48	0.30	0.00	0.01	2.67	12.48
5	cmveg	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.06
6	cdairy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.01
7	cgrain	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.93	0.01
8	cofood	0.01	0.13	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	1.88	0.02
9	cbeveg	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	ctext	0.24	0.15	3.03	0.16	0.05	0.13	0.06	0.12	0.15	5.11	2.77	0.14
11	cwood	0.07	0.18	0.12	0.19	0.59	0.46	0.19	0.68	0.16	0.25	3.96	0.19
12	cpaper	27.03	0.64	1.83	2.12	0.42	0.43	0.42	0.63	0.88	0.22	1.07	0.07
13	cpubpr	9.91	0.03	0.05	0.04	0.00	0.02	0.05	0.03	0.03	0.00	0.00	0.05
14	cchem	10.42	32.29	25.71	3.60	1.86	4.92	3.71	14.59	2.31	6.11	2.78	0.76
15	crubber	0.01	0.00	0.23	0.00	0.10	0.03	0.44	0.08	0.01	2.23	0.10	0.00
16	cnmetls	0.06	0.59	1.08	9.18	0.99	0.25	0.43	1.83	0.07	1.00	0.10	0.09
17	cmetl	0.09	0.33	1.97	2.39	60.20	43.90	19.94	19.34	2.54	6.54	3.51	0.37
18	cometls	0.09	0.64	1.96	0.76	7.39	1.02	5.37	0.87	0.34	2.36	0.62	0.48
19	cmach	4.81	1.51	3.51	1.87	0.42	1.49	21.38	0.61	0.35	1.45	0.16	0.83
20	celctma	0.00	0.01	0.00	0.00	0.35	2.56	5.24	21.69	14.86	5.02	0.12	4.80
21	ccomeq	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	30.17	0.15	0.00	0.06
22	cmantr	0.24	0.35	0.43	0.49	0.10	0.46	0.72	0.40	0.37	49.66	0.10	0.42
23	coman	0.03	0.10	0.37	0.10	0.01	0.05	0.15	0.10	2.77	0.01	12.25	0.02
24	celect	0.27	1.68	2.82	1.03	0.24	1.38	0.70	0.42	0.47	0.08	0.25	7.73
25	cwater	0.02	0.34	0.22	0.05	0.03	0.04	0.08	0.02	0.04	0.01	0.02	0.24
26	cbuldg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18
27	coconst	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.22
28	ctrade	0.77	1.39	1.37	1.64	0.32	1.48	2.35	1.30	1.16	0.25	2.32	1.11
29	caccod	0.01	0.02	0.03	0.02	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.18
30	ctrans	0.73	8.25	1.46	11.87	0.14	1.00	1.31	1.11	0.70	0.14	3.15	1.78
31	ccomm	0.33	0.31	0.56	0.47	0.06	0.70	0.71	0.39	0.31	0.06	0.11	0.47
32	cinsure	0.76	0.85	0.85	1.56	0.34	1.23	0.93	0.73	1.93	0.50	0.17	4.27
33	creste	1.10	1.41	1.00	1.42	0.25	1.20	2.05	1.46	1.80	0.16	0.32	0.16
34	cbusa	2.17	3.28	6.26	5.21	0.53	2.87	3.71	4.34	2.79	0.40	1.23	0.62
35	cggov	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
36	chswk	2.97	4.97	6.04	6.12	0.53	2.85	3.98	2.93	2.65	0.31	1.58	0.09
37	cacsr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86

Source: Free State SAM 2004

*A.1 Shares of commodities in each sector's output continues (%)*

	awater	abuldg	aoconst	atrade	aaccod	atrans	acomm	ainsure	areste	abusa	aggov	ahswk	aacsr
	25	26	27	28	29	30	31	32	33	34	35	36	37
cagco	0.00	0.00	0.02	0.01	4.66	0.01	0.00	0.00	0.00	0.03	0.04	0.16	0.15
cagsb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cgmin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
comin	2.21	1.18	2.72	0.00	0.10	0.11	0.00	0.00	0.06	0.00	0.03	0.10	0.09
cmveg	0.00	0.00	0.00	0.01	11.32	0.02	0.00	0.00	0.00	0.10	0.04	0.20	0.08
cdairy	0.00	0.00	0.00	0.05	5.64	0.01	0.00	0.00	0.01	0.02	0.01	0.05	0.03
cgrain	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
cofood	0.00	0.00	0.00	0.07	1.96	0.01	0.00	0.00	0.01	0.10	0.01	0.07	0.07
cbeveg	0.00	0.00	0.00	0.00	7.59	0.10	0.00	0.00	0.00	0.00	0.01	0.00	0.00
ctext	0.07	0.81	0.36	0.48	0.67	0.61	1.97	0.02	0.85	0.10	0.19	1.16	0.39
cwood	0.20	4.27	0.49	0.17	0.28	0.33	0.00	0.00	0.00	0.00	0.03	0.04	0.16
cpaper	0.27	0.28	0.48	1.33	0.09	0.56	0.14	0.34	0.14	0.55	0.07	0.35	0.42
cpubpr	0.56	0.10	0.04	1.31	0.46	0.12	1.17	0.85	0.71	0.89	0.12	0.66	0.53
cchem	4.82	3.52	5.11	1.10	3.64	8.83	1.39	0.29	3.59	1.58	0.84	9.39	0.95
crubber	0.23	0.00	0.00	0.01	0.00	1.33	0.10	0.03	0.00	0.03	0.02	0.17	0.02
cnmetls	0.38	9.89	12.05	0.20	1.47	0.36	0.04	0.00	0.65	0.13	0.07	0.04	0.12
cmetl	0.94	5.30	6.39	0.00	0.00	0.20	0.00	0.00	0.11	0.02	0.02	0.00	0.00
cometls	0.52	1.14	1.34	0.18	0.34	0.08	0.25	0.01	0.36	0.08	0.04	0.04	0.10
cmach	2.60	0.85	2.03	0.24	0.06	0.28	0.70	0.00	0.07	0.63	0.06	0.00	0.17
celctma	1.92	9.45	4.09	0.09	0.41	0.35	0.42	0.03	0.50	0.25	0.20	0.17	0.13
ccomeq	1.94	0.00	0.00	0.03	0.19	0.08	6.65	0.25	0.34	1.46	0.48	4.71	0.74
cmantr	0.00	0.00	0.00	0.23	0.00	6.43	0.35	0.11	0.06	0.23	1.23	0.38	2.25
coman	3.41	2.11	1.24	0.74	0.36	1.18	0.32	0.53	0.44	0.93	0.13	1.36	1.17
celect	4.72	0.14	0.24	0.41	2.74	0.86	0.66	0.17	0.50	0.05	0.04	0.37	0.41
cwater	26.56	0.05	0.05	0.06	0.54	0.12	0.06	0.04	0.34	0.01	0.02	0.16	0.05
cbuldg	0.00	18.09	4.15	0.76	0.30	0.48	0.00	0.13	3.00	0.13	0.09	0.38	0.17
coconst	0.00	9.73	8.18	0.11	0.00	0.18	0.00	0.00	0.89	0.00	0.10	0.11	0.03
ctrade	1.38	2.43	1.40	16.49	0.84	12.99	18.08	1.26	4.21	11.28	0.40	6.74	4.39
caccod	0.10	0.00	0.00	0.22	0.04	0.67	0.00	0.04	0.10	0.60	0.06	0.31	0.45
ctrans	4.46	1.36	1.32	5.44	0.31	1.37	5.32	0.77	0.18	4.65	0.56	2.09	1.38
ccomm	1.14	1.12	1.37	4.70	1.06	2.01	17.04	0.81	1.78	4.44	0.34	2.60	1.56
cinsure	2.72	1.92	3.50	4.44	1.22	6.63	0.39	13.60	5.36	3.71	0.29	0.86	1.66
creste	0.76	0.64	0.72	4.26	7.40	0.97	0.78	1.56	2.14	4.60	0.15	4.39	1.07
cbusa	1.92	3.46	8.29	3.49	5.67	3.31	0.46	3.16	5.49	6.41	0.79	5.80	2.13
cggov	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	1.65	0.00	16.21	10.98	0.00
chswk	0.56	1.23	2.56	0.60	1.05	2.10	0.62	0.33	2.95	1.34	0.10	0.59	0.97
cacsr	0.00	0.00	0.00	0.00	0.00	3.48	0.00	13.97	0.00	12.16	11.24	3.92	17.14

Source: Free State SAM 2004

## A.2 SAM legend

<b>Aggregate symbol</b>	<b>Symbol</b>	<b>Description</b>
Aagr	Aagco	<i>Agriculture - Commercial</i>
	Aagsb	<i>Agriculture - Subsistence</i>
Amin	Agmin	<i>Gold mining</i>
	Aomin	<i>Other mining</i>
Aagpro	Amveg	<i>Meat, Fish, Fruit, Vegetables, Oils and Fat Products</i>
	Adairy	<i>Dairy products</i>
	Agrain	<i>Grain Mill, Bakery and Animal Feed Products</i>
	Aofood	<i>Other food products</i>
Aman	Abeveg	<i>Beverages and tobacco products</i>
	Atext	<i>Textiles, Clothing, Leather Products and Footwear</i>
	Awood	<i>Wood and Furniture Products</i>
	Apaper	<i>Paper and Paper Products</i>
	Apubpr	<i>Publishing and Printing</i>
	Achem	<i>Chemicals &amp; Chemical Products (incl Plastic Products)</i>
	Arubber	<i>Rubber Products</i>
	Anmetls	<i>Non-Metallic Mineral Products</i>
	Ametl	<i>Basic and Structural Metal Products</i>
	Aometls	<i>Other Fabricated Metal Products</i>
	Amach	<i>Machinery &amp; Equipment</i>
	Aelctma	<i>Electrical Machinery &amp; Apparatus</i>
	Acomeq	<i>Communication, Medical and other Electronic Equipment</i>
	Amantr	<i>Manufacturing of Transport Equipment</i>
Aoman	<i>Other Manufacturing &amp; Recycling</i>	
Autility	Aelect	<i>Electricity</i>
	Awater	<i>Water</i>
Acons	Abuldg	<i>Buildings</i>
	Aoconst	<i>Other construction</i>
Atatrn	Atrade	<i>Trade</i>
	Aaccod	<i>Accommodation</i>
	Atrans	<i>Transport services</i>
Aprv	Acomm	<i>Communications</i>
	Ainsure	<i>Insurance</i>
	Areste	<i>Real estate</i>
	Abusa	<i>Business activities</i>
Apubs	Aggov	<i>General Government</i>
	Ahswk	<i>Health and social work</i>
	Aacsr	<i>Activities/services</i>
Cagr	Cagco	<i>Agriculture - Commercial</i>
	Cagsb	<i>Agriculture - Subsistence</i>
Cmin	Cgmin	<i>Gold mining</i>
	Comin	<i>Other mining</i>

A.2SAM legend continues

Cagpro	Cmveg	<i>Meat, Fish, Fruit, Vegetables, Oils and Fat Products</i>
	Cdairy	<i>Dairy products</i>
	Cgrain	<i>Grain Mill, Bakery and Animal Feed Products</i>
	Cofood	<i>Other food products</i>
Cman	Cbeveg	<i>Beverages and tobacco products</i>
	Ctext	<i>Textiles, Clothing, Leather Products and Footwear</i>
	Cwood	<i>Wood and Furniture Products</i>
	Cpaper	<i>Paper and Paper Products</i>
	Cpubpr	<i>Publishing and Printing</i>
	Cchem	<i>Chemicals &amp; Chemical Products (incl Plastic Products)</i>
	Crubber	<i>Rubber Products</i>
	Cnmetls	<i>Non-Metallic Mineral Products</i>
	Cmetl	<i>Basic and Structural Metal Products</i>
	Cometls	<i>Other Fabricated Metal Products</i>
	Cmach	<i>Machinery &amp; Equipment</i>
	Celctma	<i>Electrical Machinery &amp; Apparatus</i>
	Ccomeq	<i>Communication, Medical and other Electronic Equipment</i>
	Cmantr	<i>Manufacturing of Transport Equipment</i>
Coman	<i>Other Manufacturing &amp; Recycling</i>	
Cutility	Celect	<i>Electricity</i>
	Cwater	<i>Water</i>
Ccons	Cbuldg	<i>Buildings</i>
	Coconst	<i>Other construction</i>
Ctatns	Ctrade	<i>Trade</i>
	Caccod	<i>Accommodation</i>
	Ctrans	<i>Transport services</i>
Cprvs	Ccomm	<i>Communications</i>
	Cinsure	<i>Insurance</i>
	Creste	<i>Real estate</i>
	Cbusa	<i>Business activities</i>
Cpubs	Cggov	<i>General Government</i>
	Chswk	<i>Health and social work</i>
	Cacsr	<i>Activities/services</i>
Lab-sk	Lab-sk	Labour-Skilled
Lab-ssk	Lab-ssk	Labour-Semi-skilled
Lab-usk	Lab-usk	Labour-Unskilled
Cap	Cappube	Capital-Public enterprise
	Capprive	Capital-Private business enterprise
	Captaxi	Capital-Combi-taxi enterprise
	Capinfe	Capital-Informal enterprise

Source: Free State SAM 2004

*A.2 SAM Legend continues*

Linc	Linc	E1-Low income group
Lminc	Lminc	E2-Low middle income group
Mdinc	Mdinc	E3-Middle income group
Hmdinc	Hmdinc	E4-High middle income group
Highinc	Highinc	E5-High income group
Ent	Entpub	Enterprise-Public enterprise
	Entbus	Enterprise-Business enterprise
	Enttax	Enterprise-Taxi enterprise
	Entinfl	Enterprise-Informal enterprise
Gov-nat	Govnat	Govt-National
Gov-prov	Govpo	Govt-Provincial
	Govpe	Govt-Provincial-Education
	Govph	Govt-Provincial-Health
	Govpw	Govt-Provincial-Welfare
	Govpec	Govt-Provincial-Economics
	Govpo	Govt-Provincial Others
Gov-loc	Govloc	Govt-Local
S-I	S-IGOV	Capital account (Investment)-Govt.
	S-IOTH	Capital account(Investment)-Others
RSA	RSA	Rest of South Africa
ROW	ROW	Rest of the world

Source: Free State SAM 2004