

The Role of the Agricultural Sector in the South African Economy

by

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Declaration

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Abstract

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The importance of the agricultural sector in the South African economy is often stressed by farmers and agricultural industry organisations. The reality, however, is that the sector has constituted less than 3% of the economy since 2005 (DAS, 2012). It is therefore important that the current role of the agricultural sector in the South African economy is investigated. This has been the subject of a number of studies. The most comprehensive study to date was undertaken by Brand (1969) within the well-known framework of Johnston and Mellor (1961). A number of less comprehensive studies have followed. This is the second comprehensive analysis of the role of the agricultural sector in the South African economy. This study reapplies Brand's (1969) framework to the data currently available. The results are contrasted with those obtained by Brand (1969) and other authors, in order to establish whether, and if so how, the role of the sector has changed in the last 50 years. The results obtained are then incorporated into policy suggestions.

The findings of this thesis are, firstly, that the agricultural sector has been unable to meet the demand for the main food items consumed domestically since 2000. This, however, did not result in the predicted rapid increase in food and general inflation. Secondly, agricultural exports have not played a growth-leading, but rather a balancing role in economic development, because the sector maintained a positive trade balance during the full period of analysis. Thirdly, the sector has released labour to the rest of the economy since 1962, thereby fulfilling what is seen as a requirement by the economic development literature. Fourthly, the sector has probably made a net transfer of capital to the rest of the economy since the mid-2000s. Lastly, the agricultural sector plus the sectors with which it has the strongest linkages represented around 7% of the economy in 2010.

This study concurs with Brand's (1969) main conclusion that the South African agricultural sector does not play a growth-leading or initiating role in the economy, but rather a growth-permissive role. This is due to the sector's relatively small quantitative significance in the economy, which limits the growth impact of agricultural exports, capital transfers from the sector and linkages with the rest of the economy. The sector plays a growth-enabling role, however, by supplying food to consumers at the lowest possible price - either by producing it domestically, or by affording food imports with the exchange earned through the export of agricultural produce. In addition, the sector has an important role in providing employment, especially in rural areas.

It is recommended that the current agricultural marketing and international trade policy framework, which is conducive to international trade and limits market distortions, is retained. The sector has the potential, given the adoption of the required policy, to create employment by virtue of its relatively high labour intensity and the existence of some complementarities between capital and labour in the sector. Also, the competitiveness of the sector should be increased by means of an investment in infrastructure.

Uittreksel

Die Rol van die Landbousektor in die Suid Afrikaanse Ekonomie

(“The Role of the Agricultural Sector in the South African Economy”)

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Die belangrikheid van die landbousektor in die Suid-Afrikaanse ekonomie word dikwels deur boere en bedryfsorganisasies benadruk. Die realiteit is egter dat die sektor sedert 2005 minder as 3% van die ekonomie uitmaak (DAS, 2012). In die lig hiervan is dit belangrik dat die huidige rol van die landbousektor in die Suid-Afrikaanse ekonomie ondersoek word. Dít was al die tema van verskeie studies, waarvan die mees omvattende tot op hede deur Brand (1969) binne die bekende raamwerk van Johnston en Mellor (1961) aangepak is. Verskeie minder omvattende studies het sedertdien gevolg.

Hierdie tesis is dan die tweede omvattende analise van die rol van die landbousektor in die Suid-Afrikaanse ekonomie. Brand (1969) se raamwerk word op die huidige data toegepas. Die resultate word dan met dié van Brand (1969) en ander navorsers vergelyk om vas te stel of, en indien wel hoe, die rol van

die sektor verander het oor die afgelope 50 jaar. Hierna word die resultate in beleidsvoorstelle geïnkorporeer.

Daar word eerstens bevind dat die landbousektor sedert 2000 nie in staat is om in die binnelande vraag na die hoof-voedselsoorte wat plaaslik verbruik word, te voorsien nie. Dit het egter nie tot die voorspelde sterk toename in voedsel- en algemene inflasie gelei nie. Tweedens het landbou-uitvoere nie 'n leidende rol in ekonomiese groei gespeel nie, maar eerder 'n balanserende rol vervul aangesien die sektor gedurende die volle periode van analise 'n positiewe handelsbalans gehandhaaf het. Derdens het die sektor arbeid aan die res van die ekonomie beskikbaar gestel, soos vereis in die ekonomiese ontwikkelings literatuur. Vierdens het die sektor waarskynlik sedert die middel-2000's 'n netto-bydrae kapitaal aan die res van die ekonomie gemaak. Laastens het die sektor, tesame met die sektore waarmee dit die sterkste skakels het, in 2010 sowat 7% van die ekonomie uitgemaak.

Hierdie studie stem met Brand (1969) se hoofbevinding saam, naamlik dat die Suid-Afrikaanse landbousektor nie 'n groei-inisiërende rol in ekonomiese groei speel nie, maar eerder 'n groei-vergunnende een. Dít is 'n gevolg van die sektor se klein kwantitatiewe omvang in die ekonomie, wat die impak wat landbou-uitvoere, kapitaaloordragte en die sektor se skakels met die res van die ekonomie op makro-ekonomiese groei het, beperk. Die sektor stel egter ekonomiese groei in staat deur voedsel teen die laagste moontlike prys aan verbruikers te verskaf - óf deur dit plaaslik te produseer, óf deur die invoer daarvan te bekostig met die buitelandse valuta wat deur middel van landbou-uitvoere verdien word. Verder het die sektor ook 'n belangrike rol as werkverskaffer, veral in plattelandse gebiede.

Daar word voorgestel dat die huidige landboubemarkings- en internasionale handelsbeleid, wat internasionale handel bevorder en markverwringing beperk, behou word. Gegewe dat die vereiste beleid ingestel word, het die sektor die potensiaal om werk te skep weens die betreklik hoë arbeidsintensiteit, en die moontlikheid om arbeid en kapitaal in sommige gevalle op 'n komplementêre wyse aan te wend, wat in die sektor bestaan. Die mededingendheid van die sektor moet ook verskerp word deur middel van staatsinvestering in infrastruktuur.

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Dedications

This thesis is dedicated to my dearest Mother.

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Chapter 1

Introduction

The importance of the agricultural sector in the South African economy is often stressed by farmers and agricultural industry organisations. These stakeholders cite considerations such as the role of the sector in providing food, employment and foreign exchange earnings. They often base their arguments about the sector's importance on its significance to the South African economy. The reality, however, is that the sector has constituted less than 3% of the economy since 2005 (DAS, 2012). Nevertheless, to argue that the sector is more significant than its actual share in the economy is understandable given that the sector utilised 82.3% of the total available land in 1991¹ (DAS, 2012) and consumed 60% of the available water for irrigation purposes (Blignaut *et al.*, 2009). It is therefore imperative that the role of the agricultural sector is investigated in order to place its actual contribution to the economy in perspective. This has become even more important in recent times due to increased government attention to the sector, specifically in accessing the sector's potential to create employment (DTI, 2009; NPC, 2010, 2011).

The contribution or role of the agricultural sector in the South African economy has been the subject of a number of studies over many years. The most comprehensive study to date was conducted by Brand (1969) within the well-known Johnston and Mellor (1961) framework. A number of studies followed, including Van Zyl *et al.* (1988), Van Rooyen (1997) and Oosthuizen (1998).

¹More current data is unavailable, but it can be assumed that this figure is at present somewhat lower due to the removal of agricultural land for conservation and mining purposes.

The study by Van Zyl *et al.* (1988) in the main reapplied Brand's framework to the sector, but it was not as comprehensive. Van Zyl *et al.* (1988) reached similar conclusions, except that they stressed the importance of the agricultural sector as a provider of employment. The conclusions of this article remain as the main premises for the current view on the role of the sector in South Africa and it continues to be cited (e.g. (Liebenberg and Pardey, 2010)) due to the lack of more recent work. It is possible, however, that the conclusions reached by Brand and Van Zyl *et al.* may not be valid within the current context. This may be due to the drastic changes that the South African economy, and more importantly the agricultural sector, have undergone since the mid-1980s. This includes the application and removal of international sanctions, the deregulation of agricultural marketing and the liberalisation of trade, and the reduction of government support to the sector.

Another factor is the decline in the relative share of the agricultural sector in the economy. One of the main points argued by Brand (1969) was that of the limited impact of the agricultural sector in the economic development of South Africa due to its relatively small share in the economy. Van Zyl *et al.* (1988) also agreed with this conclusion, yet added that the overall impact on the economy of a reduction in agricultural output is twice as great as the direct impact of the reduction. The share of the sector declined from 7.7% of gross domestic product (GDP) in 1969 (Brand's study), to 5.3% in 1988 (Van Zyl *et al.*'s study) and to the current level of below 3% (DAS, 2012). It is therefore possible that the sector has declined (in relative terms) to such an extent that its impact on the economy is almost negligible.

1.1 Objectives of this study

This study is the second comprehensive analysis of the role of the agricultural sector in the South African economy. The objectives of this study are fourfold. The first is to provide an overview of the theory of the role of the agricultural sector in economic development in order to contextualise the analytical framework applied by Brand (1969). The second is to apply Brand's framework to the data currently available in order to establish the role of the sector according to the respective themes. These results will be contrasted with those obtained

by Brand (1969) and Van Zyl *et al.* (1988) in order to establish whether, and if so, how the role of the sector has changed since their work was published. The third is to incorporate the results obtained into the formulation of policy tailored to optimise and expand the role of the sector. The fourth is to establish themes that will require further research and to provide a critique on the framework of analysis used.

1.2 Outline of the study

In the first chapter an overview of the theories that address the role of the agricultural sector in economic development, and their evolution over time, will be provided. This is important for the contextualisation of the arguments made by Brand (1969) and those that are to follow in this thesis. This chapter will also provide an overview of the findings of South African research on the subject. These findings will be revisited in the subsequent chapters in order to establish whether they remain valid.

In chapter 3 the role of the agricultural sector as a source of food is analysed. The aim is to establish whether the sector was able to meet the domestic food demand during the period of analysis. In chapter 4 the spotlight is turned to agricultural exports in order to determine whether they play a growth-leading, balancing or growth-retarding role in the South African economy. In chapter 5 the focus turns to agricultural labour with the question whether the sector transferred labour to or received labour from the rest of the economy. In chapter 6 the capital transfers between the agricultural sector and the rest of the economy is analysed in order to establish the direction of the net flow of these transfers. For this purpose the chapter will examine government transfers to the sector, the capital intensity of and investment by the sector, and the direction of the sector's net capital transfers. In chapter 7 the linkages between the agricultural sector and the rest of the economy are analysed. Chiefly under investigation are the sector's production linkages, but the sector's consumption, factor and productivity linkages are also touched on. Chapter 8 contains a summary of the results of the study, provides a synthesis of those results, and a discussion of the policy implications of the study's findings. The chapter

will conclude with a critique of the framework applied by the study and make suggestions for future research.

1.3 Limitations of the study

This study is concerned with the role of the agricultural sector in economic development as understood during the 1960s and early 1970s. During this period most scholars did not concern themselves with economic development as it is understood today, but rather focussed more narrowly on economic growth (refer to chapter 2 for a full explanation). Research from the mid-1970s onwards, however, follows a multifactor approach that focuses more strongly on the economic development aspects of the sector such as poverty alleviation; household food security, the provision of environmental services; rural out-migration control; buffer in times of economic crisis and national cultural identity (Hazell and Thurlow, 2007; FAO, 2007). Some studies also focus on the role of the sector in the rural non-farm economy through its various linkages (Haggblade, 1989; Haggblade *et al.*, 1991; Haggblade and Hazell, 2007). These considerations are deliberately excluded by this study, mainly because the primary purpose of this study is to revisit and update the research undertaken by Brand (1969), rather than expanding on his argument. Taking this study beyond this narrow focus would require considerable additional research and move this thesis beyond its mandate.

The primary period of analysis for this study is the period 1970 to 2010 and an attempt is made to provide time series data for this period where possible. There are two reasons for limiting the focus to this period. The first is that data prior to this period is sparse for many of the required variables. The second is that Brand (1969) already covered the period 1910 to 1965/6 and therefore an analysis of this period would merely repeat his work. The data and/or results provided by Brand (1969) are included for comparative purposes where applicable. They enable but a crude comparison, however, due to differences in definition, estimation, deflation, calculation and other considerations. Time series data prior to this period is provided in cases where relevant to the argument concerned.

It has to be mentioned that there are some issues with the data available for this period. The *Directorate of Agricultural Statistics* serves as a reasonably reliable source of data until the mid-1990s, but thereafter the data becomes more dubious. The most systematic analysis of data on the sector has been done by Frikkie Liebenberg for his PhD. Liebenberg provided me with some of his data and where it has been published, I have incorporated it. However, his PhD has not been published, which necessitated the use of other data sources. BFAB is a reliable source, but only provides data on a limited number of commodities and only since 2000. In some instances data provided by the *Directorate of Agricultural Statistics* were used in conjunction with those provided by SAGIS. Reliable agricultural trade data are also difficult to come by, especially quantitative data. In this case the data provided by the FAO-Stat, ITC and Trade map were utilised. A thorough investigation into the reliability of the data provided by the respective sources falls beyond the scope of this thesis. One can also argue that the general trend in the data is more important than the exact figures due to the broad, long-term approach of this thesis.

This study does not distinguish between the commercial and traditional agricultural sector, but regards the sector as a whole. No distinctions are made between the two respective sectors and most of the datasets include the data of both. One of the main data sources used is the *Abstract of Agricultural Statistics* as published by the Directorate of Agricultural Statistics. This publication includes the traditional sector in the calculation of the gross value of agricultural production in all the periods calculated, but includes these areas in commodity-specific production data only after 1994 (Liebenberg, 2012*a*).

Chapter 2

A Review of the Theory and South African Studies

Condensing the theory on the role of agriculture in economic development into a couple of pages is no simple task, especially in light of the changing perceptions about this role over time. The first section of this chapter will give a brief outline of this body of literature. The second section will give an overview of the application of this theory to the South African context and the last section will conclude the chapter.

2.1 The theory on the role of agriculture in economic development

At the dawn of the industrial revolution, no formal theory of the role of agriculture in economic development existed, because there was no development other than that of agriculture. It is estimated that at the beginning of the 19th century, approximately 75-90% of the working population in the now-developed world was still engaged in farming (Johnson, 1997). In the United States the urban population exceeded 10% of the total population only by 1830 (Johnson, 1997). During the 18th century French physiocrats argued that agriculture was the only productive activity in which one could engage, while in the United States Thomas Jefferson famously stated that farming is the sole foundation

of democracy (Timmer, 2002). It was also during this period that one of the foundations of the role of the agricultural sector in development was laid down by none other than Adam Smith (1776, 140):

[W]hen by the improvement and cultivation of land and labour one family can provide food for two; the labour of half the society becomes sufficient to provide food for the whole. The other half, therefore, or at least the greater part of them, can be employed in providing other things, or in satisfying the other wants and fancies of mankind.

The rise of the town and city thus only became possible after land and labour productivity improved sufficiently for families to be able to produce more than what they themselves could consume (Johnson, 1997). And this is exactly what happened: during the mid-19th century agricultural output in the United Kingdom was greatly increased by the introduction of the humble parsnip, which enabled rotational production practices (Nurkse, 1961). This simple innovation greatly increased soil fertility, thereby increasing land productivity directly and labour productivity indirectly. This enabled a farmer to produce more than what his household could consume, which released labour from the farms and ultimately led to the industrial revolution. The industrial revolution in turn developed mechanical and other labour productivity-enhancing innovations that enabled agriculture to release even more labour (Boserup, 1965). Note, however, that this was the development model of countries that experienced a labour shortage - countries such as Great Britain, the United States, Japan, etc.

During the 20th century economists in the developed world turned their attention to the question of how to replicate this economic development in the less-developed world. Some classical economists regarded the agricultural sector as “*the home of traditional people, ways and living standards*” (Timmer, 2002, 1511). The agricultural sector was therefore viewed by these classical economists as a traditional sector with low productivity, and which only contributed passively to economic growth through the provision of food, labour and capital to the rest of the economy (Hazell and Thurlow, 2007). These

theorists regarded economic development as a systematic process that reallocated the factors of production from the primary/traditional sector to the modern sector, the latter enjoying higher productivity and returns (Adelman, 2001). These theorists also regarded an investment in the modernisation of agriculture as unnecessary, because the sector would decline naturally as the economy modernised (Timmer, 2002). This sentiment towards the sector was not helped by the structural property of development that determines that the sector's share in the economy decreases with increasing development. This is due to Engels's law, which states that in a closed economy with constant prices, the income elasticity of demand for food is less than one. Therefore, if an individual's income increases, the percentage share of that person's expenditure on food will decrease. If this effect is aggregated, it can be deduced that the total value of sales by farmers will grow at a slower rate than the rate of growth of GDP (Timmer, 1988). Ultimately this sentiment led to the development of an extractionist policy toward the sector, according to which

agriculture was thought to provide the only source of productivity which could be tapped quickly to fuel the drive for modernisation, implicitly a drive that took place in cities and factories. Surplus labour, surplus savings, and surplus expenditure to buy the products of urban industry and even foreign exchange to buy machines to make them, could be had from an uncomplaining agricultural sector. Nothing more was needed to generate these resources than the promise of jobs in the cities and a shared nationalistic pride in the growing power of the state. (Timmer, 2002, p.1511)

The sentiment towards the sector started to shift during the 1950s, however, due to the work of authors such as Lewis (1954). Lewis still argued that the agricultural sector had to transfer capital and labour to the rest of the economy, but added that an industrial revolution only occurred in conjunction with an agrarian revolution. He argued that an agrarian revolution that would lead to productivity increases is essential to ensure a sufficient food supply for sustained economic growth. The role of agriculture therefore is to ensure that the "Ricardian trap" is avoided: an insufficient food supply would raise food prices, which in turn would raise wages and reduce economic growth due to

a reduction in the available development capital. Agricultural productivity therefore only had to expand at a rate faster than the population growth rate (Hazell and Thurlow, 2007). These models still attributed a passive-permissive role to the agricultural sector in economic development.

The shift in the sentiment toward the role of the agricultural sector in economic development continued in the 1960s. This came on the back of the positive results of the green revolution, which clearly showed that the agricultural sector can play an active role in economic development (Hazell and Thurlow, 2007). The green revolution also showed that the agricultural sector can be rapidly transformed into a modern sector through the adoption of science-based technology, as argued by Schultz (1964). This period also saw the publication of a seminal article by Johnston and Mellor (1961), which highlighted the role of agriculture in economic development. Johnston and Mellor (1961) made a clean break from the extractive approach by presenting agriculture as a driver of economic growth, *especially during the early stages of industrialisation*. They argue for a “balanced growth”¹ approach according to which both the agricultural and industrial sectors are promoted. This calls for agricultural development in such a way that it minimises the sector’s demand for the resources needed for industrialisation, whilst its contribution to economic growth is maximised. They also break from the analytical approach and present their arguments under five functional headings that emerge from the empirical evidence. The roles of the agricultural sector were presented as follows:

- Increasing the food supply for domestic consumption
- Releasing labour for industrial employment
- Enlarging the market for industrial output
- Increasing the supply of domestic savings
- Earning foreign exchange through agricultural exports

The role of the agricultural sector as a source of food, labour and capital is to some extent consistent with the prior extractionist view of the agricultural

¹Not in the Nurksean sense. See chapter 7.

sector. The difference, however, is that Johnston and Mellor (1961) attached an equal weight to all the various roles (Timmer, 2002), and in their view the agricultural sector had an active and not a passive role in the process of economic growth (Hazell and Thurlow, 2007).

One branch of the “new theory” concerned itself with agricultural trade and argued that it could play one of three roles in economic growth, namely a growth-leading role, a balancing or growth-enabling role, or a growth-lagging or retarding role

Another branch of the “new theory” that developed during the late 1950s highlighted the intersectoral linkages between the agricultural sector and the rest of the economy (Hirschman, 1958; Nicholls, 1963; Schultz, 1964; Hayami and Ruttan, 1970). A number of subthemes were developed within linkage theory. The first was that of production linkages, identified by Hirschman (1958). He was the first to draw attention to the backward and forward production linkages between the agricultural sector and the rest of the economy. He argued that the achievement of “sustained and reliable surpluses” by the agricultural sector was essential to economic growth because of the sector’s production linkages with the rest of the economy (Nicholls, 1963). Later research showed that the production linkages of the agricultural sector strengthened as the economy modernised, but declined in relative importance along with the agricultural sector’s share in the economy (Brand, 1969; Haggblade, 1989).

The theory of agricultural linkages was also extended to include consumption linkages. Johnston and Mellor (1961) identified these consumption linkages as one of the roles of the agricultural sector in their seminal article. Mellor (1966) later expanded on these consumption linkages, arguing that increased rural production leads to increased rural income, which stimulates industrialisation through increased demand for manufactured goods. Later theorists strongly agreed with this conclusion by arguing that an agricultural demand-led development approach is superior to an export-led development approach as it is argued for by Kindleberger (1962). This hypothesis was also tested by way of its application to a general equilibrium model constructed for a hypothetical country. The model achieved favourable results for a demand-led development strategy during the initial stages of development (Adelman, 1984). The theory of agricultural linkages underwent a significant further progression, which will

be expanded on in chapter 7.

During the 1980s and 1990s the debate on the role of the agricultural sector in development moved from a national to a rural focus (Hazell and Röell, 1983; Haggblade, 1989; Haggblade *et al.*, 1991). These studies investigated agricultural production and consumption linkages on a regional level. This shift was motivated by *i*) imperfect or missing commodity markets in rural areas, *ii*) rigidities in rural-urban factor movements, *iii*) high rural transport costs, *iv*) the existence of rural non-tradable sectors and *v*) rural unemployment and underemployment (Hazell and Thurlow, 2007). At this stage an important point has to be made on how the role of the agricultural sector in poverty alleviation was understood.

Almost all the research prior to the 1970s investigated the role of the agricultural sector in *economic development*. These theorists did not concern themselves with economic development as it is understood today, however, but rather concerned themselves with *economic growth*. The concern therefore was not the distribution of income but rather the level of output per head and growth in aggregate output (Fields, 2004). In their defence, one could argue that these theorists did not need to concern themselves with the distribution of income, because most people were equally poor in the mostly rural agricultural economy. A shift towards a stronger distributional focus started to emerge in the 1970s with the recognition of the sector's role in improving equity and providing employment. During this period growing evidence from the green revolution started to show that agricultural productivity gains are strongly pro-poor (Byerlee *et al.*, 2009). During the 1990s researchers started to establish poverty alleviation as one of the major roles of agriculture, by demonstrating explicit links between agriculture and poverty reduction (Hazell and Röell, 1983; Haggblade, 1989; Timmer, 2002; Thirtle *et al.*, 2003; Christiaensen and Demery, 2007). Thirtle *et al.* (2003) showed that agricultural productivity growth had a substantial impact on reducing poverty in Africa and Asia, whereas productivity growth in the industrial and services sector had almost no impact on poverty levels.

One of the most recent and comprehensive studies on the role of the agricultural sector was conducted by the FAO in 2007 as the *Roles of Agriculture Project*. This project had a strong focus on the externality effects or con-

tribution of the agricultural sector on society. These include its impact on poverty alleviation, household food security, the provision of environmental services, out-migration control, buffer in times of economic crisis and national cultural identity. The study concluded that the agricultural sector has significant positive externalities for the rest of the economy, which therefore warrant a significant investment of resources into the sector despite its relatively low share in the economy. The study also called for a correction of the market, policy and institutional failures that prevent the sector from attaining its potential, which is higher if one takes the aforementioned external benefits into account. (FAO, 2007). The study therefore argued for the importance of the agricultural sector like the studies since the 1960s, but purely from a social impact and not from an economic growth perspective.

2.2 South African agriculture: existing research on the role of agriculture

Specific research on the role of agriculture in the economic development of South Africa has been very limited. The most extensive study to date was conducted by Simon Brand in 1969 for his doctorate, *The Contribution of Agriculture to the Economic Development of South Africa since 1910*. Another article, less comprehensive yet significant, is that of Van Zyl *et al.* (1988), *Agriculture's Contribution to the South African Economy*. Other studies on the topic have been undertaken by Du Plessis and Groenewald (1963), Nel (1964), Van Rooyen (1997) and Oosthuizen (1998). This section, and this thesis, will rely heavily on Brand's (1969) study but will also draw on that of Van Zyl *et al.* (1988).

The aim of Brand's (1969) study was to provide a holistic view of the interactions between the agricultural sector and the rest of the economy, in order to provide necessary perspective against which agricultural policy could be evaluated. A secondary goal of the study was to identify possible areas of further research where understanding is lacking. From a theoretical perspective, Brand chose to evaluate the contribution of the sector according to the themes of Johnston and Mellor (1961), and investigated the role of the sector from an

economic growth perspective. Brand was not oblivious to the dualism of the South African economy and agricultural sector, and devoted both a chapter and several other passages throughout the dissertation to this topic. Brand investigated the contribution of the agricultural sector according to three main themes, namely the sector's product, market, and factor contributions. Brand reached the following conclusions regarding each.

The *product contribution* of the agricultural sector represents the role of the agricultural sector as a source of food. Brand reached two conclusions regarding this contribution. The first was that an increase in agricultural output did not have a significant effect on overall value added, due to the small share of the sector in the economy. The second was that the sector was able to meet the domestic demand for food and therefore the sector maintained nearly constant terms of trade with the rest of the economy. The price of food therefore remained constant relative to the prices of non-food items.

Market contributions represent the role of the agricultural sector as an earner of foreign exchange, as well as the linkages between the agricultural sector and the rest of the economy. Brand concluded that agricultural exports did not play a growth-leading role because their expansion rate lagged behind that of the other sectors. The sector played a balancing role, however, because it maintained a positive agricultural trade balance. Brand analysed both the sector's consumption and production linkages: In terms of consumption linkages he found that the impact of the purchases of goods by the sector on the economy was insignificant due to the small share of the sector in the economy. His investigation of the production linkages between the agricultural sector and the rest of the economy showed that the strength of the production linkages increased but the importance thereof declined as the economy developed. In other words, the agricultural sector induced few activities in other sectors during the time when the agricultural and related sectors represented a large share of the economy.

Factor contributions represent the transfer of production factors, such as capital and labour, between the agricultural and non-agricultural sectors. In terms of capital, Brand concluded that capital flowed into the agricultural sector from the rest of the economy, the opposite result to that which would be expected from an analysis of the literature. Brand put forward two main reasons for this.

The first was the relatively abundant supply of capital due to mineral exports by the mining sector. This reduced the demand for capital from the agricultural sector and also lowered the cost of capital in the economy. The second reason was that capital was provided to the agricultural sector at subsidised rates.

Turning to labour, Brand stated that one would expect that the supply of cheap capital to the agricultural sector would lead to a substantial substitution of capital for labour. At first glance, however, this did not seem to be the case, because agricultural employment was still increasing despite the cheap capital. A closer analysis, however, revealed that agricultural employment had declined in relative terms since the end of the Second World War. Black agricultural employment was the only category that showed an absolute increase in agricultural employment.

Brand (1969) also investigated the dual nature of the South African agricultural sector, which is split into a modern and traditional sector. The analysis from this perspective relies heavily on the work of Lewis (1954), Liebenstein, and Mellor (1966). Brand concluded that almost all the product and market contributions of the agricultural sector to the South African economy were provided by the commercial agricultural sector. In terms of the factor contributions, both sectors experienced a net inflow of capital from the rest of the economy, but the analysis shows that this was allocated very differently by the respective sectors: the commercial sector allocated most of the capital to productivity-enhancing inputs, whereas the traditional sector spent most of it on infrastructure for production. In terms of labour, the traditional sector was the main source of unskilled labour to both the agricultural sector and the rest of the economy. The commercial sector, however, was a source of skilled labour to the rest of the economy. It was also noted that the transfer of labour from the traditional sector to the rest of the economy was enabled by sufficient production of food by the commercial sector. In light of this, Brand concluded that the commercial agricultural sector was the main contributor to the economic development of South Africa.

Van Zyl *et al.* (1988) revisited the topic nearly two decades later, but also included a model that estimated the effect of a change in the agricultural sector on the rest of the economy. The article was therefore not an extension

of the theory as such, but rather an update. It investigated a number of themes.

Food supply: Van Zyl *et al.* (1988) reaffirmed that the agricultural sector has an important role as a provider of food, irrespective of the level of development. The analysis concluded that the South African agricultural sector was able to meet the domestic demand for food, because at that stage domestic food prices were the 6th cheapest in the world. Interestingly, the article also mentioned that this self-sufficiency was reassuring given the possible threat of a food embargo.

Foreign exchange: Van Zyl *et al.* (1988) reached the same conclusions as Brand regarding the balancing role of agricultural exports resulting from a positive trade balance.

Labour: The article contained two apparently contradictory conclusions regarding agricultural employment. The first was that the agricultural sector had made a net contribution of employment to the rest of the economy as a result of a relative and absolute decline in agricultural employment. The second was that the sector then acted as an important source of employment in the economy.

Supplier of raw materials: Van Zyl *et al.* (1988) showed that the sector was still an important provider of raw materials, seeing as 28% of factories depended on the processing of these materials.

Agriculture as a market: The authors showed that the sector has a significant role as a buyer of agricultural inputs and as a market for goods produced in the industrial sector. They went further by adding that this role could in fact have been much larger if the backward linkages were to be properly accounted for.

Van Rooyen (1997) argued for the important role of the agricultural sector in the generation of rural incomes, the creation of employment, ensuring food security and the transfer of resources to the rest of the economy. Oosthuizen (1998) did not investigate the agricultural sector according to the Johnston and Mellor framework, but rather argues for the modernisation of the sector. He argued that such a modernisation would be a pro-poor strategy, because it would lead to a decrease in rural food prices, which would in turn benefit

the rest of the economy through higher real rural incomes. He also argued that the distributive effects of such a pro-poor strategy would have positive consumption linkages with the rest of the economy. It is clear that these authors moved the analysis of the agricultural sector from a national level to a regional level, and their studies are therefore not comparable with the studies of Brand (1969) and Van Zyl *et al.* (1988).

2.3 Conclusion

This chapter has given an overview of the basic theory concerning the role of the agricultural sector in economic development, and the application of that theory to the South African context. The first section presented an overview of the evolution of the theory. This analysis has shown that it can be divided into four distinct phases. The first phase was the pre-development phase in which the agricultural sector constituted the economy and where it was regarded by some as the only productive activity. The second phase can be labelled the post-industrialisation phase, during which the agricultural sector constituted an ever smaller share in the economy. During this stage the sector was seen to have a passive role in economic growth and was required to provide food, labour and capital to the modern sector of the economy. The third phase can be labelled the post-green revolution phase. During this phase the understanding of the role of the agricultural sector in economic development moved to an active one. According to this view the sector does not merely play a growth-enabling role, but could play a growth-leading role. The fourth phase can be labelled as the new era. The theory of the role of the agricultural sector evolved away from a national perspective towards a regional perspective, according to which the traditional roles of the sector made place for more pro-poor and other developmental considerations. Research during this stage started to highlight the redistributive effects of agricultural development in rural areas as well as the role of the sector in ensuring food security. Later studies also highlighted other indirect positive externalities that can be attributed to the sector.

The second section gave an overview of the application of the above theory to the South African situation. The respective studies and their results will not be repeated, but a number of general observations can be made. The first is

that very little research has been conducted regarding this topic from a South African perspective, especially studies that bring all the respective components together. It is also clear that Brand's study, as the most comprehensive to date, together with that of Van Zyl *et al.* (1988), were mostly set in the second, but also touched on the third phase of the theory. The studies of both Van Rooyen (1997) and Oosthuizen (1998) were firmly set in the fourth phase of the theory's development.

Chapter 3

Expansion of the Food Supply

In Chapter 2 it was illustrated that the theory of the role of the agricultural sector in economic development has undergone significant changes since the 1800s. Likewise, the way the role of the sector is understood as a source of food has changed as well. The importance of the sector's role as food source, however, has never been disregarded. Initially the goal was simply that each agricultural family produce more than it can consume, so that another family can be released to pursue a non-agricultural endeavour (Smith, 1776). During the 19th century the output per agricultural family in the UK was greatly increased through the introduction of parsnips, which enabled rotational production practices (Nurkse, 1961). This development led to the release of a large quantity of labour by the agricultural sector, which enabled the industrial revolution in Great Britain (Johnson, 1997). During this period classical economists remained mindful of the disastrous effects of a shortage of food (Hazell and Thurlow, 2007). During the early stages of economic development an economy is typically very labour intensive and an increase in the price of food would lead to an increase in labour costs, which could bring economic growth to a standstill (Ricardo, 1817). This phenomenon became known as the "Ricardian trap", which laid the foundation for subsequent development theorists such as Schultz, Lewis, Fei and Ranis, and Jorgenson (Diao, 2007). These theorists attributed a passive, growth permissive role to the agricultural sector through its provision of food (Hazell and Thurlow, 2007). This remained as the general consensus on the role of the agricultural sector until the mid-20th century.

During the 1950s, however, the intersectoral terms of trade between the primary sector and the manufacturing sector started to receive attention in the work of Singer (1950) and Prebisch (1950). They independently proposed that the inter-sectoral terms of trade move against the primary sector over the long run (Ardeni and Wright, 1992). This later became known as the Singer-Prebisch hypothesis and remains a subject of debate (Grilli and Yang, 1988; Thamarajakshi, 1990; Sapsford *et al.*, 1992; Kaplinsky, 2006). An evaluation of this hypothesis is not relevant for the purposes of this thesis, but the concept of the inter-sectoral terms of trade is. The concept of the terms of trade, or trade balance, has its origin in international trade theory and gives an indication of the prices of export prices relative to the prices of imported products. A worsening terms of trade between country A and B for example, would indicate that the prices of exported products from country A have declined relative to the prices of the products imported from country B. In other words the cost of imported products increased (Blanchard, 2006). The intersectoral terms of trade between the agricultural sector and the rest of the economy therefore refers to the relative prices between agricultural and non-agricultural products as if the sectors imported and exported goods from each other. A worsening terms of trade between the agricultural sector and the rest of the economy would indicate that agricultural prices have declined relative to the prices of the outputs of the rest of the economy. The price of food therefore has declined relative to the outputs of the rest of the economy. Today a comparison between the general inflation (less food) and food inflation rate would give an indication of the terms of trade between the agricultural sector and the rest of the economy.

During the 1960s the theory regarding the role of the agricultural sector in economic development changed due to the results of the Green Revolution. The major shift was that the agricultural sector was now regarded as having an active, growth-leading role in economic development, especially during *the early stages of development*. Theorists reiterated that an increase in the food supply is essential for newly developed economies due to their high rate of population growth and higher relative income elasticity of demand for food (Johnston and Mellor, 1961). These theorists also added that an expansion of the food supply could play a growth-initiating role through its product contribution to the economy. An expansion of agricultural output, and therefore

income per worker, would lead to an economic expansion if a large portion of the economy were involved in agricultural production (Kuznets, 1964; Mellor, 1966).

Brand (1969) concluded that the expansion of the food supply by the agricultural sector did not play a growth-initiating, but rather a growth-permissive role in the South African economy. The growth-initiating role of the sector through its product contribution was dismissed due to the small share of the sector in the economy. The sector played a permissive role, however, due to the fact that the supply of food kept up with the demand thereof during the full period analysis, 1910 to 1967. During this period the sector maintained an almost constant terms of trade with the non-agricultural sector. This result is contrary to prediction of the Smith-Prebisch hypothesis of a declining terms of trade over time.¹ Brand speculated that this constant terms of trade were due to the Marketing Act (No. 26 of 1937) that prevented the downward movement of agricultural prices and was therefore partially responsible for the gradual inflation experienced by the country at the time.

The conclusion that the sector cannot play a growth-initiating role through its product contribution is accepted given the fact that the sector's share in the economy has declined even further since the publication of Brand's study. Therefore the role of the sector as source of food from a growth-h permissive perspective will be analysed in this chapter. For this purpose the sector's ability to provide in the domestic demand will be analysed.

In the first section the main food items consumed by South African households will be identified through an analysis of the *Household income and expenditure survey* as published by Statistics South Africa (henceforth referred to as "Stats SA"). Household food expenditure will also be examined in terms of its share in total household expenditure, and how the composition of the household food basket changes with a change in income. This will enable a better understanding of the vulnerabilities of households regarding the prices of the identified food items. In the second section the focus will be shifted to the agricultural sector's ability to supply the foodstuffs identified in the first section. For this purpose the total production, consumption and trade in these items will be analysed over the period 1971 to 2010. In the third section the link between

¹Brand did not make any mention of the Smith-Prebisch hypothesis.

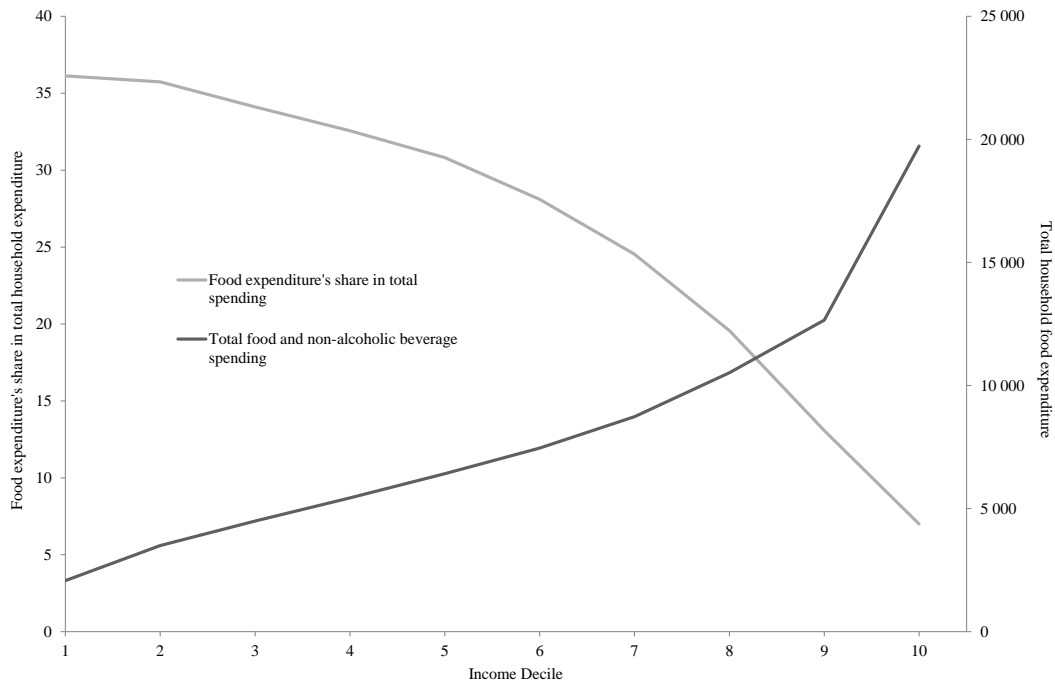
food prices and inflation will be analysed. The final section will conclude the chapter with a summary of the key findings.

3.1 South African household food expenditure trends

According to Engel's law, the income elasticity of demand for food is less than one, assuming a closed economy with constant prices. Figure 3.1 clearly illustrates that although these assumptions do not hold in the South African context, the theory does. With an increase in income, actual household food expenditure increases, while food expenditure's share in total expenditure decreases. Note that each of the income deciles² represents 10% of the just over 12 million South African households (the average household consisting of 3.8 people), grouped according to income levels.

According to Stats SA (2008), the average South African household spends 14.4% of its budget on food and non-alcoholic beverages. This is on par with the international average for high-income countries of between 10 and 20%, but low given the fact that South Africa is a middle-income country. Households in middle-income countries typically spend between 20 and 50% of their budget on food (OECD, 2008; FAO, 2009). According to figure 3.1 the median (between deciles 5 and 6) household food expenditure is between 28 and 31% of total household expenditure. This is more comparable with the average food expenditure share of households in middle-income countries. Brand (1969) was confronted by a similar phenomenon: according to his calculations the income elasticity of demand in South Africa was comparable to that of developed countries and not to that of countries with a similar per capita income. Brand (1969) attributed this to the dualistic nature of the South African economy, a dualism that has continued since and is discussed at length by numerous authors (Van der Berg *et al.*, 2008; Aliber, 2009; Altman *et al.*, 2009). At

²The "income deciles" as presented in figure 3.1 should not be confused with LSM groups as published by the South African Advertising Research Foundation (SAARF). The deciles here are simply a statistical demarcation of the respective income groups, while the SAARF LSM attempts to define household wealth according to a set of household characteristics such as type of house, running water, appliances, etc.

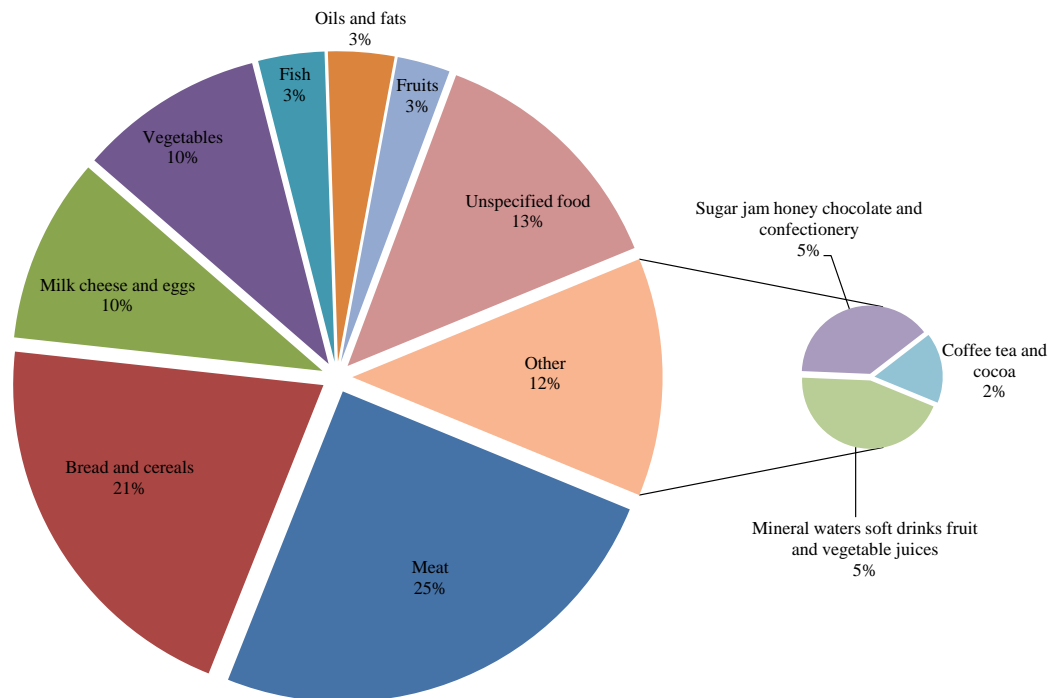


Source: Stats SA, IES 2005/06

Figure 3.1: Household food expenditure

present Stats SA (2008b) assigns to food expenditure a weight of 20.6% in the household consumption basket for the purpose of calculating the inflation rate. In light of the above one can argue that this does not reflect the true impact of rising food prices on a large percentage of South African households.

According to Stats SA (2008a) the average South African household spends two thirds of its food budget on four food categories, namely meat (25%), bread and cereals (21%), milk, cheese and eggs ("MCE") (10%), and vegetables (10%). The remaining third is spend on sugar, jams and confectionary (5%); non-alcoholic beverages (5%); fish (3%); oils and fats (3%); fruits (3%); coffee, tea and cocoa (2%); and other unspecified food items (13%). This is reflected in figure 3.1. It is to be expected that the composition of this food basket changes with a change in income: as income increases, households will spend a smaller percentage of their food budget on staples, and a bigger portion on non-staples such as meat and dairy products. This is clearly illustrated in figure 3.1, where the respective shares of both meat and MCE increase with an increase in income. Conversely, the respective shares of bread and cereals, and vegetables, decrease with an increase in income.

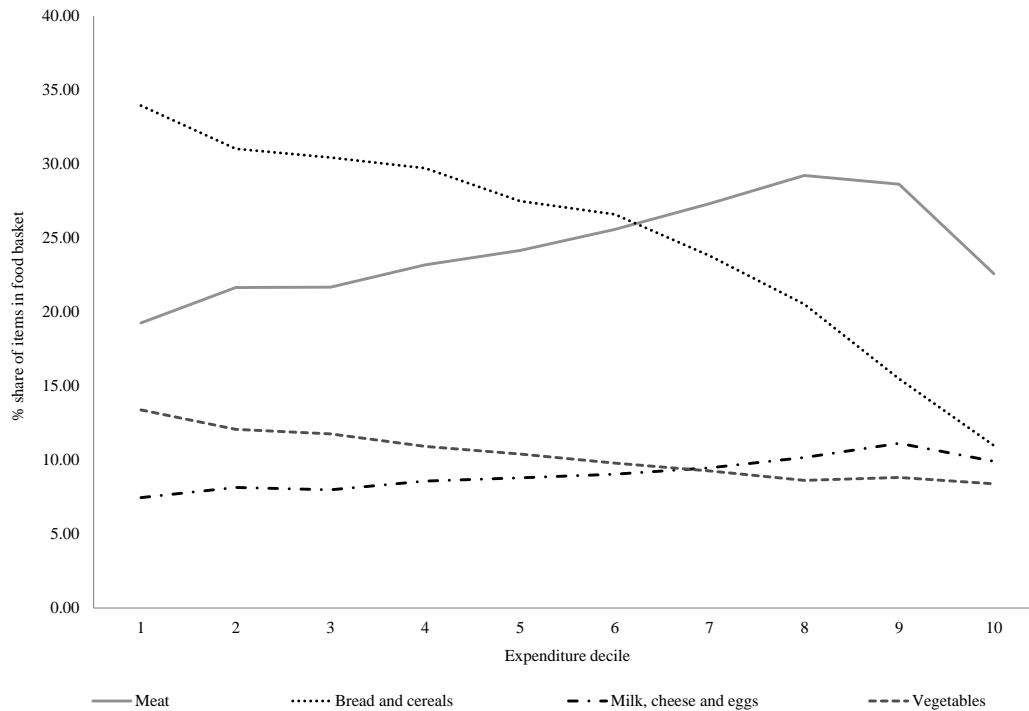


Source: Stats SA, IES 2005/06

Figure 3.2: The average household food basket

Another point that one should take note of is the high combined share of the meat and cereal categories in both the food expenditure budget and total budget of a large number of households. Households in deciles one to eight (i.e. 80% of the population) spend between 53.2 and 49.7% of their food budget on meat and cereals. One should also take into account that the rand-value expenditure on all food items increases with an increase in income, as is clear from figure 3.1. This does not indicate that households consume more, but rather that they consume differently by buying more expensive items within the food categories.

Martins (2006) investigated household food spending according to the SAARF LSM groupings and concluded that, in terms of grains, households increase their spending on more expensive food items such as bread and other bakery items, but decrease their spending on rice and maize meal with an increase in household income, as reflected in table 3.1. In terms of meat, households decrease their spending on poultry and increase their spending on beef and mutton/lamb. Spending on MCE shows a similar shift in consumption, with spending on eggs decreasing and spending on fresh milk, yogurt and cheese



Source: Stats SA, IES 2005/06

Figure 3.3: Share in household food budget per expenditure decile: meat; bread and cereals; milk, cheese and eggs; and vegetables

increasing with an increase in income.

This section has shown that South African households spend an average of 14.4% of their budget on food, but that this share is significantly higher for the median household. The implication of this is that the lower income half of the population spends between 28 and 31% of their budget on food. Households are the most exposed to price changes in these four food groups: meat, bread and cereals, MCE, and vegetables. This exposure is especially significant with respect to price changes of meat and cereals, because spending on these items makes up between 49.7 and 53.2% of the total food expenditure of the lower-income half of the population. These trends should be taken into account in the following section, especially when the link between food prices and inflation is considered.

Table 3.1: Income-induced changes in household consumption within food categories

	LSM 1	LSM 6	LSM 10
<hr/>			
Bread and cereals			
Bread	26%	49%	44%
Rice	23%	13%	7%
Maize meal	22%	7%	-
Cakes and biscuits	-	-	14%
Breakfast cereals	-	-	9%
Meat			
Poultry	46%	24%	25%
Beef	17%	23%	23%
Mutton	16%	22%	23%
Boerewors	-	9%	8%
Milk, cheese and eggs			
Eggs	39%	19%	9%
Fresh milk	27%	43%	45%
Sour milk	30%	-	-
Cheese	-	9%	16%
Condensed milk	3%	-	-
Yogurt	-	6%	9%

Source: Martins (2006)

3.2 Food production, consumption and trade trends

In this section the production, consumption and import trends for the main food categories identified in section 3.1 will be investigated, i.e. those of meat, bread and cereals, MCE, and vegetables. Each of these groups will be analysed both in terms of the main items within the group, and the group as whole. This will be preceded by a short discussion of the trends in the composition of agricultural output over time, which will be relevant to the discussion in this as well as later chapters.

The historical production data presented in this chapter are sourced chiefly from the *Directorate of Agricultural Statistics*. These data were contrasted with those from other databases such as those of SAGIS and BFAP - data from the latter sources were used if they appeared more applicable or reliable.

Data published by Frikkie Liebenberg were also used. It is important to note that the commodity-specific data published by the *Directorate of Agricultural Statistics* only include former homeland production since 1995, and to draw the reader's attention to the data issues as discussed in chapter 1. Regarding the future commodity outlooks, the chapter draws heavily on the data provided by BFAP. Lastly, the trade data presented in this chapter were sourced from FOA Stat and/or the ITC. All growth rates are calculated according to the ordinary least squares method and all the values presented are quantitative.

3.2.1 The composition of South African agricultural output

Grain production contributed about 34% of agricultural output in 1910, this increased to about 47% during the 1970s, but declined significantly since the 1980s to reach 24% in 2010. The reduction of corn and wheat production accounted for most of post 1970s decline (Liebenberg, 2012*a*). This decline is mainly due to changes in trade and agricultural policy, which are discussed in chapter 6.

Livestock production constituted 55% of total agricultural output in 1910, and declined marginally to 51% in 2010. One of the biggest changes in agricultural output took place within the livestock sector itself: in 1910 69% of the value of total livestock production was made up by the production of wool (20%), dairy (19%), beef (15%) and mutton/lamb (15%). By 2010, however, the poultry sector contributed 46% of the value of total livestock production (Liebenberg and Pardey, 2010; Liebenberg, 2012*a*).

The horticultural sector was the main contributor toward the growth of the agricultural sector during the past century, outgrowing the field crop and livestock sectors by 0.7% per year during the period 1911 to 2010. This led to an increase in its share of agricultural output from 10 to 26%. This growth was mainly driven by improvements in cold supply chain management (Liebenberg, 2012*a*) and the trade and agricultural policy discussed in chapter 6.

3.2.2 Cereals

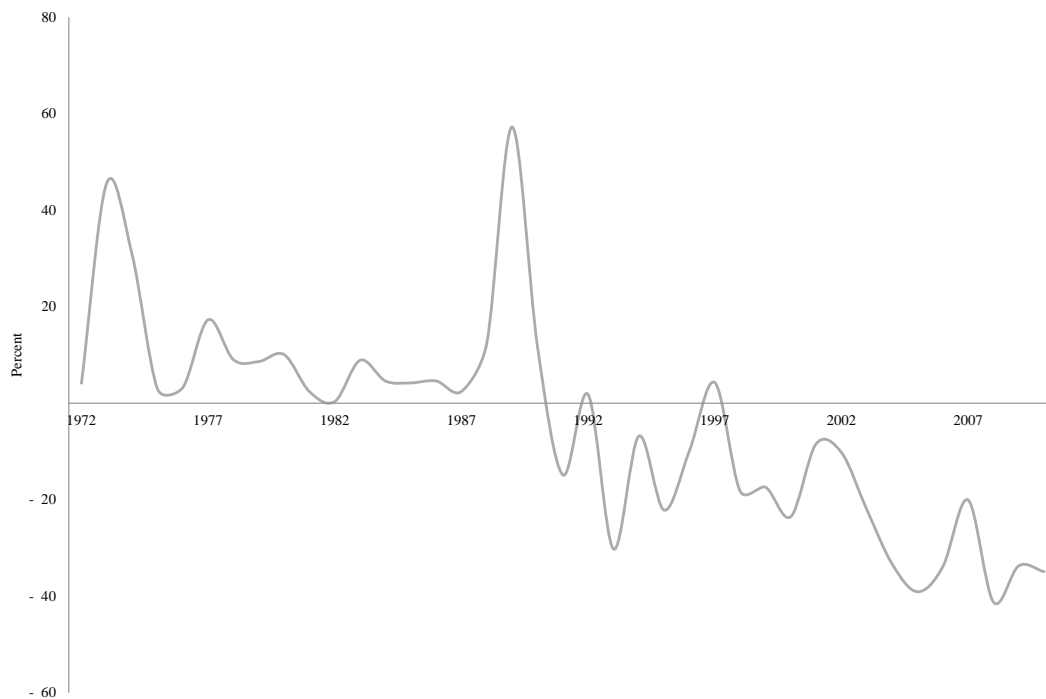
Maize: The domestic production of maize was able to meet the domestic demand for both human and animal feed consumption during the period of 1971 to 2010. During this period, production grew at an average yearly rate of 0.73%, while the area planted declined at a rate of 1.35% per year (see table 3.2). The area planted shrunk from close to 4.8 million hectares in 1971, to an average of around 3 million hectares between 2006 and 2010. Total consumption grew at an average yearly rate of 1.06% and processing for human consumption grew at 1.01%. Feed consumption outgrew human consumption by 1.09% per year during the period of analysis (DAS, 2012). Feed consumption overtook human consumption in 2011 and this trend is expected to continue, with feed consumption expected to increase from 4.7 million tons in 2010 to 6.4 million tons in 2020 (BFAP, 2011*a*). Human consumption of maize is projected to decline from 4.8 million to 4.58 million tons between 2010 and 2020. Production is expected to meet the demand, while the area planted is expected to stabilise at 2.3 million hectares. Imports are expected to exceed exports if the area planted decreases below this level beyond 2015 (BFAP, 2011*a*).

Table 3.2: Maize: percentage growth in area planted, deliveries and total commercial consumption

	Area Planted	Deliveries	Consumption		
			Food maize	Feed maize	Total
1971 - 1980	-0.33	4.80	1.18	2.63	1.18
1981 - 1990	-0.50	-1.81	-3.85	1.30	-1.01
1991 - 2000	-1.24	3.14	3.57	-4.55	-0.94
2001 - 2010	-1.48	1.06	2.02	3.29	2.64
1971 - 2010	-1.35	0.73	1.01	1.09	1.01
1981 - 2010	-1.91	1.22	1.60	0.59	1.60

Source: Directorate of Agricultural Statistics (2012)

Wheat: South Africa moved from being a net exporter of wheat to a net importer for the first time in 1991, but recovered briefly in 1992 and 1997, as reflected in figure 3.2.2. An average of 34% of domestic wheat consumption has been imported since 2004. During the period 1971 to 2010, production grew at an average annual rate of 0.43%. The area planted declined at a rate of 3.25% per year, declining from just over 2 million hectares in 1971 to just



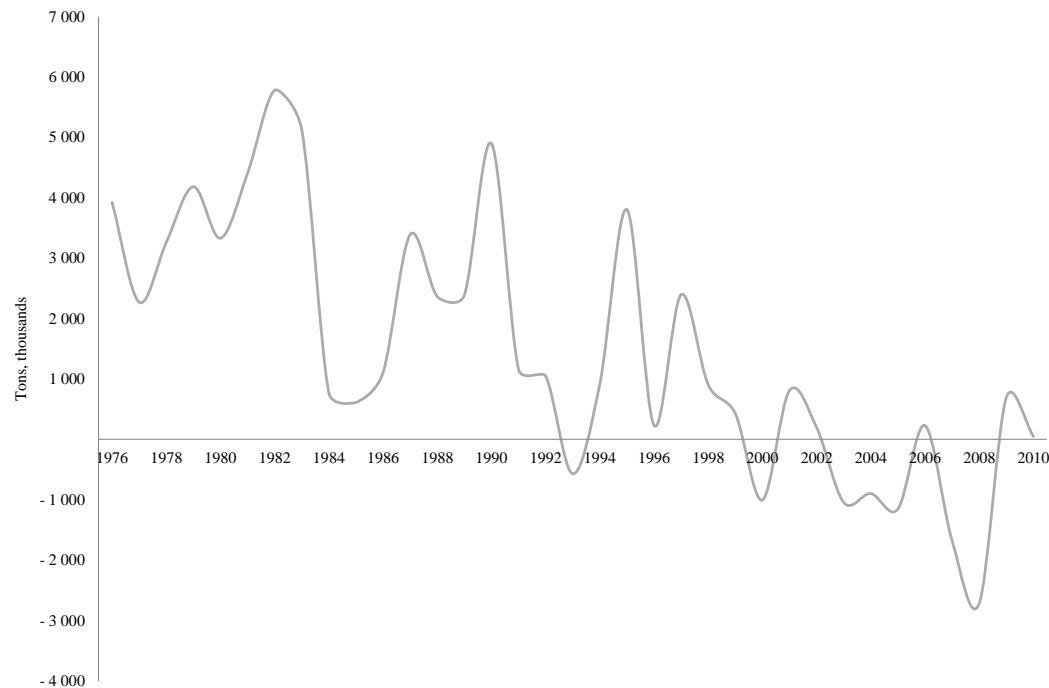
Source: Directorate of Agricultural Statistics (2012)

Figure 3.4: Wheat: net exports as a percentage of total consumption

under 600 000 hectares in 2010. From 1971 to 2010, wheat consumption grew at an average annual rate of 2.05% and consumption reached 3 million tons in 2010 (DAS, 2012). It is expected that the area planted will fluctuate between 560 000 and 600 000 hectares between 2010 and 2020, while the demand is expected to increase by an average of 1.5% per year (BFAP, 2011*a*). In light of this, and given the current production trends, net imports as a percentage of total consumption is set to increase even further.

Sorghum: South African sorghum production was able to meet the domestic demand in most years during the period 1971 to 2010, with the exception of 2000, 2003 and 2008. Production decreased at a rate of 2.51% per year between 1981 and 2010, while processing for human consumption has stabilised at around 182 000 tons since 1990 (DAS, 2012; FAO, 2012). The area planted is expected to decline towards 2020, and total domestic consumption is expected to decline marginally as well (BFAP, 2011*a*).

Rice: South Africa produces no rice, but rice consumption increased at an average rate of 7.08% per year during the period 1971 to 2010. Consumption



Sources: Directorate of Agricultural Statistics (2012), FAO Stat (2012), Trade Map (2012)

Figure 3.5: Net exports: total grains

grew the fastest during the period 1981 to 1990, averaging a rate of just under 9% per year. This slowed to an annual growth rate of 3.51% during the period 2001 to 2010 (FAO, 2012; ITC, 2012). Rice consumption is expected to increase at an average annual growth rate of around 3% per year towards 2020.

Total food grains: During the period 1971 to 2010, total grain production expanded at an average annual rate of 0.4%, while the total consumption grew at an average annual rate of 1.33%. This is clearly reflected in figure 3.2.2, where one can see that the net exports of food grains decreased from their highest level of just over 5.7 million tons in 1982, its lowest point of a net import of 2.7 million tons in 2008. Net imports of grains totalled an average of 600 000 tons per year between 2001 and 2010. South African net maize exports are therefore less than net rice and wheat imports. This deficit is expected to expand due to the expected increase in both wheat and rice imports and the reduction of maize exports due to the greater domestic feed consumption. It is also possible that the country could become a net importer of maize if the area planted or production per hectare does not improve beyond 2015.

3.2.3 Meat

Beef: South Africa was a net importer of red meat during the full period 1971 to 2010. Production expanded at an average rate of 0.67% per year, and consumption by 0.51% per year. Annual per capita consumption of red meat declined from 24.15kg in 1971, to a low of 12.69kg in 2001, before increasing moderately to 17.07kg in 2010 (DAS, 2012).³ Trade figures show that net imports declined from 108 000 tons in 1976, to 42 000 tons in 2010 (FAO, 2012). This represents a decline in net imports' share in domestic consumption from 19% to 5% (DAS, 2012; FAO, 2012). Total production and consumption are expected to increase by 2.8% per year between 2010 and 2020 (BFAP, 2011a) and South Africa is therefore expected to retain its status as net beef importer. This is also subject to the retention of the 40% tariff on beef imports (Sandrey and Vink, 2006; DAFF, 2011b).

Mutton, lamb and goat: South Africa was a net importer of meat within this category during the full period 1975 to 2010. During this period production declined at an average yearly rate of 1.57%, while consumption declined at 0.66% per year. Annual per capita consumption declined from 6.3kg in 1975 to a low of 2.8kg in 2010. Imports increased from 4% of domestic consumption to a maximum of 35% in 2000, before decreasing again to 8% in 2010 (DAS, 2012; FAO, 2012). The decline in per capita consumption is due to a rapid rise in the price of this food item, which in turn is due to the insufficient local supply, which has moved domestic prices up to import parity prices. Consumption and imports are projected to increase towards 2020 (BFAP, 2011a).

Chicken meat: South Africa briefly became a net importer of chicken meat in 1987 and has retained that status since 1992. Production and consumption grew at average annual rates of 4.27% and 5.15% respectively during the period 1981 to 2010. During the period 2001 to 2010, production and consumption grew at rates of 6.18% and 7.13% per year respectively. Per capita consumption increased from 6.24kg in 1971, to 33.36kg in 2010 (DAS, 2012). Net exports declined from 22 000 tons in 1971, to net imports of 224 000 tons in 2010, totalling 13.3% of consumption (DAS, 2012; FAO, 2012). Chicken production and consumption are expected to grow at average annual rates of 3.8% and

³The latter rates of production and per capita consumption growth seem to have been overestimated by the Department of Agriculture (RMRD SA, 2012).

4.1% respectively towards 2020 (BFAP, 2011*a*). Chicken meat imports are therefore expected to increase.

Pork: Production and consumption expanded at average annual rates of 1.89% and 2.33% respectively during the period 1971 to 2010. Growth rates were the fastest during the 10-year period 2001 to 2010, with production expanding at an average annual rate of 6.66% and consumption at a rate of 7.1%. The annual per capita consumption of pork declined from 4kg in 1971 to a low of 2.6kg in 2001, before increasing to 4.4kg in 2010 (DAS, 2012) - the highest level to date. South Africa became a net importer of pork for the first time in 1994 and that has remained the status quo. Net exports totalled 4 000 tons in 1971, and have since decreased to net imports of 23 000 tons in 2010. This represents 23% of domestic consumption (DAS, 2012; FAO, 2012). Production towards 2020 is projected to expand by a total of 35%, being outpaced by consumption growth of 41%. Imports are therefore projected to increase over the next decade (BFAP, 2011*a*).

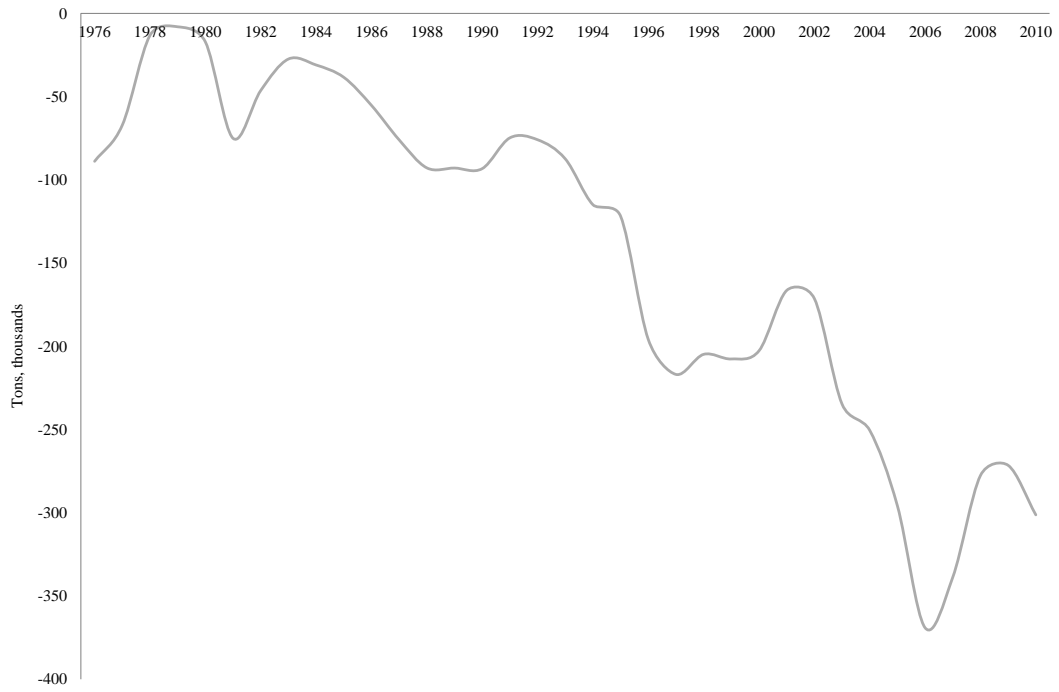
Table 3.3: Total meat: percentage growth in production, consumption and imports

	Total production	Total consumption	Net imports
1981 - 1990	1.53	1.84	10.18
1991 - 2000	0.27	1.33	14.73
2001 - 2010	5.71	5.87	6.59
1981 - 2010	2.07	2.49	8.14

Source: FAO Stat (2012), Stats SA (2012)

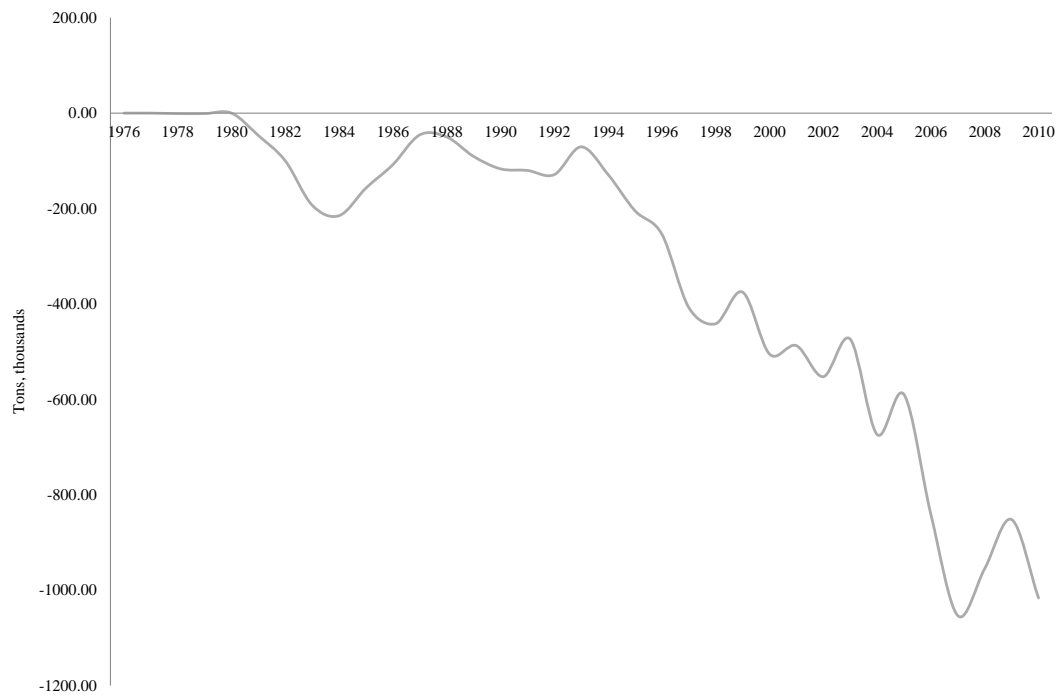
Total Meat: South Africa was a net importer of meat during the full period under analysis. From 1971 to 2010, meat production grew at an average annual rate of 2.07% and consumption at 2.47%, as reflected in table 3.3. As a result, net imports increased from 88 000 tons in 1976, to 301 000 tons in 2010 - an increase in net imports' share in consumption from 8% to 10%, as illustrated in figure 3.2.3 (DAS, 2012).

Meat production cannot be analysed in isolation because meat production is a factor of feed used. Animal feed consists of two main categories: maize and oil cakes. Maize consumption for feed purposes has been discussed in section 3.2.2, but discussion of oilseed remains necessary.



Source: Directorate of Agricultural Statistics (2012), FAO Stat (2012)

Figure 3.6: Net exports: total meat



Source: BFAP (2011)

Figure 3.7: Net exports: sunflower and soybean oil cake

Domestic oilseed situation: Lower maize and higher oilseed production have led to increases in the area planted of sunflower and soybeans of 61 and 34% respectively between 2001 and 2010. Domestic oilcake production and consumption have increased by average annual rates of 4.71 and 7.46% respectively during the period 1981 to 2010 (BFAP, 2011*a*). This led to growth in net imports at an average annual rate of 9.41% during this period. Imports grew from zero in 1976, to their highest level of just over a million tons in 2007 (FAO, 2012), as reflected in figure 3.2.3. Net imports grew by an average annual rate of 22.32% between 2000 and 2010 (FAO, 2012). The area under sunflowers is expected to remain stable while the area under soybeans is expected to increase at a rate of 5.7% per year towards 2020. During this period the yield per hectare of sunflower and soybeans are expected to increase by 20% and 38% respectively. This increase in domestic oilseed production, together with the expected increase in processing capacity, will reduce the net imports of sunflower and soybean oilcake towards 2020. The country is expected to retain its status of net importer, however, due to the expected expansion in chicken meat production (BFAP, 2011*a*).

3.2.4 Milk, cheese, eggs (MCE)

Milk: Milk production (both fluid and powdered) increased by an average rate of 1.52%, and consumption at an average of 1.24% per year during the period 1981 to 2010. Average annual growth rates in production and consumption of 3.29 and 3.07% respectively were attained during the period 2001 to 2010. South Africa was a net exporter of this food category in most of the years analysed, with net exports averaging 25 000 tons per year between 1981 and 1990, which increased to an annual average of 680 000 tons between 2001 and 2010. Fresh milk, skimmed milk powder and full cream milk powder consumption are expected to grow at average annual rates of 2.3, 4.7 and 4.2% respectively between 2011 and 2020 (BFAP, 2011*a*).

Cheese: Cheese production and consumption grew at average annual rates of 1.85 and 2.1% respectively between 1981 and 2010. South Africa was a net importer of cheese during this period, with net imports increasing from an average of 160 tons per year between 1981 and 1990, to 1430 tons between

2001 and 2010. Cheese consumption is expected to expand by an annual rate of 5.5% between 2011 and 2020 (BFAP, 2011*a*).

Eggs: South African egg production and consumption during the period 1981 to 2010 saw growth of 3.40 and 3.46% respectively. South Africa was a net exporter of eggs during this period, with net exports averaging about 3 000 tons per year. Egg consumption is expected to expand by an average annual rate of 3.3% per year between 2011 to 2020, with domestic production expected to expand sufficiently to meet this increased demand (BFAP, 2011*a*).

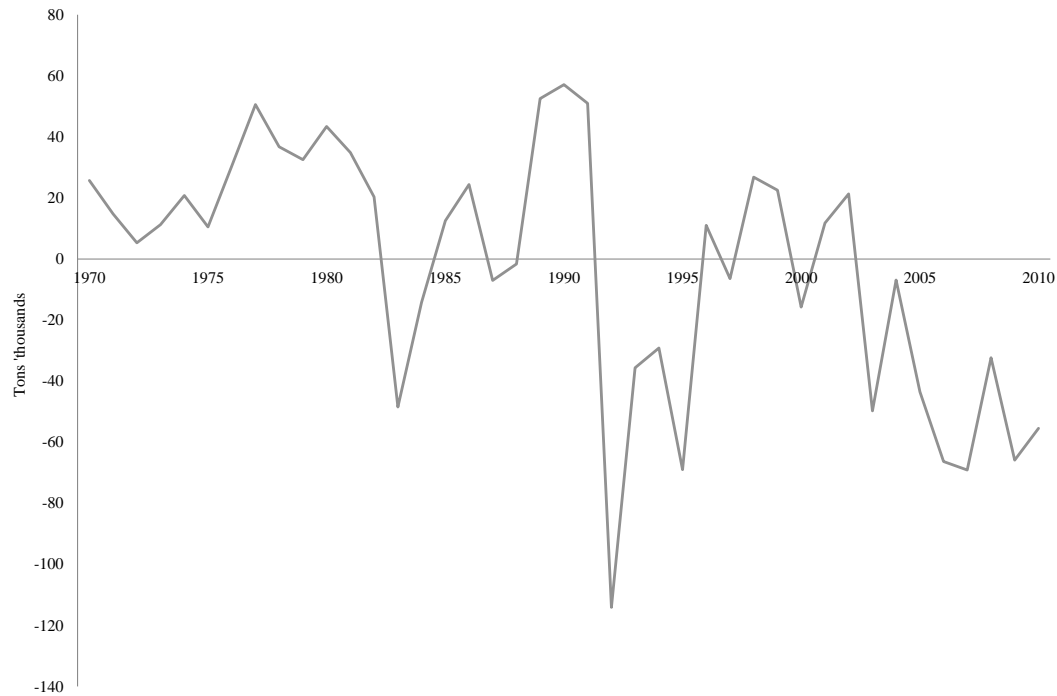
Total MCE: Total average annual production outgrew total annual consumption of this food group by 1.72% to 1.48% during the period 1981 to 2010. South Africa was thus a net exporter during most of the years analysed as is expected to retain this status in future.

3.2.5 Vegetables

An analysis of that data shows that South Africa was a net exporter of vegetables by volume until 1991, but became a net importer thereafter, importing an average of 29 000 tons per annum during the period 1992 to 2010, as shown in figure 3.2.5. A closer inspection of the data shows that onion and potato exports grew at annual rates of 8.8% and 5.5% respectively during this period, and represented 44% of total vegetable exports in 2010. This growth, however, was offset by the growth in dry bean (classified as a vegetable) imports since 1992. Imports of this vegetable item increased from two tons in 1991 to 106 000 tons in 1992. The total imports of this item have decreased since, but still averaged 66 000 tons per year during the period 2001 and 2010. The combined average exports of onions and potatoes were 58 000 tons per year during the same period.

3.2.6 Summary of all main foodstuffs: cereals, meat, MCE and vegetables

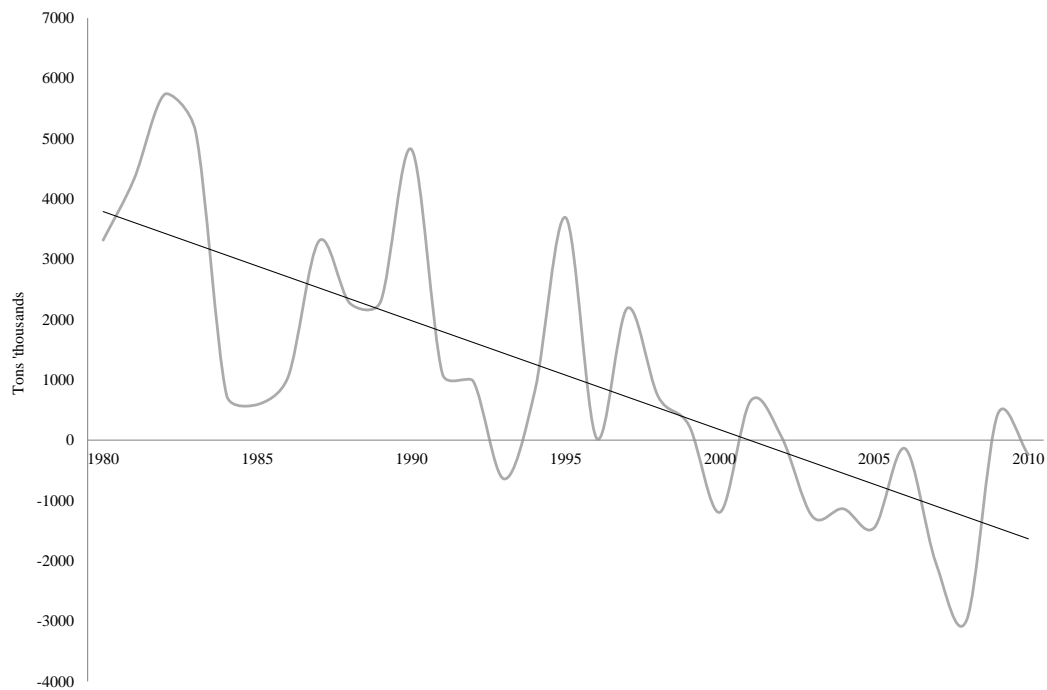
It has been shown in this section that the overall cereal production has not been able to meet the domestic demand during the period 2001 to 2010. Maize



Source: FAO Stat (2012)

Figure 3.8: Net exports: vegetables

production, as the exception, is still able to meet the domestic demand, but this could be reversed if yields do not continue to grow or the area planted decreases below 2.3 million hectares after 2015. The total net imports of all the meat products analysed increased significantly during the period of analysis. This was driven by the sharp increase in chicken meat consumption and imports, which more than offset the decrease in imports of both lamb and beef. This upward trend in meat product imports was strengthened by the sharp increase since 1993 in the imports of feed component products such as sunflower and soybean oilcakes. South Africa retained its status of net exporter by volume of MCE during the period of analysis. The sector was also able to meet the local demand for vegetables. It is therefore reasonable to conclude that South Africa has moved from being a net exporter of primary foodstuffs to being a net importer of primary foodstuffs by volume since the mid-1990s, as is reflected in figure 3.2.6. The agricultural sector is therefore unable to supply in the domestic demand of the main food items consumed. This situation is expected to worsen with meat, cereal and oil cake net imports expected to grow towards 2020.



Source: Compiled from Directorate of Agricultural Statistics (2012), BFAP (2011), FAO Stat (2012) and Trade Map (2012).

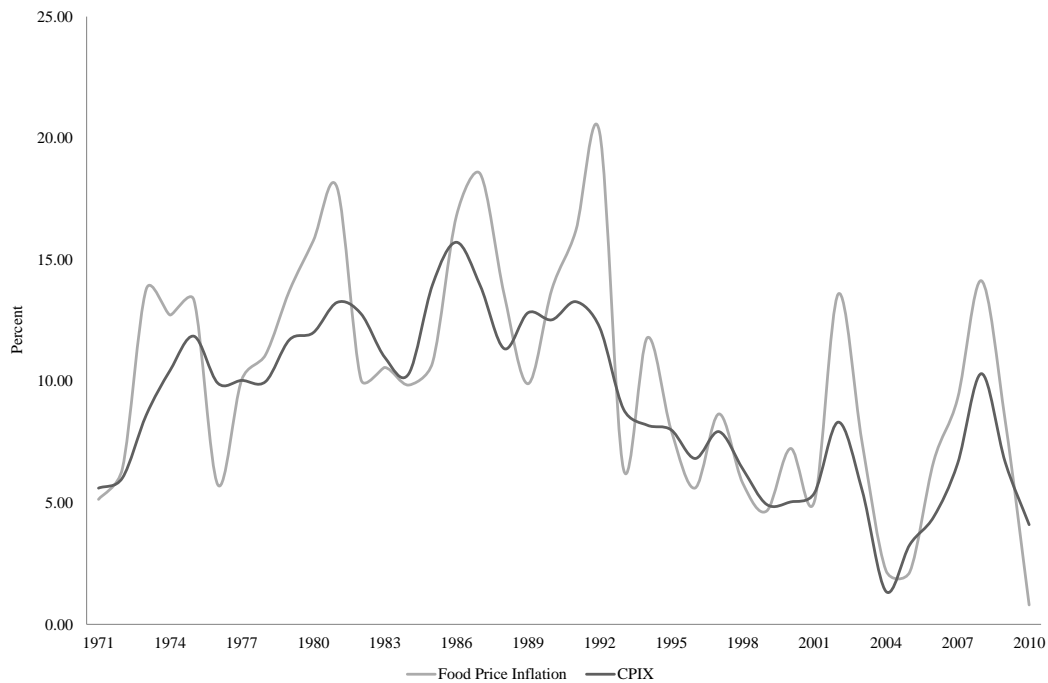
Note: Growth rates calculated according to the ordinary least squares method.

Figure 3.9: Net exports: cereals, meat, MCE and vegetables

3.3 Food prices and inflation

Chapter 2 and the introduction to this chapter stated that the agricultural sector had to be able to provide in the domestic demand for food in order to prevent a worsening in the intersectoral terms of trade between the agricultural sector and the rest of the economy, which would avoid the "Ricardian trap". This is a valid concern because the impact of rising food prices on the economy would be significant given that they constitute 20.6% (20.99% before 2008) of the consumer price index (Stats SA, 2008). In section 3.1 it has also been illustrated that the lower-income half of the population, which represents a large portion of unionised workers, would be most affected by increases in the food price, given the fact that they spend between 28 to 31% of their total budget on food. This group would therefore be more likely to demand wage increases in response to an increase in food prices.

Figure 3.3 depicts the average annual inflation and food inflation rate as published by Stats SA (2012). This figure clearly shows a gradual increase in food



Source: Stats SA (2012)

Figure 3.10: Annual general and food price inflation

price inflation during the period 1971 to 1992. The trend is reversed, however, from 1993 onwards. Table 3.4 presents the 10-year average general and food price inflation for the periods 1971 to 2010, in which this clear downward trend since 1990 is also reflected. This result is the opposite of what is expected by the proponents of the domestic food self-sufficiency argument. The reason for this result is that proponents of the self-sufficiency argument make the implicit assumption of a closed economy, or they do not perceive imported food as an option. They argue with regard to the latter that food imports are unnecessary foreign exchange wastage (Brand, 1969). Also, imported food would have been contrary to the pre-1990s development model of import substitution and self-sufficiency (Vink and Kirsten, 2002).

Table 3.4: Ten-year average inflation: 1971 to 2010

	General inflation (CPIX)	Food price inflation
1971 to 1980	10.78	9.62
1981 to 1990	12.76	13.18
1991 to 2000	8.17	9.46
2001 to 2010	5.60	6.98

Source: Stats SA (2012), own calculations

The decrease in food prices since the 1990s coincides with a period of increased access to international markets (late 1980s) and the deregulation of agricultural marketing (completed in 1998). This policy reform resulted in the abandonment of fixed prices, production quotas and the policy of import protection and import substitution. It shifted the country from an import substitution to an export led growth strategy (Vink and Kirsten, 2002; Vink, 2003). This policy shift not only resulted in a great increase in the quantity of imported food, as shown in section 3.2, but also led to great increase in the efficiency of local agricultural production (Kirsten, 1999; Liebenberg and Pardey, 2010; Liebenberg, 2012*a*). It still has to be established how these increased food imports were afforded. Some authors argue that it would be a waste of foreign exchange reserves that could have been used to afford more important imported products (Brand, 1969). Others cite the detrimental effect of a worsening trade balance and the depreciation of the currency that increases the price of food even further (Headey and Fan, 2008; Von Braun, 2008).

Another fact that has to be taken into account is that food prices are no longer only dependent on the production and demand for human food consumption. Research by the FAO (2009) has shown that the production of ethanol and biodiesel have a significant impact on cereal prices. Cereal stock levels, for example, have been declining due to biofuel production at a rate of 3.4% per year since the mid-1990s, and reached their lowest levels during the food crisis of 2008 . Recent research has estimated the impact of the biofuel industry on cereal (mainly corn and soybean) prices at between 10 and 20% over the long run (FAO, 2008; OECD, 2008; FAO, 2009; Baffes and Haniotis, 2010). It is therefore an oversimplification to simply investigate the supply of and consumption demand for food.

3.4 Conclusion

The ability of the South African agricultural sector to provide in the domestic demand for food was evaluated in this chapter. Theorists argue that in order for the sector to fulfil this role it has to be able to meet the local demand for food in order to prevent a “Ricardian trap” caused by rising food prices, or to prevent the wastage of foreign reserves on food imports.

Section 3.1 investigated South African household food consumption trends in order to establish which are the main food items consumed, and what the share of food expenditure is in the total household budget. This section showed that the lower-income half of the population spent between 28 and 31% of their disposable household income on food in 2005. The analysis also found that the average household spends two thirds of its food budget on four main food items, namely meat (25%), bread and cereals (21%), milk, cheese and eggs (10%), and vegetables (10%). Section 3.2 analysed the production of, total demand for and trade in the four main food groups identified in section 3.1. This section concluded that the country moved from being a net exporter of these food items by volume, to being a net importer of them since 2000.

Section 3.3 investigated the food and general inflation effect of the agricultural sector's inability to meet the local demand for food. This section showed that the sector's inability to meet the local demand for food did not lead to increased inflation as projected by the literature, but had the opposite effect: food inflation decreased significantly since 1992. This was due to the deregulation of agricultural marketing and the liberalisation of trade that enabled and increased imports, which in turn increased the efficiency of domestic production.

This chapter therefore concludes that the agricultural sector was not able to meet the domestic demand for the main food items consumed since 2001. This, however, did not lead to the expected increase in food prices, but rather had the opposite effect. This was due to imported food items and increased efficiency due to increased international competition. It is uncertain, however, what the effect of the increased food imports was on the agricultural and total trade balance.

Chapter 4

Agricultural Trade and the Expansion of Agricultural Exports

The role of agricultural exports in economic development was one of the main points highlighted by Johnson and Mellor (1969) and was also analysed by Brand (1969). Brand evaluated the role of agricultural exports in terms of a framework proposed by Kindleberger (1962), according to which an export sector can either have a leading, lagging or balancing role in the economy. In order for an export sector to have a leading role, it has to be able to communicate its growth to the rest of the economy, thereby inducing growth in the whole economy. Based on a broad analysis of literature, Brand (1969) concluded that there are three factors that determine whether an export sector can provide growth-leading impetus.

The most important requirement, put forward by North (1964), is that of a social and economic climate conducive to investment. Such a climate would ensure that the gains from trade in the relevant sector are reinvested in the local economy. The second condition is that the export sector in question has to have strong backward and forward linkages with the rest of the economy. This conclusion is based mainly on the work of Hirschman (1958) and will be discussed in chapter 7. The third condition is that agricultural exports have to expand rapidly. This argument is based primarily on the work of Prebisch (1950) and was extended by Nurkse (1961). Nurkse argued that, as development progresses, the international terms of trade shift against the

export of primary products such as agricultural output. This is due to the fact that the prices of primary products, relative to non-primary products, decline with economic development. Agricultural exports, being low-value and high-volume products, would therefore have to outperform high-value manufactured exports by volume in order to play a growth-initiating role in economy.

If the agricultural export sector does not meet the above criteria, it will play a balancing or lagging role in economic development. A balancing sector can still make an important contribution to economic growth through its contribution to earning foreign reserves. Such reserves can be used to offset the possible exchange losses of other, growth-leading sectors in the economy, which may not necessarily earn sufficient reserves themselves. If the sector does not maintain a positive trade balance, it simply has a lagging role in economic growth, because other sectors first need to earn foreign reserves before net agricultural imports can be afforded.

Brand (1969) concluded that the South African agricultural export sector did not play a leading role in economic growth, because it did not meet the third criterion for leading export sectors: Brand argued that, due to their small share in total exports, agricultural exports could not contribute significantly to economic growth, even if strong backward linkages with the rest of the economy existed, or all the gains from trade were reinvested. Brand concluded, however, that the South African agricultural sector did play an important balancing or enabling role in economic development by earning foreign exchange reserves. This enabled economic development, which at the time was driven by a policy of industrialisation through import substitution, and the growth in domestic final demand.

Van Zyl *et al.* (1988) revised this conclusion by reapplying Brand's criteria. They concurred with Brand that the sector did not play a growth-leading role, but rather an essential balancing role during their period of analysis.

In this chapter the role of agricultural exports in the growth of the South African economy will be investigated in order to establish whether it still plays a balancing role in economic growth. This is achieved by reapplying Brand's criteria to the period 1961 to 2010. The first section provides an overview of the South African agricultural export sector during the period of analysis. In the second section, Brand's criteria are reapplied to South African agricultural

exports in order to establish whether they played a leading role in economic development. The conclusion is that this is not the case, so in the third section the question whether agricultural exports played a balancing or lagging role is addressed. The final section concludes this chapter by way of a summary of the arguments.

4.1 South African agricultural trade: 1961 to 2010

South African gross agricultural exports declined during the period of analysis at an annual rate of 0.3%, while gross agricultural imports increased at an annual rate of 4.06%, as reflected in table 4.1 and figure 4.1. Agricultural exports declined the fastest during the period 1980 to 1991 at an annual rate of 2.04% per year.

Table 4.1: Growth rates in agricultural and total South African trade (percentages)

	RSA total		Agriculture		Net trade
	Imports	Exports	Imports	Exports	
1961 to 1971	6.56	3.07	3.01	-1.60	-2.86
1971 to 1980	3.98	16.30	-2.28	1.60	2.79
1981 to 1990	-2.46	0.61	-0.77	-2.04	0.29
1991 to 2000	7.26	4.26	5.98	6.36	12.28
2001 to 2010	5.26	3.35	7.61	2.98	-8.00
1961 to 1985	4.04	7.43	5.46	-0.73	-4.21
1986 to 2010	4.83	2.87	4.87	2.86	-0.67
1961 to 2010	2.93	4.01	4.06	-0.30	-3.57

Source: Directorate of Agricultural Statistics (2012), Liebenberg (2012), South African Reserve Bank (2012)

Note: Growth rates calculated using ordinary least squares

Agricultural exports recovered sharply after 1991 by growing at an annual rate of 6.36% between 1990 and 2001, and 2.98% between 2000 and 2011. Agricultural imports slowed during the 1970s and 80s, but increased significantly during the 1990s and 2000s, growing at annual rates of 5.98 and 7.61% over the respective latter decades (DAS, 2012; Liebenberg, 2012*a*). This was mainly due to the liberalisation of trade and the deregulation of agricultural marketing that took place due to the political changes in this period. An illustration

of the scope of the liberalisation of trade is provided by the fact that the tariff lines were reduced from 12 500 to just 200 in the 1990s (Vink *et al.*, 2002; Tregurtha *et al.*, 2009).



Source: Liebenberg (2012)

Figure 4.1: South African agricultural imports and exports

Quite a number of interesting shifts in the composition of South African agricultural trade took place during the period of analysis, but most of these fall beyond the scope of this thesis. For a detailed analysis of the changing nature of South African exports, refer to Vink *et al.* (2002a). For the purpose of the present study, two points need to be highlighted. The first concerns the exports of fruit and wine. During the period of analysis the share of fruit and wine exports in total agricultural exports, in value terms, increased from 29% in the 1960s to 68% during the 2000s. This is illustrated in figure 4.1. During the period 1961 to 2009 the fruit and wine export sector realised an average annual growth rate of 2.13%, while total agricultural exports, excluding fruit and wine, declined at an average annual rate of 2.29%. Fruit and wine exports achieved the highest annual growth rates in the 1990s (7.2%) and 2000s (5.74%). Table 4.2 shows that wine exports were the biggest contributor to the growth in this sector, with an impressive average annual growth rate of



Source: FAO Stat (2012)

Figure 4.2: Fruit and wine versus total non-fruit and wine agricultural exports

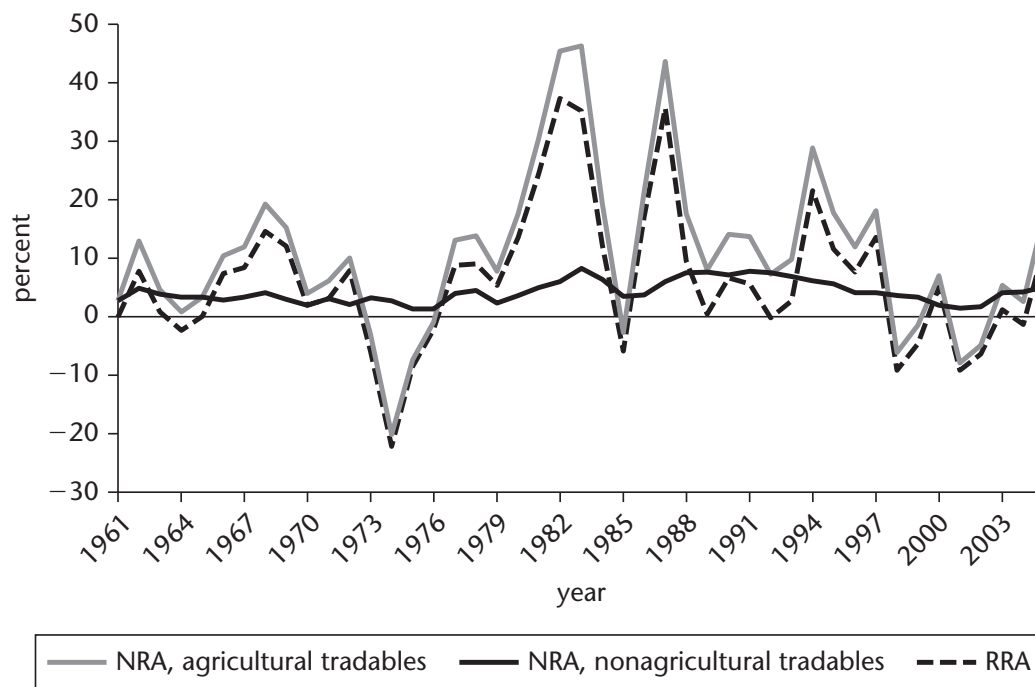
27.06% between 1990 and 2001. This impressive growth rate was realised from a very low base of R0.5 billion (1991), which increased to R4.8 billion in 1999 (2005 prices). Wine export growth has since slowed to an average annual rate of 6.88% between 2000 and 2010.

Table 4.2: Exports: growth rates of selected agricultural products

	1971-1980	1981-1990	1991-2000	2001-2010
Fruit and vegetables	1.86	-1.20	3.24	5.00
Grains, oilseeds and pulses	2.37	-4.20	4.43	4.40
Livestock production	0.32	-1.67	3.56	-2.39
Oilcakes	-9.79	7.86	-13.88	-18.31
Plant oils	15.61	-2.62	1.41	-0.24
Natural fibre excl. wool	7.43	7.17	-2.71	-2.70
Wool	-3.34	-0.42	-7.46	6.04
Wine	-3.63	6.28	27.06	6.88
Tabacco	-5.10	1.28	9.89	-7.47
Sugar	1.82	-0.58	17.91	-4.71

Source: FAO Stat (2012) Note: Growth rates calculated by ordinary least squares

The second trend is the increase in feed oilcake and plant oils (mostly sunflower and soybean) imports. The share of this category in total agricultural imports increased from 3% during the 1960s, to an average of 18% since 2000. During the period 1991 to 2010 imports of oilcakes and plant oils increased at an average annual rate of 6.81%, while agricultural imports, excluding these products, grew at a rate of 1.49%.



Source: Kirsten *et al.* (2009)

Figure 4.3: Nominal rates of assistance for agricultural and non-agricultural tradables and the agricultural relative rates of assistance, South Africa, 1961-2005

According to Kirsten *et al.* (2009) these shifts are the result of distortions to agricultural incentives, illustrated in figure 4.1. This figure presents a comparison between the nominal rate of assistance (NRA) for the agricultural sector to that of the NRA for non-agricultural tradables (manufacturing, mining and highly processed agricultural products). The figure also presents the relative rate of assistance (RRA) to the agricultural sector. The agricultural RRA gives an indication of the incentive to produce agricultural tradables relative to non-agricultural tradable products. This figure shows that the distortions in the agricultural tradable sector, relative to that of non-agricultural tradables, were high during the period 1960 to the mid-1990s, with the exception

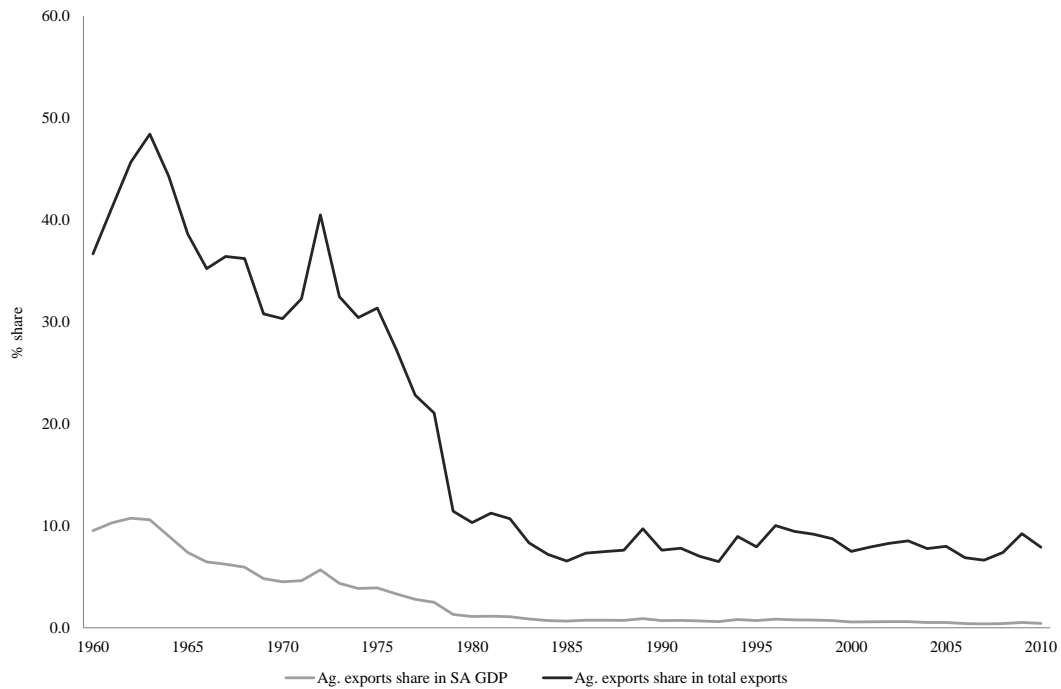
of the period 1972 to 1976 due to the world food crisis. This coincides with the periods in which the agricultural sector received the highest transfers from government, as illustrated in chapter 6. The deregulation of agricultural marketing and liberalisation of trade, however, lowered the support to the sector to such an extent that the resource allocation shifted against agriculture and towards non-agricultural industries (Kirsten *et al.*, 2009). Figure 4.1 shows that this shift was not against the entire agricultural sector, but against non-fruit and wine tradables. This was mainly due to the reduction in production and trade in grains, as illustrated in chapter 3.

4.2 South African agricultural exports as a leading sector?

In this section it will be established whether agricultural exports play a leading role in the growth of the South African economy by re-evaluating the sector using Kindleberger's (1962) criteria. These criteria have to be preceded by another, which is that of scope. If South African agricultural exports are insignificant in relation to the rest of the economy, their impact on economic growth would also be insignificant, even if all the criteria are met. In this section, this question is therefore attended to before any further analysis.

Agricultural exports' share in total exports declined from an average of 38.4% during the 1960s, to an average of around 8% since 1985, as reflected in figure 4.2. In this respect the prospects for agricultural exports to play a leading role in economic growth do not seem very good. One other point of analysis remains, however, namely agricultural exports' share in the economy. Agricultural exports could still have a significant role if total exports represent a large portion of the total economy. Based on figure 4.2, this does not seem to be the case. Agricultural exports' share in the South African GDP declined from its highest level of 10.7% in 1962, to its current level of 0.4% (2010). What is more, this position is worsening: agricultural exports' share in GDP decreased at an average annual rate of 4.11% from 2001 to 2010. One can therefore conclude that even if all the gains from agricultural trade were reinvested in the domestic economy, the impact on economic growth would be insignificant due

to the small contribution of agricultural exports to GDP.



Source: Liebenberg (2012)

Figure 4.4: Agricultural exports: share in total exports and GDP

4.2.1 Agricultural exports and linkages with the rest of the economy

Brand (1969) concluded that even if South African agricultural exports had strong backward and forward linkages with the rest of the economy, they still could not play a leading role in economic development due to their relatively small contribution to GDP. In light of the previous section it seems that the situation has worsened significantly since the publication of Brand's study. One can therefore conclude without further analysis that agricultural exports, with a 0.4% share in GDP, is unlikely to have a leading role in economic growth, even if strong linkages existed. Although recent research on the linkages between the agricultural sector and the rest of the economy is quite limited, this topic will be investigated in chapter 7.

4.2.2 The rate of expansion of agricultural exports

The argument for this criterion is based on Nurkse's (1961) theory that there is a structural bias against agricultural trade, which leads to a worsening in terms of trade between the agricultural and the non-agricultural sector. The bias against the sector can also be due to the distortions of agricultural trade as discussed in subsection 4.1. Nurkse (1961) argued that this bias is due to the decline in the relative prices of primary goods, which leads to a situation where the value of primary trade can decline while the quantity remains constant or increases. This theory is an extension of Schultz's (1945, p.49) theory of the farm problem. Nurkse (1961) argued that in order for agricultural exports to play a leading role in economic growth, they have to expand at a rapid rate to overcome these structural biases. The problem with this argument is that it makes the assumption that agricultural trade consists only of primary goods. This may have been the case during the 1960s, but things have changed since then, with the world trade in processed agricultural products increasing its share of total agricultural exports from 27.3% in 1980-81 to 38.3% in 2000-01 (Aksoy and Beglin, 2005). This trend was also apparent in the analysis of South African agricultural trade in section 4.1. The fastest growth in trade since the 1990s was achieved by the following processed agricultural products: wine, feed oil cakes and vegetable oils. In light of this one can argue that the assumption underpinning the expansion criterion does not necessarily hold in the changing world of agricultural trade. Agricultural exports are therefore not required to expand at such a rapid rate as previously proposed in order for this export sector to play a leading role in economic growth.

In a comparison between the growth of South African agricultural exports and total exports, one would expect agricultural exports to at least match or outpace the growth in total exports in order for it to play a growth-leading role. Figure 4.2 shows that agricultural exports' share in total exports has increased in some years, most notably 1963 and 1972. This indicates that the growth in agricultural exports outpaced that of total exports during these years. Agricultural exports' share in total exports declined sharply between 1961 and 1985. However, growth in agricultural exports matched that of total exports during the period 1986 to 2010. One can thus conclude that South African agricultural exports did not meet the criterion of exceeding the growth

rate of total exports.

4.2.3 Combining the criteria

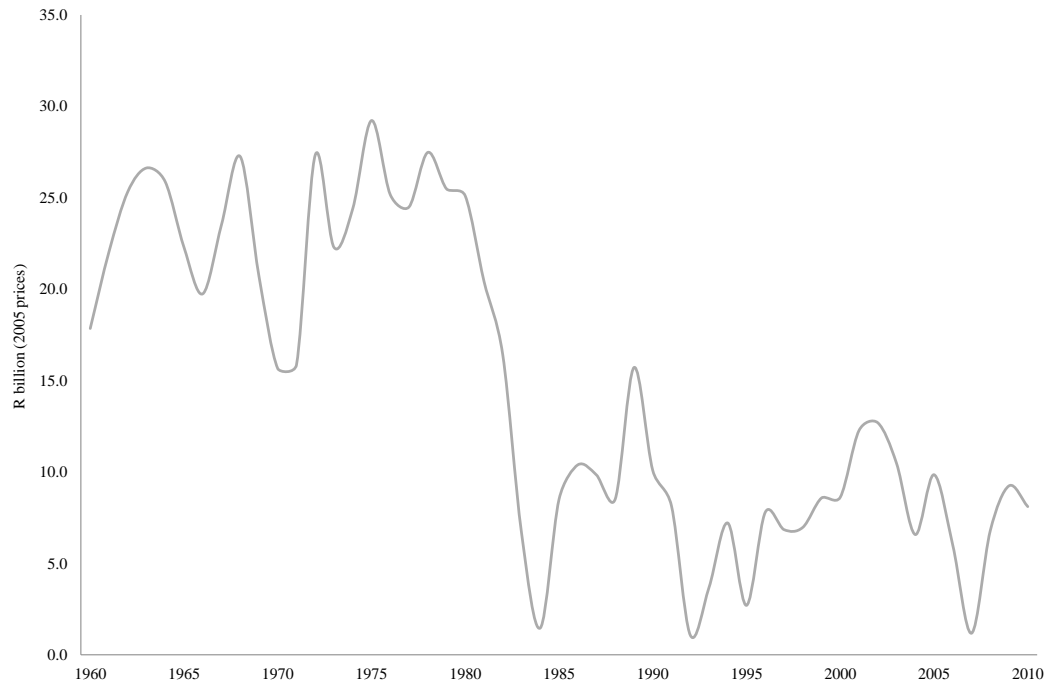
This section has shown that South African agricultural exports did not play a leading role in economic development during the period of analysis because none of the criteria in order for it to do so were met. This is due to agricultural exports' small share in total exports, small share in GDP and slow rate of growth relative to total exports. This section therefore agrees with the conclusion reached by Brand (1969).

4.3 Balancing or lagging role

In the previous section the conclusion is that the agricultural export sector does not play a leading role in economic development in South Africa. The last question is to establish whether it plays a balancing or lagging role in economic growth. In order to decide this, one has to investigate the agricultural trade balance. Brand (1969) and Van Zyl *et al.* (1988) concluded that the agricultural sector played a balancing role in economic development. This was due to the fact that the sector maintained a positive trade balance, which enabled the country to afford more imports, especially in growth-leading sectors (which do not necessarily maintain a positive trade balance).

Figure 4.3 shows that the South African agricultural sector maintained a positive trade balance during the period 1960 to 2010. The size of this positive trade balance, however, declined at an average annual rate of 3.57% between 1960 and 2010. Table 4.1 illustrates how agricultural import growth has outpaced export growth. Agricultural exports, for example, increased at an annual rate of 2.98% between 2000 and 2011, while imports increased at 7.61% per year during the same period.

Table 4.3 shows the total trade balance (excluding agriculture) in the first column, and the agricultural trade balance in the second column. This table shows that the foreign reserves earned from agricultural trade contributed significantly to total reserves - at times sufficiently to turn a negative trade



Source: Liebenberg (2012)

Figure 4.5: South African net agricultural exports

Table 4.3: Balance of trade: total economy (excluding agriculture) versus agriculture

	Net exports excluding agriculture	Agricultural net exports
	R billion (2005 prices)	
1961-1965	-75.3	24.4
1966-1970	-83.1	21.4
1970-1975	-94.7	23.8
1976-1980	-15.2	25.6
1981-1985	17.8	10.7
1986-1990	48.7	10.9
1991-1995	31.2	4.6
1996-2000	3.1	7.8
2001-2005	-5.3	10.4
2006-2010	-32.3	6.3

Source: Compiled from Directorate of Agricultural Statistics (2012), Liebenberg (2012), South African Reserve Bank (2012), World Bank (2012).

balance to a positive one. This table, however, also shows that the size of the positive agricultural trade balance has decreased significantly from its highest level of R25 billion during the second half of the 1970s. This has reduced the impact of agricultural trade on the total trade balance significantly. The risk also exists that the sector could end up with a negative trade balance, which would make it a lagging sector.

4.4 Conclusion

Brand (1969) and Van Zyl *et al.* (1988) concluded that South African agricultural exports played neither a leading nor a lagging, but rather a balancing role in economic growth. This chapter has re-evaluated their findings in order to establish whether this is still the case. The re-evaluation of the agricultural export sector was preceded by a short overview of the composition of and trends within agricultural trade during the period 1960 to 2010. This analysis shows that agricultural exports declined significantly during the early 1980s, but that they have increased since the 1990s. Agricultural exports, however, did not regain their previously prominent share in total exports after the sharp decline in the early 1980s, and retained an 8% share in total exports during the period 1985 to 2010. Agricultural exports' share in total GDP also declined significantly during the period of analysis, declining from its highest level of 10.7% in 1962 to a level of 0.4% in 2010.

In terms of agricultural exports' role in economic growth, the conclusion is that the agricultural sector did not play a growth-leading role because it did not meet the criteria required for it to do so. This conclusion is reached mainly on the basis of the relatively small share of agricultural exports in total exports, their small share in GDP, and their slow rate of growth. The impact of the agricultural sector from a reinvestment and linkages perspective would thus be unimportant (small), even if the linkages were strong.

The condition that agricultural exports have to expand at a rapid rate due to their high-volume, low-value nature has been questioned. This is due to the fact that the fastest growing agricultural exports and imports were not in low-value, high-volume goods but rather in processed products such as wine,

feed oilcakes, and vegetable oils, which have a higher value per unit of volume. It is therefore concluded that agricultural exports do not have to exceed non-agricultural exports by such a wide margin as previously proposed in order for them to play a growth-leading role. During the period 1985 to 2010 for example, agricultural exports matched the growth in total exports and therefore could not play a growth-leading role.

In the last section concurred with the findings by the previous authors, concluding that: the sector played an important trade-balancing role during the period of analysis. This conclusion was reached based on the fact that the sector always maintained a positive trade balance and made a significant contribution to the country's balance of payments, even moving the country as a whole from a negative to a positive trade balance at times. It was also found, however, that the extent of the sector's ability to play a balancing role decreased significantly after the mid-1980s. It is also possible that the sector could transition to a negative trade balance. According to Brand (1969) and his contemporaries this would automatically indicate that the sector plays a lagging role in economic growth. This, however, is not automatically the case: a comparison between the agricultural trade balance and economic growth among low, middle and high-income economies reveals that there is no fixed relationship between these two variables. Low-income countries that maintain a negative agricultural trade balance typically have a low rate of economic growth. Among middle and high-income economies, however, the relationship between the agricultural trade balance and rate of economic growth is more heterogeneous (Aksoy and Beghin, 2005).

Chapter 5

Labour Transfers from Agriculture to the Rest of the Economy

The South African government has made the creation of employment one of its main goals. For this purpose, it has identified six key drivers of employment creation in its New Growth Path, with one of them being employment in the agricultural value chain (DTI, 2009). Agriculture's role in the creation of employment was also integrated into the Nation Planning Commission's 2011 National Development Plan. This, however, is not the role of the sector as it appears from classical development economics. There, the role of the sector is seen as the exact opposite, namely to release labour to other sectors for economic development. This view of the sector is argued for by Johnson and Mellor (1961) and Schultz (1964); this is also the context of Brand's study. These authors argue that the sector is a major source of labour for two main reasons, which stem from the structural properties of the sector. The first is the agricultural sector's declining share in total employment as a country develops, and the second is due to the quantitative significance of the sector in a developing economy (Brand, 1969).

The reason for the decline in the agricultural sector's share in the total labour force is twofold. It is in the first instance simply due to the structural property of economic development whereby the agricultural sector's share in the total economy declines as development progresses. This results in a decline in the relative share of the agricultural sector in total employment, even if agricultural

employment does not decline in absolute terms - it could increase, but then at a slower rate than non-agricultural employment (Brand, 1969). The second reason is due to agricultural wages, which are lower than those paid in the rest of the economy. This results in a transfer of labour from the agricultural sector until these differentials are equalised, i.e. until agricultural wages become more comparable with non-agricultural wages (Schultz, 1945). The cause of this wage differential is the low marginal product of agricultural labour in developing countries, which can be referred to as the “disguised unemployment” of the agricultural sector. It is proposed that the agricultural sector can remove a large part of its labour force without reducing its output (Nurkse, 1953). This implies that the marginal product of agricultural labour is very low, or even zero (Brand, 1969). This is in line with the assumptions of dual economy, labour surplus growth models such as that of Lewis. These factors will put constant pressure on agricultural employment and lead to significant transfers of labour from the agricultural sector to the rest of the economy. This will lead to a relative decline in the agricultural sector’s share in total employment, and ultimately to an absolute decline in agricultural employment (Kuznets, 1966).

The second reason for the sector’s large contribution to the labour force is its quantitative significance. This is illustrated by Kuznets (1966) with a simple example. Suppose that 75% (75 units) of the labour force is employed by the agricultural sector¹ and the remainder in the rest of the economy. Further suppose that both sectors grow at an annual rate of 1.5%. At this rate the total labour force will expand by 116 units in ten years, with the agricultural labour force expanding by 12 units to total 87 units, and the non-agricultural sector by 4 units to total 29.

Now suppose that the agricultural sector’s share in total employment declines from 75 to 70% during the period of analysis. The result is the same expansion of the total labour force, but agricultural employment will only expand to 81.2 units, and the non-agricultural labour force to 34.8 units. This means there is a transfer of 5.8 units from the agricultural to the non-agricultural sector, which is larger than the 4 units of increase resulting from the internal growth of the non-agricultural sector. As the agricultural sector’s relative share declines, the extent of the transfer from the agricultural to the non-agricultural sector will

¹Note that the “agricultural sector” represents the rural economy and assumes a mostly subsistence mode of agriculture.

decline as well. The contribution of the internal growth of the non-agricultural sector will therefore exceed that of the contribution from the agricultural sector at some stage of the agricultural sector's decline. This, however, is also a factor of the internal growth of the respective sectors.

The assumption that the internal rate of growth of both sectors is equal, is incorrect because the population growth in rural areas, in which the agricultural sector finds itself, is higher than in urban areas. The effect of this can be illustrated using the same example (Kuznets, 1966). Suppose that the population in the agricultural sector grows by 2% and in the non-agricultural sector by 0.7% per year, and that the share of the agricultural sector in the labour force declines from 75 to 70% in a decade. According to this new set of assumptions the non-agricultural sector would add a mere 1.8 units from its own internal growth. The agricultural sector on the other hand would have to transfer 8.7 units to overcome its high rate of population growth and to be able to reduce its share in the total labour force. These examples clearly illustrate the potential for large transfers of labour from the agricultural to the non-agricultural sector if the agricultural sector employs a significant portion of the total labour force.

Brand (1969) concluded that the agricultural sector made a contribution to the non-agricultural labour force during the period of his analysis. He concluded that the structural transformation of South African agricultural employment followed a similar path to that of other countries presented in the international literature. A distinctive feature of the South African case, however, was that the respective demographic groups did not progress similarly in terms of the sector's structural transformation. By the 1960s, the Asian, white and coloured agricultural labour force had progressed the furthest, with only the coloured agricultural workforce showing an absolute increase. In terms of black agricultural employment, Brand concluded that it increased in absolute terms within commercial agriculture, but shrank in relative terms within the whole economy. The transfer from the homeland areas to the non-agricultural sector therefore outweighed the transfer from these areas into commercial agriculture.

Van Zyl *et al.* (1988) investigated the role of the agricultural sector in terms of labour and concluded that the sector plays an important role in providing employment, especially to coloured and black people. Their research showed

that total agricultural employment started to decline in absolute terms after 1970. The coloured population was the only population group whose employment in agriculture increased in absolute terms after 1970, but the agricultural employment of all the population groups declined in relative terms. Van Zyl *et al.* (1988) therefore concurred with Brand (1969) that the sector was an important source of labour for the rest of the economy.

This chapter revisits the agricultural sector in terms of its role in providing labour to the rest of the economy, in order to establish whether this is still the case. The role of the sector in providing employment, as identified by Van Zyl *et al.* (1988) and stressed by government, is investigated as well

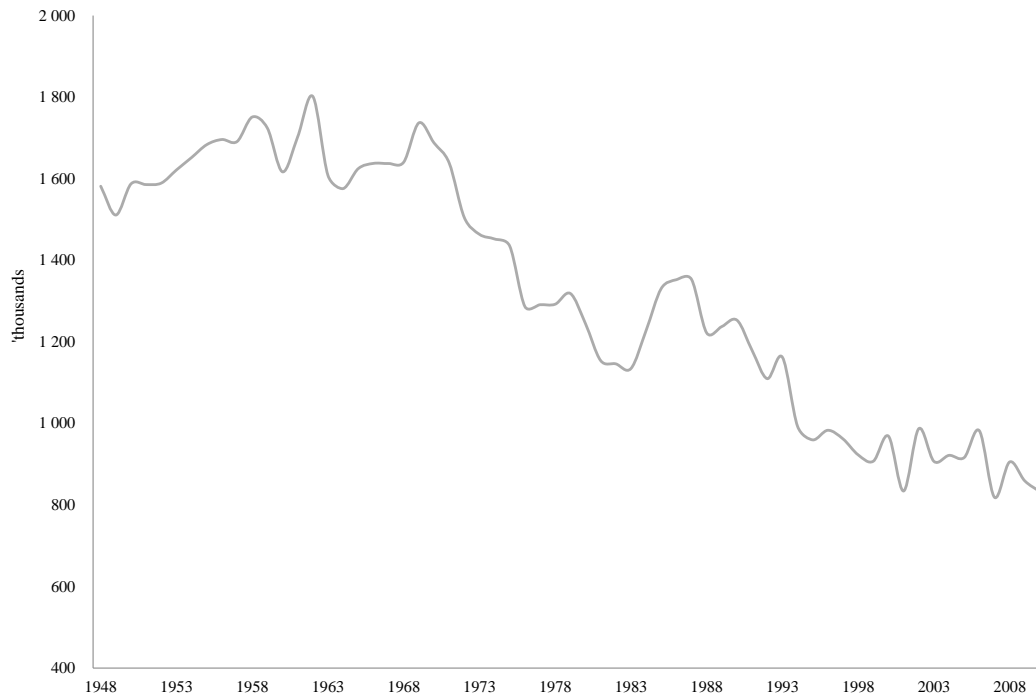
In the first section, South African agricultural employment trends from 1960 to 2010 are analysed. In the second section, the demographic trends in South Africa are investigated in order to provide a better perspective on the current labour force and projected trends therein. The third section integrates the previous sections in order to estimate the agricultural sector's contribution to the South African labour force. This, in turn, is followed by a summary of the arguments put forward, and a conclusion.

5.1 South African agricultural employment trends

South African agricultural employment is depicted in figure 5.1, which shows that agricultural employment increased in absolute terms to its highest level of 1.8 million² in 1962, before declining to its lowest level of 0.832 million in 2010. Agricultural employment grew at an average rate of 0.88% per year during the period 1948 to 1962, and then declined at an annual rate of 1.52% from 1963 to 2010. The fastest rate of decline was recorded during the 1970s, with an average annual decline of 2.68%. This was reversed to an average annual increase of 1.19% during the 1980s. The decline resumed during the

²This figure includes family and propriety labour, as well as seasonal workers, and excludes domestic servants. Seasonal labour is estimated using the available data (Liebenberg, 2012a). These employment figures are about 150 000 workers higher than those provided by the DAS (2012), but are in all likelihood more accurate.

1990s at an average annual rate of 2.63%, but has slowed since 2000 to an average decline of 0.77% per year (Liebenberg, 2012a).³.



Source: Liebenberg (2011)

Figure 5.1: Agricultural employment: 1948 to 2010

The decline in agricultural employment was partially the result of changes in production practices, and government policy and support:

[T]he decline in the number of jobs provided by the South African agricultural sector over the past decades has been exacerbated by bad policies that inhibited export opportunities, encouraged the development of labour saving technology, and actively encouraged the adoption of capital intensive farming practices (Vink and Kirsten, 2001, 24).

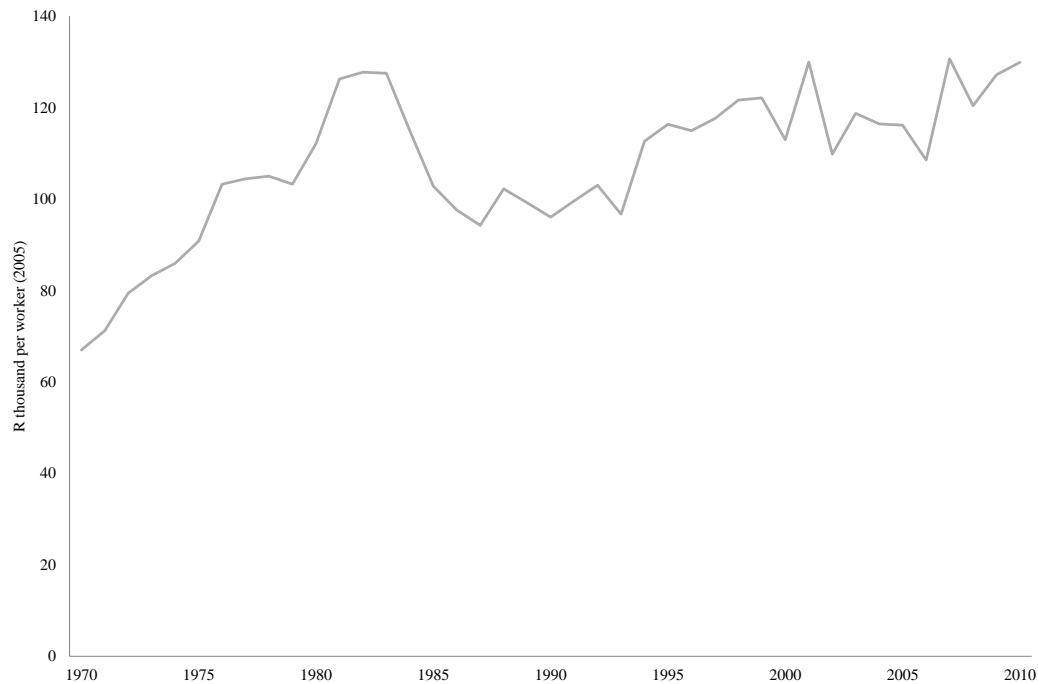
The number of employees per farm as well as per 1000ha cultivated increased from 1945 to 1970 (Van Zyl *et al.*, 1987). This increase was due to the greater

³Growth rates are the author's own calculations, and are calculated according to the ordinary least squares method

adoption of tractors, especially in the grain-producing areas. This greater adoption of tractors led to increased agricultural employment because tractors (i.e. capital) and labour were complementary factors of production (Brand *et al.*, 1992).⁴ This trend, however, was reversed by the rapid adoption of combine harvesters that followed the adoption of tractors during the 1960s. This was due to the fact that, unlike tractors, combines (also capital) and labour are substitutes in production (Brand *et al.*, 1992). The rapid adoption of combines was fuelled by a preferential tax treatment provided by the government of the day (Van Zyl *et al.*, 1987; Fenyes *et al.*, 1988). This is clearly illustrated in section 6.1 and 6.2 that shows that government subsidy spending and agricultural capital formation reached their highest levels in 1981 and declined thereafter. This period also saw an increase in agricultural wages (Brand *et al.*, 1992) and increased use of seasonal labour (Marcus, 1989; Vink and Kirsten, 2001).

These trends are also reflected in the fixed capital stock per worker as shown in figure 5.1. This figure clearly shows a significant reduction in the capital per worker during the period 1981 to 1987. This was due to the reduction in government transfers to the sector as illustrated in section 6.1. This created a shortage of capital in the agricultural sector and led to the substitution of capital for labour, which led to greater agricultural employment as shown in figure 5.1. It is interesting to note that both capital formation and agricultural employment declined during the period 1987 to 2010. During this period, however, the rate of the reduction in agricultural employment was greater than the rate of reduction in agricultural capital formation. Between 2001 and 2010 for example, agricultural employment declined by 0.9% per year, while capital formation declined by 0.4% per year. This led to an increase in capital per worker while both capital formation and employment declined in real terms. Capital per worker therefore did not increase due to an increase in investment (capital formation), but rather due to a relatively fast reduction in the size of the labour force (Liebenberg, 2012a; SARB, 2005b, 2012a). This should be taken into account when considering a figure such as the 168% increase in the capital per worker between 1970 and 1995 as presented by Bhorat (1999) .

⁴It is important to take note of the implications of this statement: capital and labour can be complementary. This is a fact that is often overlooked when an argument against mechanisation is made.



Source: Compiled from the Liebenberg (2012) and South African Reserve Bank (2005, 2012b)

Figure 5.2: Agricultural capital per worker: 1960 to 2010

This figure seems to suggest that the increase was due to an increase in capital formation, which was not the case.

In terms of agricultural employment's share in total employment, the situation changed significantly. In 1985 the commercial agricultural sector employed 13.6% of the total labour force (Fenyés *et al.*, 1988, 144).⁵ This figure declined to 12.0% in 1990, 6.4% in 2000, and 4.6% in 2010, as can be seen from table 5.1 (Liebenberg, 2012a; World Bank, 2012).⁶

Table 5.1 also shows that the agricultural sector shed 136 000 jobs between 2001 and 2010, while the whole economy created 2.9 million jobs over the same period. The whole economy, however, shed nearly double the amount of jobs during 2010 than the agricultural sector shed in a decade. Table 5.1 also shows that the agricultural sector is still relatively labour intensive if compared to the

⁵This figure is calculated using the economically active population of the RSA, self-governing territories excluded.

⁶Accurate labour data for the South African economy is extremely difficult to acquire. A comparison between the World Bank data and those of Stats SA reveals that they compare well during the 1990s, but the former overstate the labour force from the 2000s onwards.

Table 5.1: Employment: RSA labour force and agricultural employment

	RSA labour force		Commercial Agricultural employment		
	Total	Change y.o.y. '000	Total	Change y.o.y. '000	Share in total l.f. %
1990	10403.3		1252.9	15.6	12.0
1991	10799.7	396.3	1178.7	-74.2	10.9
1992	11247.3	447.6	1109.5	-69.2	9.9
1993	11696.1	448.9	1161.9	52.4	9.9
1994	12185.7	489.5	992.5	-169.4	8.1
1995	12638.4	452.7	959.3	-33.2	7.6
1996	13131.4	493.0	982.9	23.5	7.5
1997	13616.5	485.2	961.7	-21.2	7.1
1998	14121.4	504.9	922.7	-39.0	6.5
1999	14677.8	556.4	907.0	-15.7	6.2
2000	15232.8	555.0	968.5	61.5	6.4
2001	15737.1	504.3	834.0	-134.5	5.3
2002	16145.2	408.0	986.8	152.8	6.1
2003	16541.3	396.1	906.7	-80.1	5.5
2004	16863.5	322.2	921.4	14.7	5.5
2005	17212.1	348.6	916.0	-5.4	5.3
2006	17594.0	381.9	981.8	65.8	5.6
2007	18008.9	414.8	818.5	-163.3	4.5
2008	18699.3	690.4	905.2	86.7	4.8
2009	18433.2	-266.1	858.8	-46.5	4.7
2010	18163.0	-270.2	832.3	-26.4	4.6

Source: Agriculture: Liebenberg (2012), RSA: The World Bank (2012)

Note: RSA total compiled by the World Bank from data published by Stats SA (e.g. household surveys, etc.). The abbreviation y.o.y.: year on year and l.f.: labour force

mining and manufacturing sectors: the agricultural sector had a GDP share of 2.2% in 2010, but at the same time employed more than double this percentage of the workforce. The mining and manufacturing sectors on the other hand employed 1.6 and 12.5% of the labour force respectively, while they constituted 8.5 and 12.5% of the economy in 2010.⁷

⁷Calculated using data provided by the National Planning Commission (2011) and the South African Reserve Bank (2012).

5.2 South African demographic trends

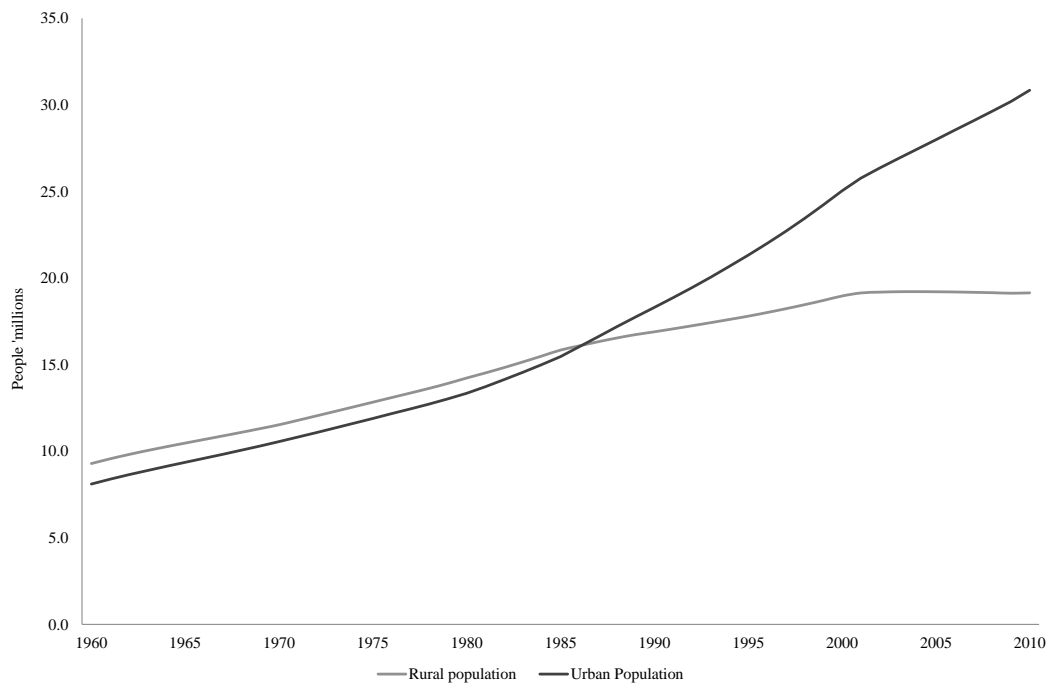
During the period 1963 to 2010, the urban and rural⁸ population grew at average annual rates of 2.59 and 2.02% respectively. This is evident from figure 5.2. One can also see that the urban and rural population grew at roughly the same rate until 1980, before the growth in the urban population accelerated. The growth in the rural population slowed significantly after 1986. This was due to the urban migration that ensued after the abolition of the pass laws in that year. The growth rate in the rural population has slowed significantly since, growing by an average of merely 0.003% per year during the period 2001 to 2010 (World Bank, 2012).⁹

This does not mean that the rural fertility rate (births per woman) was equal to 2.1 (the rate required to maintain the population), however, but rather indicates that the rural emigration rate matched the degree to which the fertility rate exceeded 2.1 since 2000. The Gauteng and Western Cape provinces, for example, which have a largely urbanised population, registered a net gain of 3 and 1 million people respectively during the period 2001 and 2007. During the same period the Eastern Cape and Limpopo provinces, which have a largely rural population, experienced a net loss of 1.4 and 1.2 million people respectively. This trend is expected to continue in future, but at a slower rate (NPC, 2011, 84). The highest fertility rate in 2007 was achieved by the OR Tambo district of the Eastern Cape at 4.1, and the lowest by the City of Cape Town at 2.2 (NPC, 2011, 80).

Given the above discussion, one can make a rough calculation of the number of people that are added to the rural labour force each year, based on a number of assumptions. The first assumption is that the growth in the rural population

⁸The term "rural" should be approached with caution. A rural area is defined as any area that is not classified as urban. Rural areas are subdivided into formal rural areas and tribal areas. Formal rural areas include farms, small holdings, recreational areas, rural industrial areas, collective living areas (institutions) and hostels. Tribal areas include vacant areas, tribal settlements, recreational areas, tribal industrial areas, collective living areas (institutions) and hostels (Stats SA, 2001). Tribal areas can thus include large "urbanised" settlements, depending on the definition. The rural population is therefore overestimated in the statistics. Another complicating factor is the migration of labour between rural areas, especially between tribal and urban areas. The South African labour force shows a circular flow between urban and rural areas, and from rural areas to other rural areas, the scope of which is difficult to estimate (NPC, 2011, 85).

⁹Own calculations, rates calculated according to exponential growth.



Source: World Bank (2012)

Figure 5.3: South African urban and rural population: 1960 to 2010

originates from within the rural area, i.e. that people do not migrate from urban to rural areas. One also has to keep in mind that growth indicates that the fertility rate is higher than the rate required to maintain the population, which is 2.1. If this rate is maintained, the people who enter the labour force each year will simply replace those who exit each year. A positive growth rate thus indicates that new jobs have to be created for these additional people. The second assumption is that people in rural areas enter the labour force at an age between 16 and 24. The third assumption is that people only migrate to urban areas after they reach the working age of 16.

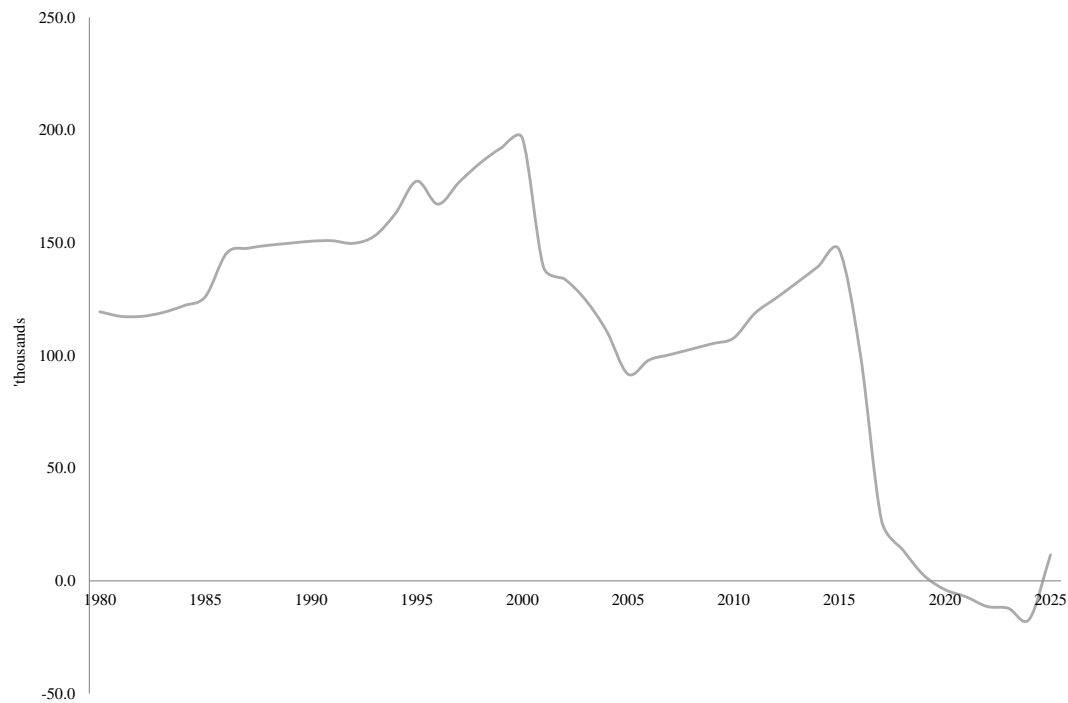
Given the assumptions above one can estimate the number of people that is added to the labour force by rural areas each year. This can be done by calculating the year on year increase in the rural population and then lagging it by 16 years. The population added in 1960, for example, will reach the age of 16 by 1976. The next step is to calculate the number of people who actually reach this age and participate in the workforce. This is calculated by multiplying the number of people who reach the age of 16 by the labour

participation rate.

Accurate data on the South African labour participation rate is fairly limited and is only formally available from 1990 (Casale, 2003). This rate is also only available at a national level, differentiated between male and female, and calculated as a percentage of people over the age of 15 who participate in the labour force. According to this statistic, the male participation rate decreased during the period 1990 to 2010, while the female participation rate increased. The figure for the whole population (male and female) moved within a narrow band between 56 and 59% during the entire period (World Bank, 2012). The average overall participation rate for the period 1990 to 2010 stands at 56.92%. This is somewhat higher than the figure indicated by the National Planning Commission (2011) at 54%. The figure of 57% is therefore assumed to be the average participation rate and is the one used in the following calculations.

The number of people added to the rural labour force was calculated under the above assumptions, and this figure is depicted in figure 5.2. Note that this figure has been calculated for beyond 2010 due to the lag in the value. This gives an indication of the future contribution of rural areas to the labour force. A negative value indicates that the rural population declined during the relevant period, which means that the migration rate exceeded the population growth rate. Interestingly, the sharp drop after 2000 is exactly 16 years after the abolition of the pass laws.

One could also interpret the data according to a broad time-frame. Rural areas added a 1.34 million people to the labour force during the period 1981 to 1990, 1.72 million during 1991 to 2000, and 1.11 million during 2001 to 2010. Rural areas are expected to add 0.80 million people during the period 2011 to 2020. Figure 5.2 also shows that the rural population “youth bulge” has preceded a similar bulge expected in urban areas, as discussed in the National Planning Commission’s Diagnostic Overview (2010). This bulge is part of the reason for the high unemployment rate of 46.7% for black youths between the age of 15 to 24 in 2008. This conclusion has significant implications in terms of employment creation and the level of unemployment, especially for the rural economy.



Source: World Bank (2012)

Note: Own calculations

Figure 5.4: Number of workers added per year to the labour force by rural areas: 1979 to 2028

5.3 The contribution of the agricultural sector and rural areas to the labour force

The first thing to note is that theorists on the topic of this chapter regard the agricultural sector and the rural subsistence sector as one and the same thing. Their view is that people who are not employed in the modern sector (i.e. the non-agricultural sector) will return to the traditional sector (i.e. the agricultural sector), where they will resume agricultural production (Lewis, 1954; Johnston and Mellor, 1961; Kuznets, 1966). The situation in the South African rural sector is more complex, however, due to its dual nature. It includes both a modern commercial agricultural sector and a traditional subsistence sector, which co-exist. Rural workers who cannot find work in urban areas (the modern sector) can seek employment in the commercial agricultural sector (the “rural modern sector”) or can return to the former homeland areas where they can make a subsistence or small-scale agricultural living if they have access to

land in these areas.

If one follows Kuznets's (1966) logic, as presented in the first section, the rural area's potential contribution per year to the labour force is equal to the number of people that are released by the agricultural sector each year (as explained in section 5.1), plus the number of people that were added to the labour force in rural areas each year (as explained in section 5.2). This assumes that the new additions to the labour force do not engage in meaningful production in the homeland areas. This is reasonable to assume, given the fact that between 10 and 20% of people between the age of 15 and 39 years participate in farming activity, while the largest portion of the total population who practise farming do so for the purpose of an extra source of food (Aliber, 2009). One also has to remember that this group is additional to the people who already make a living in these areas.

The labour released by the commercial agricultural sector plus the rural contribution to the labour force is presented by table 5.2. This table depicts the total "potential rural contribution" on a per decade basis, and shows that this figure was close to 2 million people during the decade 1991 to 2000, for example. This table also illustrates that the increase in the "potential contribution" has not been due to a decrease in agricultural employment, but rather due to the growth in the number of people added to the rural labour force. The agricultural sector added 8 500 jobs during the period 1981 to 1990, and shed 284 000 and 136 000 jobs during the respective decades 1991 to 2000 and 2001 to 2010.

Table 5.2: The rural labour "contribution"

	Rural total	Agriculture	Total contribution
		'000	
1961-1970		70.9	
1971-1980		-443.2	
1981-1990	1,345.0	8.5	1,336.4
1991-2000	1,712.4	-284.4	1,996.8
2001-2010	1,114.6	-136.1	1,250.7
2011-2020	802.8		802.8

Source: Liebenberg (2012), World Bank (2012) *Note:* Own calculations

In light of the above it can be concluded that the agricultural sector and rural

areas have made a significant contribution to the labour force during the full period of analysis. The problem, however, is that it is doubtful whether all these “contributed workers” find employment in the present commercial agricultural sector or outside rural areas, while only a few can make a subsistence living in rural areas. Most of these workers could therefore simply end up being unemployed.

5.4 The role of the agricultural sector as employment creator

The creation of employment is one of government’s key goals, as indicated in the National Planning Commission’s National Development Plan and the Department of Trade and Industry’s New Growth Path. Both highlight the importance of the agricultural sector’s role in creating employment, specifically in the processing sector (DTI, 2009; NPC, 2011). The sector’s ability to create employment was also the subject of a study by BFAP (2011b), which found that the sector could potentially create a million employment opportunities. According to the study, this could be achieved by expanding irrigation agriculture, bringing underutilised land in the communal areas under production, picking and supporting labour intensive agricultural sectors and regions, and supporting the creation of upstream and downstream industries. The study makes the conservative proposal that land under intensive irrigation crops can be expanded marginally by 145 000 ha. A more optimistic outlook puts the potential expansion at more than 500 000 ha. It is also argued that 300 000 employment opportunities can be created through better utilisation of land in the former homeland areas, with a further 326 500 potential employment opportunities upstream and downstream of the agricultural sector.

5.5 Conclusion

In this chapter the labour transfers between the agricultural sector and the rest of the economy were investigated. In the first section the focus was on trends in agricultural employment during the period 1960 to 2010. It was

illustrated that agricultural employment has shown a steady decline since 1962: the number of people employed by the sector was more than halved between 1962 and 2010. The sector therefore made a net contribution to the labour force. It was also shown that government policy had a significant impact on agricultural employment and capital per worker: during the 1970s and early 1980s the sector enjoyed its historically highest level of government subsidy spending, which resulted in a reduction in agricultural employment through the substitution of labour for capital. During the mid-1980s, however, the subsidisation of the sector was greatly reduced, which resulted in an increase in agricultural employment and a decrease in capital per labourer. It was also apparent from this section that the sector is still labour intensive if compared to the mining and manufacturing sectors: it employs 4.7% of the total labour force while it constitutes only 2.2% of the economy. In the third section the demographic trends within the rural population were presented. It was argued that while the rural population did not show a significant increase after 2001, it still made a large contribution to the labour force in the form of people who reached working age. According to the calculations and assumptions of the section, the rural population added at least 1.3 million people to the labour force during the 1980s, 1.7 million during the 1990s and 0.8 million in the 2000s. These figures depend on a number of assumptions in terms of the growth of the rural population, migration and participation in the labour force. The core of the argument does not lie in the precise values, however, but rather in the fact that a large number of young people were added to the labour force by rural areas and are probably unemployed. In the fourth section the contribution of the agricultural sector and rural areas to the labour force was calculated. It is argued that this represents the contribution to the labour force by the “traditional sector”, as understood by the theorists during the 1960s. It is argued that this contribution is equal to the sum of these two figures.

In light of this, the conclusion of this chapter is that the agricultural sector has made the contribution of labour to rest of the economy required by the theory. The theory assumes that the workers released by the sector will find more productive employment in the non-agricultural economy. This, however, does not seem to be the case in the current South African economy given the high unemployment rate, especially under black youths. The argument that flows from this is for a reversal of the role of the sector from a source of labour

to rest of the economy, to a creator of employment. This is possible given the relatively high labour intensity of the sector and evidence of the potential complementary use of capital and labour in the sector.

Chapter 6

Capital Transfers between Agriculture and the Rest of the Economy

Capital occupied a central place in early economic development models - some theorists regarded it as the only, or in any case the most limiting factor of production (Domar, 1947). Later authors warned, however, that it may be a necessary, but not the only condition for economic growth (Nurkse, 1953). This hypothesis was proven to be correct when quantitative research showed that growth in per capita output did not correlate perfectly with the growth in labour input and capital per capita. Growth in output per capita was therefore not only a factor of per capita capital and labour, but also of other unknown factors. The early authors described these factors as "the little understood forces which caused productivity" (Abramovitz, 1956, 6). Solow (1967) referred to these little known sources as "technical change", and this became the subject of a vast body of subsequent research. As could be expected these developments led to capital being regarded as less important for economic growth.

The importance of capital, however, cannot be disregarded - for two reasons (Brand, 1969). The first is that a shortage of capital is a limiting factor of production, especially in developing countries with surplus labour. The importance of capital in such economies is clearly illustrated by dual economy

labour surplus models (Lewis, 1954; Ranis and Fei, 1961). The second reason is the link between capital and technical change: the provision and expansion of research and education require capital investment. The products developed through research and development also have to be acquired with the capital of individuals or private firms before they can be adopted (Brand, 1969). Others argue for human capital investment, i.e. the need for capital investment in education. The proponents of this view argue for greater public spending on education (especially for rural women), more equitable access to education in terms of race and class, corrections in the imperfect market for educational lending, and other investments in skills development (Schultz, 1961).

South African agricultural capital has been analysed by numerous authors, but most have focussed on the relationship between capital and labour in the sector, or analysed government capital transfers to the sector. Brand (1969) is one of the few, if not the only author who has investigated the capital flow between the agricultural and non-agricultural sectors. His study showed that, contrary to what one would expect from the literature, capital flowed from the rest of the economy into the sector. This was due to the fact that the non-agricultural sector did not require capital from the agricultural sector, because it developed with foreign capital raised through mining exports and the reinvestment of non-agricultural profits. Government income raised from the non-agricultural sector enabled the government to subsidise the agricultural sector.

This conclusion, however, was subject to two qualifications. This first was that the sector could still have made an indirect capital contribution to the rest of the economy, if the subsidisation moved the terms of trade¹ against the agricultural sector. Such worsening terms of trade would mean lower food prices, which would result in lower wage increases, which in turn lead to more available capital for investment in the rest of the economy. This, however, was not the case because Brand showed that the agricultural sector experienced an almost constant terms of trade with the rest of the economy. The country experienced gradual inflation at the time and agricultural prices increased in step with inflation. The second qualification relates to the indirect transfer of capital from the sector to the rest of the economy through education. It was

¹"Terms of trade" refers to relative prices. In this case the prices of agricultural products relative to prices in the rest of the economy.

argued that agricultural capital enabled people in rural areas (mostly whites) to afford tertiary education. These people did not return to the agricultural sector, but were transferred to the rest of the economy. Agricultural capital therefore expanded the non-agricultural skills base.

In this chapter the direction of the net capital flow between the agricultural sector and the rest of the economy is determined. In the first section the capital flow between the agricultural and the public sector is analysed in order to determine the direction of this flow. The second section provides an analysis of the capital formation in the agricultural sector. In the third section the capital intensity of the agricultural sector is analysed in order to establish the potential of the sector to contribute capital to the rest of the economy. In the fourth section the findings and arguments made in the previous sections is combined in order to establish whether the net capital flows are to or from the sector. The fifth section provides a summary of all the arguments in the chapter.

6.1 Net government transfers to the agricultural and the non-agricultural sector

Total government expenditure on agriculture (see figure 6.1) increased from just under R7 billion in 1970 to R9.3 billion in 1981 and continued to a high of R9.4 billion in 1988 (all in 2005 prices). This expenditure then declined significantly starting in 1988 to reach its lowest level of R3.8 billion in 2000. It then increased again to R6.8 billion in 2010. The reduction in government spending during the 1980s and 90s was mainly a reflection of a reduction in subsidy spending, with spending on subsidies declining from its highest level of R5.2 billion in 1986 to a low of R0.04 billion in 2000. Agricultural subsidies increased after 2000 to R0.8 billion in 2008, but then decreased again to R0.4 billion in 2010.

The increase in subsidy spending since 2000 has been one of the factors contributing to the increase in total government expenditure on the sector since 2000, but it is not the main contributor. Research expenditure could have been a possible cause, but this has remained almost constant during the full period

of analysis, as shown in figure 6.1 (Liebenberg, 2012*a*). During the full period of analysis the research expenditure to output ratio remained almost constant at 0.2, which means that government spent an equivalent of R0.2 on research for every rand of value added by the sector (DAS, 2012; Liebenberg, 2012*b*). A contributing factor to the increase in total spending was the increase in spending on wages by the department: remuneration spending's share in total expenditure increased from 23.4% in 2004/5 to 30.9% in 2010/11. The increases in the number of people employed per skill level by the department is presented in table 6.1. This shows that the department increased the number of people employed from 2 474 in 2004/05 to 6 247 in 2010/11, an increase of 250%. The biggest increase was in the "skilled" category. The classification "skilled" is, however, somewhat misleading, as this category is one level above entry-level employment. This increase in "skilled" employment resulted in a decline of the average annual real remuneration per employee from R137 000 to R131 000 (DAFF, 2005, 2011*a*).

Table 6.1: Employment by the DAFF according to skill level

	2004/2005	2010/2011	% change
Lower skilled (Levels 1-2)	765	1 528	50
Skilled (Levels 3-5)	381	1 996	81
Highly skilled production (Levels 6-8)	1 010	1 681	40
Highly skilled supervision (Levels 9-12)	275	951	71
Senior management (Levels 13-16)	43	89	52
Total	2 474	6 245	60

Source: Department of Agriculture, Forestry and Fisheries (2005, 2011)

In light of the above one can argue that the increased expenditure by the department did not result in an increased transfer from government to the sector, but rather in a transfer to the department's labour force. This trend could have been to the benefit to the sector if it expanded the department's skills base, but that does not seem to have been the case because the biggest expansion by the department was not in the higher skill levels. The efficiency of government expenditure on the sector will have to be the subject of further research.

In terms of tax revenue raised from the agricultural sector, Brand (1969) found that this was significantly exceeded by government expenditure during the



Source: Compiled by Liebenberg (2012a)

Figure 6.1: Government agricultural spending: total, subsidies and R&D

period 1915 to 1965. The sector therefore enjoyed a net transfer of capital from the rest of the economy via government expenditure. The calculation of a tax income to government expenditure ratio for the agricultural sector would indicate the tax revenue raised for each rand spent on the sector. These ratios were calculated for the agricultural sector and the results are presented in table 6.2.²

This table clearly shows that the agricultural sector enjoyed, and still enjoys a net transfer of capital from the rest of the economy through government expenditure. The extent of the transfer to the sector decreased significantly since the 1980s and continued to decrease during the 2000s. The decline during the 2000s was due to the revenue growth rate being faster than the spending growth rate. One has to be careful, however, not to interpret these ratios in a literal sense but should rather note of the declining trend.

²These ratios for 1945-65 were calculated using the data provided by Brand (1969). The ratio for 1984 was calculated using data provided by Nieuwoudt (1987). The ratios for 2003-10 were calculated from revenue data provided by SARS (2009, 2011) and expenditure data provided by Liebenberg (2012a). Tax revenue data for 1970 to 2002 were requested from SARS and the SARB without success.

Table 6.2: Agricultural tax revenue and government expenditure

	Tax revenue collected			Total gov. Expenditure	Expenditure- Income ratio
	Individuals	Companies	Total		
Rand 'million					
1945	180.1	11.0	191.1	2096.1	11.0
1950	403.9	17.0	420.9	3226.6	7.7
1955	392.0	76.4	468.4	3600.6	7.7
1960	423.0	98.1	521.1	3762.5	7.2
1965	547.2	145.6	692.8	4884.5	7.1
1984	-	-	1139.8	7680.2	6.7
2003	964.0	1030.6	1994.6	4341.7	2.2
2004	1194.0	997.3	2191.3	4804.7	2.2
2005	909.9	1115.4	2025.2	4968.9	2.5
2006	1972.5	915.5	2888.0	5898.9	2.0
2007	2168.7	1097.2	3265.9	5699.8	1.7
2008	2219.5	1341.1	3560.6	6853.6	1.9
2009	2194.1	1526.3	3720.5	6842.2	1.8
2010	2099.9	1419.4	3519.3	6802.8	1.9

Source: 1945-65: Brand (1969), 1984: Nieuwoudt (1987), 2003-10: Liebenberg (2012) and SARS (2008, 2012) *Note:* All values expressed in 2005 rands

6.2 Agricultural capital formation

Before one can continue with the analysis of agricultural capital formation, a few definitions need to be clarified. Two figures relevant to this topic are calculated by the South African Reserve Bank, namely *gross fixed capital formation* and *change in inventories*. *Gross fixed capital formation* is “measured by the total value of a producer’s acquisitions, less disposals, of fixed assets during the accounting period plus certain additions to the value of non-produced assets” (OECD, 2007, 348). *Fixed assets* are defined as “tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly or continuously in other processes of production for more than one year” (OECD, 2007, 299). The non-produced assets that are included in the calculation of gross fixed capital formation include items such as subsoil assets; major improvements in the quantity, quality or productivity of land; and the costs of ownership transfer of non-produced assets (Maier and Shobayashi, 2001; OECD, 2007; Mohr, 2007).

Changes in inventories includes work in progress and consists of stocks of

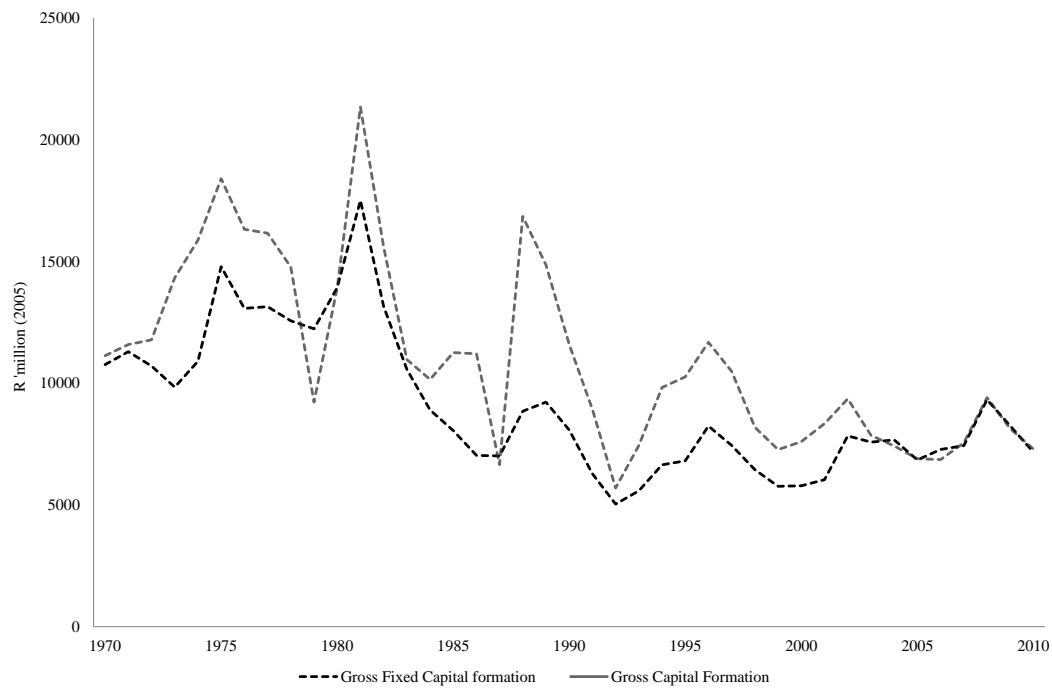
outputs that are to be completed or are already completed but not yet sold. It also includes the products acquired from other units that are to be used for “intermediate consumption or for resale without further processing” (OECD, 2007, 98). Livestock is included in the calculation of the changes in inventories for the agricultural sector by the South African Reserve Bank (2012b).

A third item, which is not calculated specifically by the South African Reserve Bank but is central to the discussion, is *gross capital formation*. This is given by the “total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables for a unit or sector” (OECD, 2007, 346). *Valuables* is defined as “produced assets that are not used primarily for production or consumption, that are expected to appreciate or at least not to decline in real value, that do not deteriorate over time under normal conditions and that are acquired and held primarily as stores of value” (OECD, 2007, 831). Examples include precious stones and metals, paintings and jewellery.³ Valuables are not calculated by the South African Reserve Bank for the economy or the sector and do not form part of the national accounts.

Given the above, the *gross capital formation* of the agricultural sector can be calculated by simply adding the agricultural *change in inventories* to the sector’s *gross fixed capital formation* as long as it is assumed that the “valuables” component is negligible. The *gross fixed capital formation* and *gross capital formation* of the agricultural sector during the period 1970 to 2010 are presented in figure 6.2.

This figure shows that both gross fixed and gross capital formation increased during the 1970s to reach their highest level in 1981. This trend corresponds with the trend in government expenditure, more specifically subsidy spending, as illustrated in section 6.1. The reason for the high increases in inventories (the difference between the two lines) during the 1970s and 1980s is uncertain, but the author wants to draw attention to this. It is clear, however, that gross capital formation during the 1970s and 1980s was significantly impacted by the direct and indirect support enjoyed by the agricultural sector at the time. The sector enjoyed direct support through the provision of subsidised credit and tax

³It is interesting to note that the paintings, gold artefacts and other valuables owned by the South African government are classified as machinery and equipment because they are mostly used by museums to deliver services (SARB, 2005a).



Source: Compiled from South African Reserve Bank (2005, 2012b)

Figure 6.2: Agricultural gross fixed capital formation and gross capital formation: 1970 to 2010

concessions. This enabled the rapid mechanisation, mainly through the adoption of combine harvesters, starting in the 1970s (Van Zyl *et al.*, 1988). This also resulted in an increase in the capital to labour ratio as discussed in chapter 5.1. During this period the sector also enjoyed indirect support through the maintenance of agricultural prices and import protection by means of the marketing act (Vink and Kirsten, 2002). These support measures (subsidies) were also capitalised in agricultural land prices (Nieuwoudt, 1987). Note, however, that the increase in land prices are not reflected in the sector's *gross capital formation* or *gross fixed capital stock* because it is excluded by the definition of these categories. It goes without saying that increases in gross capital formation led to an increased gross fixed capital stock.

Note that the increase in government expenditure on the agricultural sector after 2000 is not reflected in a greater rate of *gross capital formation* as would have been the case during the 1970s through to the mid-1990s. This adds credence to the argument that the increased government expenditure since 2000 did not lead to a transfer to farmers, but rather to a transfer to the

department's employees. On the other hand this could indicate that the sector did receive a net transfer from government, but invested this capital outside of the agricultural sector.

6.3 Agricultural capital intensity

The capital intensity (or capital-output ratio) of a sector is calculated by dividing the gross fixed capital stock⁴ by the gross domestic output of a sector (Mohr, 2007). The ratio therefore expresses the value of capital assets as a multiple of output. Brand (1969) contrasted the capital intensity of the agricultural sector with those of the mining and manufacturing sectors, and the whole economy. His analysis showed that the agricultural sector had the highest capital intensity of all the sectors analysed and therefore had the lowest potential to contribute capital to the non-agricultural economy. Brand continued that this potential is even lower due to the sector's small relative share in the economy. The results obtained by Brand, as well as the data for the period 1970 to 2010, are presented in table 6.3.

Table 6.3 shows that the agricultural sector still has a higher than average capital intensity, but was surpassed by the mining sector starting in the early 1990s. The calculated capital intensities are also presented in figure 6.3 as 5-year moving averages. It is clear that agricultural capital intensity showed a steady increase during the 1970s and early 1980s to reach its highest level in the mid-1980s, before declining towards the early 1990s. It then increased again in the early 1990s and has shown a slow decline since. The decrease in the agricultural sector's capital intensity, however, was lower than the decrease in that of the whole economy during the period 1991 to 2010. This decline is a reflection of the fact that the gross fixed capital stock *declined* at an average rate of 0.35% per year, while agricultural output *increased* at 0.35% per year during this period.

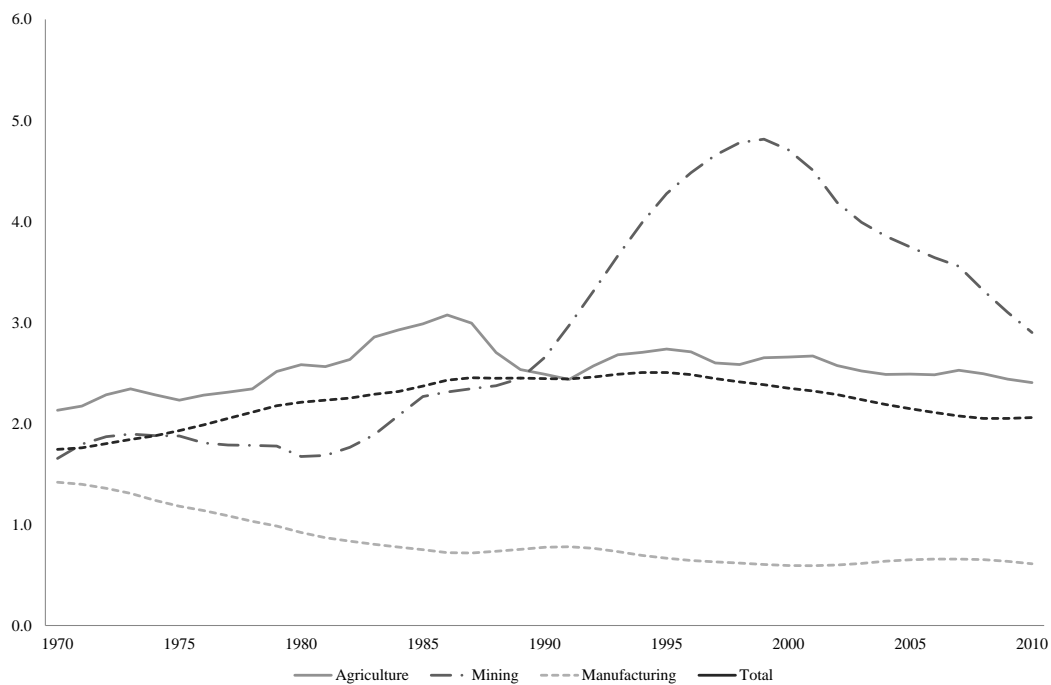
In light of the above one can conclude that the agricultural sector still has a low potential to contribute capital to the rest of the economy due to its

⁴Fixed capital stock includes fixed improvements, plant, machinery and livestock in the case of agriculture, but excludes land.

Table 6.3: Capital-output ratios of selected sectors

	Agriculture	Mining	Manufacturing	Total economy
1919-28	2.3	2	1.2	2.5
1924-33	2.9	1.8	1.1	2.5
1929-38	3.2	1.6	1.1	2.5
1934-43	2.9	1.5	1	2.3
1939-48	2.6	1.7	0.9	2.1
1944-55	2.1	1.9	0.9	2
1971-75	2.2	1.9	1.2	1.9
1976-80	2.6	1.7	0.9	2.2
1981-85	3.0	2.3	0.8	2.4
1986-90	2.5	2.7	0.8	2.4
1991-95	2.7	4.3	0.7	2.5
1996-00	2.7	4.7	0.6	2.4
2001-05	2.5	3.7	0.7	2.1
2006-10	2.4	2.9	0.6	2.1

Source: 1919-55: Brand (1969), 1971-2010: Directorate of Agricultural Statistics (2012), South African Reserve Bank (2005, 2012a, 2012b)



Source: Compiled from Abstract of Agricultural Statistics (2012), South African Reserve Bank (2005, 2012a, 2012b)

Figure 6.3: Agricultural capital intensity (capital-output ratios): 1970 to 2010

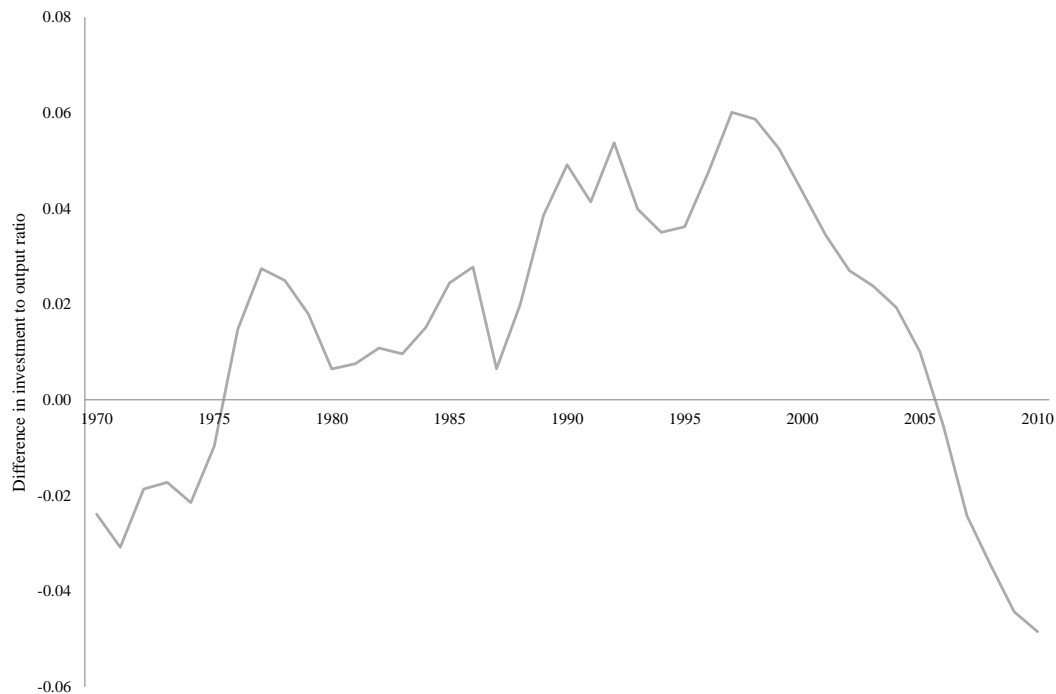
high capital intensity. (The sector does not have the lowest potential, since the mining sector is even more capital intensive.) The agricultural sector's potential is even further reduced by the sector's small and declining share in the economy. It is uncertain whether the sector experienced an outflow of capital, i.e. net investment in the rest of the economy, since its gross capital formation and capital intensity started to decline in the 1990s.

6.4 Net private transfers between the agricultural sector and the rest of the economy

To establish the extent of the gross investment of the agricultural and other sectors is quite straight forward, because it is calculated by the South African Reserve Bank for the National Accounts. To establish where sectors invested their capital, however, is much more difficult. A possible data source is the input-output tables compiled by Stats SA. The problem with these tables, however, is that they indicate investment by product, and do not show who made the investment. These tables, for example, can show that the real estate sector received an investment of Rx , but cannot tell us by whom the investment was made. Therefore it is not possible to tell from the tables what portion of the total investment was made by farmers in order to diversify their risk. Studies have shown that investments outside of the agricultural sector are an important consideration for farmers (Swanepoel and Ortman, 1993).

A possible solution to this problem would be to contrast agricultural gross capital formation per unit of output (henceforth "investment intensity") with that of the average in the whole economy. Lower agricultural investment intensity could indicate a net outflow of capital from the sector and inversely, a higher investment intensity could indicate a net inflow of capital. Figure 6.4 represents the difference between the agricultural investment intensity and the economy average. A negative value indicates that the investment intensity of the agricultural sector is low relative to the rest of the economy.

This figure shows that the agricultural sector invested R0.02 less per rand of



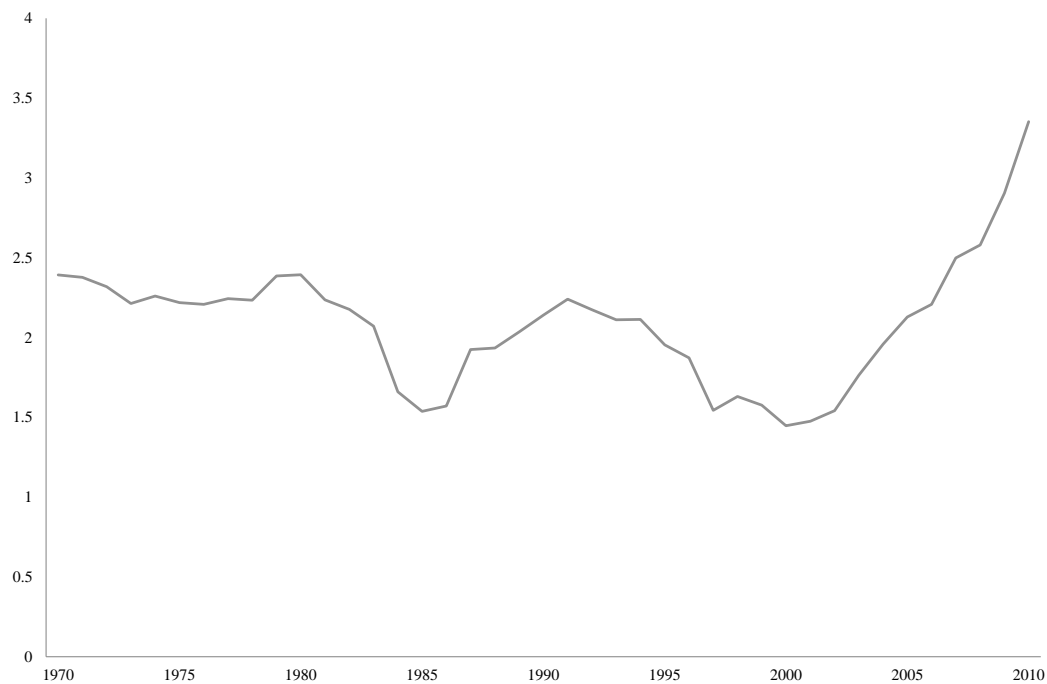
Source: Compiled from South African Reserve Bank (2005, 2012a, 2012b)

Figure 6.4: Agricultural investment intensity versus the economy average

output than the rest of the economy in 1970. This situation was subsequently reversed so that the agricultural sector invested R0.03 per rand of output more than the economy-wide average in 1977. This figure continued to increase to reach a maximum of R0.06 in 1997, before starting a rapid decline in 1998 to reach a low in 2010, at which time the whole economy invested R0.05 more than the agricultural sector per rand of output.

The decline since 1998 in the relative agricultural investment intensity requires further explanation. A possible cause was the decrease in government expenditure on the sector as explained in the previous sections. One would expect, however, that the agricultural investment intensity would have declined sooner, because support to the sector was significantly reduced during the 1980s and early 1990s. Another possible explanation could be that capital investments took a number of years to complete, but the timeframe for their completion is uncertain. It is probably safe to assume, however, that few investment projects undertaken by farmers would take more than three years to complete. This would rule out this explanation for the decline. Another explanation could be the deregulation of agricultural marketing and trade liberalisation that was

only completed in 1998. This increased the exposure of the agricultural sector to international markets and resulted in lower and more volatile grain prices (Vink and Kirsten, 2000). A partial productivity analysis has shown that these policy changes led to a significant increase in labour productivity (Liebenberg and Pardey, 2010). These changes could also have put agricultural profit and, as a result, agricultural investment, under pressure. A way of shedding some light on this is by comparing net farm income and agricultural gross capital formation, as is done in figure 6.4.



Source: Compiled from Abstract of Agricultural Statistics (2012) and South African Reserve Bank (2005, 2012a, 2012b)

Figure 6.5: Ratio of net farm income to agricultural gross capital formation

This figure shows that the agricultural sector earned R2.40 of net farm income for each rand of gross investment in 1971. This ratio decreased during the 1970s and 1980s to reach its lowest level of R1.60 in 2000. This decline indicates that the sector used the capital available less efficiently than in 1970. This could be indicative of an excessive availability of capital and correspond with previous discussions. The increase since 2000 indicates a far greater efficiency in the use of the available capital. Such an increase could have been due to an increase in farm profit or a decrease in capital formation. Section 6.2, however, indicated

that gross capital formation remained almost constant between 2001 and 2010. This increase was therefore due to greater net farm income. The agricultural sector therefore obtained much higher capital efficiency by earning a much higher farm income per unit of capital formation, no doubt mainly because of the shift from field crop production to horticulture and the higher returns to exports as illustrated in chapter 3.

An answer to the question regarding the transfer of capital from the agricultural sector to the rest of the economy still remains outstanding. The analysis above has shown that the agricultural sector has not increased its rate of capital formation since the late 1990s and that it has invested less per rand of value of added than the economy average since 2005. It has also been shown that the sector greatly increased its profit earned from each rand invested starting in 2000, which was reflected in much greater profits earned by the sector. In light of this one can conclude that the agricultural sector probably invested a significant amount of capital outside of the sector after 2000, due to the fact that the sector was in a good position to invest within the sector, but it does not seem to have done so.

6.5 Conclusion

In this chapter the capital transfers between the agricultural sector and the rest of the economy were investigated. In section 6.1 the flow of capital between the agricultural and public sector was examined. The analysis showed that the agricultural sector enjoys a net transfer of capital from government, because tax revenue raised from the sector is exceeded by government expenditure on the sector. In section 6.2 agricultural gross capital formation, i.e. gross investment, came under the spotlight, and it was shown that it was strongly correlated to government expenditure on agriculture during the 1970s through to the 1990s. It was also shown that gross agricultural investment decreased significantly starting in the 1990s, and remained almost constant after 2000. In this section it was also demonstrated that the correlation between government expenditure and agricultural gross investment has been less pronounced since 2000. Section 6.3 went on to an investigation of the capital intensity of the agricultural sector relative to the rest of the economy, in order to establish

the sector's potential to contribute capital to the rest of the economy. In this section it was shown that the sector still has a higher capital intensity than the economy average, but does not have the highest intensity after being surpassed by the mining sector in the 1990s. The sector therefore has a low capital contribution potential according to this metric. In this last section the focus shifted to net private transfers from the agricultural sector to the rest of the economy. The conclusion was that the agricultural sector has probably made significant private transfers to the rest of the economy since 2000. This conclusion is drawn from the fact that the sector achieved much greater profits during this period, and still received a net transfer from government, but did not increase its rate of capital formation.

In light of the above this chapter concludes that there is a strong possibility that the agricultural sector has made a net capital contribution to the rest of the economy since 2000. The actual extent of private transfers to the rest of the economy from the sector during this period is unknown, but there is a reasonable possibility that it has exceeded public transfers to the sector since 2000. This conclusion is even more plausible if it is accepted that the sector is receiving an increasingly small percentage of government expenditure from the department. One still has to keep in mind, however, that this net transfer to the economy probably did not have a major macroeconomic impact, due to the sector's relatively small quantitative significance. It should also be noted that these conclusions are preliminary results and will need to be investigated more thoroughly.

Chapter 7

The Market Contribution of Agriculture (Linkages)

The South African primary agricultural sector constituted less than 3% of the economy in 2005 (DAS, 2012). This, however, does not reflect the total impact of the agricultural sector within the domestic economy, because it omits the value added to agricultural output by the manufacturing sector, and omits the value added by the primary and manufacturing sector to the inputs used by the agricultural sector. It also omits the final consumption expenditure of agricultural households on non-agricultural goods and services. This so-called "market contribution" of the agricultural sector has been the subject of a large body of research.

Johnston and Mellor (1961) presented it primarily as the agricultural sector's role in "increased rural net cash income as a stimulus to industrialisation." They argued that in a mostly rural economy, increased agricultural output would increase overall per capita income in the economy. This increased income would be spent on factors of production such as machinery and agricultural inputs, or on consumer items. The increased demand for production factors and/or consumer items would stimulate non-rural production, boost industrialisation and lead to economic growth.

Another view on the market contribution of the agricultural sector, as articulated by Hirschman (1958), focuses on the linkages between the agricultural sector and the rest of the economy. This theory formed part of a critique of

the theory of balanced growth, which was proposed by Nurkse (1955). Nurkse argued for the initiation of economic growth through a balanced pattern of simultaneous investment in a number of different but complementary industries. These dissimilar but complementary industries would expand differently due to the difference in the elasticity of consumer demand for their respective products. All the industries would expand, however, due to their complementary nature. Hirschman (1958) had a number of criticisms of the theory. One of them questioned the assumption of an abundant supply of production factors such as entrepreneurial and managerial ability. Hirschman argued that these cannot be assumed to be sufficient, because they are the very skills which would be in short supply in a developing economy. In light of this, and other shortages in production factors, an “unbalanced growth” strategy therefore (Brand, 1969, 66)

relies on the fact that an increase in the output of one commodity will call forth an increased demand for certain other commodities that are either required as direct inputs in the production of the first commodity, or are associated with it in use. (Brand, 1969, 66)

This increased output of one commodity can therefore have a derived demand, or backward linkage effect by stimulating the local production or import of the required input, and/or it can have an output utilisation, or forward linkage effect through the utilisation of the outputs by local production or exports. These linkages, however, have to be measured to ensure that the unbalanced investment is channelled toward industries that will best utilise the limited factors of production. Linkages are evaluated according to their strength and importance. The strength of the linkage is determined by the probability that the stimulated activity will induce other activities. The food processing sector, for example, would have a strong linkage with the food production sector, because an increase in food processing capacity will induce increased production (given sufficient excess capacity). The importance of a linkage effect is measured by the combined net output of all the industries affected by the sector being analysed. The linkage between the food production and processing sectors, for example, will have high importance if they constitute a large share in the economy. According to an unbalanced growth strategy,

one would therefore invest in sectors with the strongest and most important linkages (Hirschman, 1958, 100-4). This laid the foundation for linkage theory, and the theory has since progressed significantly.

In a summary of linkage theory, Haggblade *et al.* (2007) show that agricultural linkages can be divided into four main groups, namely production, consumption, factor market and productivity linkages. Production linkages represent the backward and forward linkages between the agricultural sector and rest of the economy. The backward linkages arise through the inputs bought by the agricultural sector from the primary and manufacturing sectors, and the forward linkages through the agricultural products supplied to the manufacturing sector for further processing. Consumption linkages represent the spending of farm families on locally produced consumer goods. Factor market linkages represent the impact of agricultural income on the rest of the economy. This includes the investment of farm income in non-farm investments, and other factor flows, such as labour, to the rest of the economy. Johnston and Mellor (1961) devoted their attention to these consumption and factor market linkages, and also to the factor market contributions of supplying labour and capital. Brand (1969) also concerned himself with these three themes, grouped together as the "market contribution" of the agricultural sector. True to his time, Brand only regarded the production linkages as "linkages" in the Hirschmanian sense, and regarded the consumption and factor market linkages as "contributions" in the sense of Johnston and Mellor. In his conclusions, however, he interprets the consumption and factor market contributions in terms of their importance and therefore as linkages, an indication that he was slightly ahead of his time.

Productivity linkages are the newest addition to the theory and represent the non-market linkages between the agricultural and non-farm economy. Because these are non-market linkages that are not as precisely defined as the other linkages, they are more difficult to measure. Broadly speaking, these linkages represent a host of beneficial macroeconomic linkages that are transmitted from agriculture to the non-farm economy (Haggblade and Hazell, 2007). Examples include the positive effect of lower food prices, which impacts on worker nutrition and productivity. Others argue that it improves food security and political stability (Block and Timmer, 1994). Some also include the bene-

ficial effects of knowledge flows that accelerate productivity growth in both agriculture and non-farm production, and also cite the beneficial effects of the agricultural sector on the rural non-farm economy (Tomich *et al.*, 1995). These linkages are also included in studies of the socio-economic role of the agricultural sector, which analyse the positive externalities of the agricultural sector (FAO, 2007). The problem with this approach is that one could include the content of this whole thesis, and eventually the whole economy, as a productivity linkage, so that delimiting the agricultural sector becomes an arbitrary question of definition.

Brand (1969) concluded that the consumption and factor market contribution of the agricultural sector were unimportant due to the small share of the agricultural sector in the economy. He also showed that the structural transformation of the agricultural sector in terms of its consumption and factor market contribution followed a similar path to that indicated by international case studies. In terms of the production linkages, Brand found that the *backward linkages* were the weakest¹, but the most important² in the early stages of development, during which the sector constituted a large share in the economy. As the economy developed, the importance of the agricultural sector declined and so did agricultural manufacturing's share in total manufacturing. Brand (1969) reached a similar conclusion regarding the *forward linkages*. The forward linkages were the most important, but the weakest, during the early stages of development, but their importance declined after the 1930s with the decline in the relative share of the sector.

In this chapter, the market contributions of the agricultural sector are investigated by looking at the importance of its production, consumption and factor market linkages. The sector's non-market contributions in the form of productivity linkages are also briefly touched on.

In the second section the production linkages of the agricultural sector are investigated. The emphasis in this section will not be on determining the strength of the existing production linkages, because this has been established by previous studies. It is assumed that the strength of the linkages is almost

¹They had a low probability of inducing other activities, see above.

²The combined net output of all the industries affected by the linkages was the largest, see above.

constant when compared to their importance, which fluctuates more. This section is therefore aimed at establishing the importance of the agricultural production linkages in the South African economy. The third section provides for an investigation of the importance of the consumption and factor market linkages by drawing from the conclusions of the previous chapters. In the fourth section the productivity linkages of the sector are briefly examined, and conclusions are reached in the fifth section.

7.1 The importance of the agricultural production linkages

As mentioned in the previous section, linkages are measured in terms of their strength and importance. The strength is a reflection of the probability with which the activity will induce other activities, and the importance is given by the combined net output of all the industries affected by the industry in question. In theory it is therefore very simple to measure the extent of agricultural linkages. The first step is to determine the sectors/industries with which the agricultural sector has the strongest linkages - this has been done (Kempen, 1966; Van Seventer *et al.*, 1992). The second step is to determine the importance by simply determining the combined contribution to GDP of the agricultural sector and the sectors identified in step one. This, however, is not as easy as one would expect, because Stats SA does not list the agricultural sector and the industries affected by it separately. With the calculation of the GDP, the whole economy is divided into three broad sectors: the primary sector (agriculture and mining), the secondary sector (manufacturing, electricity and construction) and the tertiary sector (wholesale, transport, finance, government services and personal services). The share of GDP of industries affected by the agricultural sector are included in the shares of the primary, secondary and tertiary sectors. Despite this complication, however, one can estimate the size - and therefore the importance - of the linkages through the use of previously published studies and current economic data.

During the period 1920 to 1960, the agricultural sector had the strongest backward and forward linkages with the food, beverage and tobacco (henceforth

“food”) sector and the chemical and chemical products (henceforth “chemical“) sector. The sector also exhibited strong backward linkages with the metal and equipment manufacturing (henceforth “equipment”) sector and strong forward linkages with the textile industry (Kempen, 1966). A more recent study confirmed the linkages with these sectors, except that it found both a forward and backward linkage with the textile sector (Van Seventer *et al.*, 1992). The results of Brand’s investigation into the importance of the sectors identified above are presented in table 7.1. This table has also been updated with current data for the period 1993 to 2010 (Stats SA, 2011).

While the food sector showed the strongest linkages, it did not have high importance, due to its low share in the total manufacturing sector, which declined from 32.5% in 1920, to 17.9% in 1960 (Brand, 1969, 181). This trend continued after 1960, with the sector showing a 16.3% share in total manufacturing in 1993 and 15.47% in 2000. This trend was reversed after 2000: the food sector’s share increased to 21.87% in 2010. The food sector outgrew all other manufacturing sectors during the period 2001 to 2010, growing at an average annual rate of 4.11% per year, while the total manufacturing sector grew at a rate of 0.31% per year (Stats SA, 2011). A figure that Brand (1969) did not calculate was the food sector’s share in the total economy. This figure can be calculated from his data. The sector had a 2.4% share in the economy in 1920, which increased to its highest level at 3.4% in 1945 and 1960, and then declined to 2.7% in 2010 (Stats SA, 2011). The importance of the food and beverage sector is therefore low, given that it represents a fifth of total manufacturing and a mere 2.7% of GDP.

Another sector which showed strong linkages, though still much weaker than those of the food sector, is the chemical sector, which provides inputs such as fertilizer, fuel and spraying chemicals to the agricultural sector. This sector had an 8.8% share in manufacturing and a 1.7% share in the economy in 1960 (Brand, 1969). It has grown significantly since then, reaching a maximum of 24.2% of manufacturing and 4% of the total economy in 2005. The sector had a 2.9% share in the economy in 2010 (Stats SA, 2011). The extent of the agricultural sector’s input purchases from this sector is uncertain due to the limited availability of data. In light of the above one can conclude that the importance of the linkage would remain low even if the agricultural sector

Table 7.1: The importance of manufacturing sectors with the strongest linkages to the agricultural sector

	Food processing		Chemical processing		Metal and eq. mfg		Total mfg.
	Percentage share in:						
	Mfg.	Total	Mfg.	Total	Mfg.	Total	GDP
1920	32.5	2.4	8.4	0.6	1.8	0.1	7.5
1925	32.9	2.6	11.2	0.9	2.3	0.2	8.0
1930	32.0	2.9	10.2	0.9	2.2	0.2	9.2
1935	28.5	3.1	9.2	1.0	2.0	0.2	10.9
1940	24.8	3.1	9.3	1.2	2.1	0.3	12.6
1945	22.6	3.4	8.7	1.3	2.0	0.3	15.2
1950	18.7	3.2	8.9	1.5	5.2	0.9	16.9
1955	17.5	3.3	8.3	1.6	9.8	1.8	18.8
1960	17.9	3.4	8.8	1.7	9.7	1.9	19.2
1993	16.9	3.3	18.6	3.6	20.3	3.9	19.4
1995	16.4	3.2	18.2	3.5	21.4	4.1	19.4
2000	15.5	2.7	24.0	4.1	19.1	3.3	17.3
2005	17.1	2.8	24.2	4.0	20.3	3.3	16.5
2010	21.9	2.7	23.4	2.9	18.9	2.4	12.5

Source: 1920-60: Brand (1969), 1993-2010: Statistics South Africa (2011)

bought all the output from this sector, due to the small size of the sector's share in the total economy. One can, however, estimate the percentage share of the chemical sector's output that was bought by the agricultural sector in 1985.

Van Seventer *et al.* (1992) found that the production of basic and other chemicals represented 6.21% of the economy in 1985. This included the fertilizer sector, which had a 0.75% share in GDP. The sector therefore purchased 12.1% of the chemical sectors output as fertiliser. According to the Directorate of Agricultural Statistics (2012), fertilizer, fuel, and dips and sprays (FFDS) purchases represented 15.9, 15.7 and 10.6% respectively of the value of total intermediate goods and services purchased by the agricultural sector in 1985. Fuel, and dips and sprays also form part of the chemical sector. The share that the categories of fuel, and dips and sprays had in in the chemical sector can therefore be scaled according to the 12.1% share of agricultural fertiliser purchases. Following this reasoning, the agricultural sector bought 32.3% of

the total output of the chemical sector.³ With this information the share of agricultural chemical purchases in the economy can be calculated at 0.9% if one assumes that the agricultural sector purchased 32.3% of the chemical sector's output in 2010.

The third sector that showed strong linkages with agriculture was the metal, metal products, machinery and equipment sector. This sector had a 9.7% share in total manufacturing in 1960 (Brand, 1969), which increased to 21.4% in 1995, but then declined to 18.9% in 2010 (Stats SA, 2011). In terms of its share in the total economy, it had a share of 1.9% in 1960, 4.1% in 1995, and 2.4% in 2010. Van Seventer *et al.* (1992) estimated agricultural equipment purchases' share in the total economy at 0.06% in 1985, which represented a 0.6% share in the output of the manufacturing sector. It is uncertain what this figure would be for 2010. Nevertheless, if it is assumed that the calculations by Van Seventer *et al.* (1992) still hold, agricultural purchases from the manufacturing sector represented a 0.02% share in the economy in 2010. This figure seems low, but one has to keep in mind that the agricultural sector imports most of its equipment such as tractors, combines, packing machinery, etc.

The fourth industry that showed relatively strong linkages with the agricultural sector was the textile industry. It is not necessary to determine the importance of the linkage with this sector, because the textile sector's share in the economy declined from 1.4% in 1993 to a mere 0.4% in 2010 (SARB, 2012a). The importance of this sector is therefore negligible, even if the agricultural sector purchased its total output or supplied all its inputs.

The combined share in GDP of primary agriculture and the linked sectors discussed above can be estimated at 5.82%.⁴ From this one can conclude that the importance of the linkages between the agricultural sector and the rest of the economy is low. The calculated figure, however, still does not include all the sectors affected by the agricultural sector. Van Seventer *et al.* (1992) concluded that the agricultural sector and all the sectors it affects, termed "agribusinesses",⁵ represented a total share of 14.68% of the economy in 1985.

³The sum of fertilizer, fuel and dips = 12.1% + 12.1% + 8.1%.

⁴Agriculture plus manufacturing = 2.2% (primary) + 2.7% (food) + 0.9% (chemicals) + 0.02% (manufacturing).

⁵Described as "the sum total of all operations involved in the manufacture and distribution of farm supplies, production operations on the farm, and the storage, processing, and

As has already been mentioned, an exact calculation of this figure falls beyond the scope of this dissertation, and no research on the topic has been conducted on a national level since 1992. This figure can, however, be estimated from the research discussed above.

One way to make the estimate is by scaling the figure according to the agricultural sector's current share in GDP. In 1985, the agricultural sector constituted a 4.77% share in the total economy and the combined share of agribusinesses was 14.68% of the total economy. If the sector had a 2.2% share in the economy in 2010,⁶ the scaled share of agribusinesses, according to the calculations of the previous study, would be 6.77%.⁷ The share of the remaining sectors that have strong linkages with the agricultural sector can be estimated to have a share of 0.95% in the economy: this is difference if the shares of the primary agricultural (2.2%), the food (2.7%), chemical (0.9%) and manufacturing (0.02%) sectors are subtracted from the 6.77%.

It is therefore safe to conclude that agribusinesses have made a contribution of close to 7% to the economy in 2010. This share of 7% is relatively small compared to the mining and quarrying; manufacturing; wholesale, retail and hospitality; and finance and real estate sectors, which respectively represented 8.5, 12.5, 12.9 and 19.6% of the economy in 2010 (SARB, 2012*b*). This result indicates that the importance of agricultural linkages has decreased significantly since the publication of both the studies of Brand (1969) and Van Seventer *et al.* (1992). Given the above one should keep in mind, however, that the agricultural sector's contribution has high sustainability as a flow resource compared to that of the mining sector as a stock resource.

7.2 Agricultural consumption linkages

Studies show that there are both strong and important consumption linkages between the agricultural and rural non-farm sector (Haggblade and Hazell, distribution of farm commodities and items made from them" (Davis and Goldberg, 1957, 5).

⁶This figure is lower than the 2.4% indicated by the Directorate of Agricultural Statistics (2010), but it, as well as all the other relative shares mentioned, was calculated meticulously with the data provided by the South African Reserve Bank (2012).

⁷Total agribusinesses = 14.68% ÷ 4.77% × 2.2%

2007). A study of higher-income small farmers in India showed that they spend half of their disposable income on non-agricultural goods and services, and a third on locally procured perishable products (Mellor and Lele, 1972). Other studies show that each additional unit of value added by the agricultural sector adds 0.6 to 0.8 units to the rural non-farm economy in Asia, and between 0.3 and 0.5 units in Africa (Haggblade *et al.*, 2009).

The fact that the agricultural sector has strong and important linkages with the rural non-farm economy, especially in underdeveloped countries, cannot be denied. The importance of these consumption linkages on a total economy level in a middle income country such as South Africa is much lower, however, due to the small share of the agricultural sector and agribusinesses in the economy (Brand, 1969). The importance of these linkages has also declined since the publication of previous studies, as the previous section and chapters have shown.

7.3 Productivity linkages

The term "productivity linkage" is broad and somewhat vague, as mentioned in the introduction to this chapter. An in-depth discussion of these linkages falls beyond the scope of this dissertation, but one point does deserve mention. Chapter 3 shows that since 2000, the agricultural sector has moved from being a net exporter to being a net importer of the *main food items* consumed in South Africa. This was brought about by the expansion of the food demand, a reduction in the production of grains such as maize and wheat, and an increase in the imports of foodstuffs such as wheat, rice, poultry, etc. Chapter 4, on the other hand, has shown that the agricultural sector has been a net exporter of *total agricultural produce* by value during the full period of analysis. The changes in production and trade trends were brought about by increased international competition due to the deregulation of agricultural marketing and the liberalisation of trade. Contrary to what is to be expected according to the proponents of import protection, this shift in policy has been to the benefit of consumers, who enjoyed decreased food price and general inflation (Vink and Kirsten, 2001). This decrease in food prices resulted in beneficial productivity linkages through greater food security, and could have resulted

in greater political stability and greater worker productivity. Even though these price decreases were brought about by factors external to the agricultural sector, one can still argue that the sector facilitated the lower prices by enabling the imports of these food items through the sector's export earnings.

Another form of positive productivity linkages is that of the linkages between the agricultural sector and the rural non-farm population. Studies has shown that the decline in inequality in Brazil is because of the rise in rural non-farm employment, which can be linked almost exclusively to the primary agricultural sector (Mellor, 1998).

7.4 Conclusions

In this chapter the importance of the market contribution of the agricultural sector to the South African economy has been investigated. This topic was approached from the perspective of linkage theory as proposed by Hirschman, and extended by numerous others such as Johnston, Mellor, Lele, Haggblade, Hazell and others. Agricultural linkages were investigated according to the four main groupings of production, consumption, factor market, and productivity linkages. The second section provided for the investigation of the importance of the production linkages of the agricultural sector. It was not aimed at re-establishing which sectors/industries have the strongest linkages with the agricultural sector, but rather at a re-evaluation of the importance of the sectors identified by previous studies. This investigation showed that the agricultural sector and the sectors it impacts have an estimated share of 7% of the economy. The conclusion in this section was therefore that the linkages of the agricultural sector are of low importance, and that their importance declined since the publication of previous studies. In the third section, the consumption linkages of the agricultural sector were examined. This showed that these linkages can be important if viewed from the perspective of consumption linkages between the agricultural sector and the rural non-farm economy. The consumption linkages are unimportant, however, if viewed from a total economy perspective, where the agribusiness sector represents a small share in the economy. The conclusion was therefore that the consumption linkages are unimportant given the conclusions reached in section 7.1. In the fourth section attention was given

to the productivity linkages of the agricultural sector. This section did not expand on these linkages at length, but did look at the sector's productivity linkages through its provision of food. It was concluded that the sector had a beneficial productivity linkage with the rest of the economy though providing food at lower prices. This was achieved through more efficient local food production or through food imports, which could be afforded due to agricultural exports.

The analysis in this chapter has shown that the agricultural sector has strong linkages with a number of sectors. This aspect of the agricultural sector is often used to argue for the importance of the agricultural sector in the economy. The problem, however, is that the combined share in the economy of the agricultural sector and the sectors affected by it is relatively low. This share has been estimated at around 6.8% of the economy. One can therefore conclude that while the agricultural sector has strong linkages with the rest of the economy, the importance of these linkages is low due to their small combined share in the economy.

There would be no sense in repeating this analysis on an economy-wide level because it would reach a similar conclusion: the importance of the linkages will continue to decline with the decline in the agricultural sector's share in the economy. It would be much more meaningful, however, to evaluate the importance of the linkages between the agricultural sector and the rural non-farm economy. On this level of analysis the agricultural sector should have much more important linkages, due to its share in the rural economy being much larger than its share in the entire domestic economy. These linkages may be particularly important from a consumption and productivity linkage perspective.

Chapter 8

Conclusion

The objectives of this thesis were fourfold. The first was to investigate the theory of the role of the agricultural sector in economic development in order to contextualise and supplement the analytical framework applied by Brand (1969). This was achieved in chapter 2 and will not be discussed further in this chapter. The second was to investigate the role of the agricultural sector in the economy according to a set of five focus areas. The analytical framework that was applied to the data was primarily that of Brand (1969), but was supplemented where applicable. The results were then compared to those of Brand (1969) and Van Zyl *et al.* (1988) in order to establish whether, and is so how, the role of the sector has changed over time. This objective was addressed in chapters 3 to 7 and the results are summarised in section 8.1 of this chapter. The third objective was to synthesise the results obtained and then to incorporate this into policy recommendations aimed at optimising and expanding upon the role of the sector. This will be addressed in sections 8.1 and 8.2 of this chapter. The fourth objective, to establish themes that will require further research and to critique the framework of analysis used, will be discussed in section 8.3.

8.1 Thesis overview

In this thesis the role of the agricultural sector in the South African economy was investigated. In chapter 3 the role of the sector as a source of food was

analysed and the aim was to establish whether the sector was able to meet the local food demand. For this purpose the chapter established which are the main food items consumed and found that the average South African household spends more than two thirds of its food budget on four main food groups, namely meat (25%); bread and cereals (21%); milk, cheese and eggs (10%); and vegetables (10%). The analysis also showed that the poorer half of the population spend between 28 and 31% of their total income on food. Then the total production of, consumption of and trade in these main food items was analysed in order to establish whether the sector was able to meet the domestic demand for these items. The analysis showed that the country has been a net importer by volume of these food items since 2000. The agricultural sector's inability to meet the local demand did not result in a rapid increase in food and general inflation as predicted by the theory, however: an analysis of food and general inflation revealed that it moved in the opposite direction instead. One of the main reasons for this was the liberalisation of trade and deregulation of agricultural marketing, completed in 1998. This enabled greater food imports, which forced domestic producers to increase their efficiency in order to compete with these imports. This resulted in lower food prices and benefitted the consumer and economic growth through lower inflation.

In chapter 4 agricultural trade was analysed in order to determine whether it plays a leading, lagging or balancing role in South African economic development. The analysis showed that the sector does not play a growth-leading role, due to the fact that agricultural exports represent a small share in total exports (8%) and a small share in total value added by the total economy (0.04%), and that the growth in agricultural exports was outpaced by that of total non-agricultural exports. The analysis revealed, however, that the sector plays a growth-balancing role in economic development by maintaining a positive trade balance during the full period of analysis. This means that it does not play a lagging role as foreign exchange user. However, the size of the agricultural exchange surplus has decreased significantly since the mid-1980s and therefore the sector could lose its status as a net exporter (by value) of agricultural products.

In chapter 5 agricultural employment was investigated in order to establish whether the agricultural absorbed from or released labour to the rest of the

economy. The analysis showed that the sector has released labour to the rest of the economy - decreasing employment from its highest level of 1.8 million in 1962 to 0.85 million in 2010. This chapter has also showed that the sector is still relatively labour intensive because it employed 4.7% of the labour force in 2010 while it only had a share of 2.2% in the economy. This chapter also investigated the contribution of rural areas to the labour force. This analysis was conducted due to the fact that the classical theorists did not draw a distinction between the agricultural and rural labour force. The analysis showed that rural areas add a significant number of workers to the total labour force: During the period 2001 to 2010 for example, it is estimated that 1.1 million people from rural areas were added to the labour force, this assuming a working age of 16 years and a labour participation rate of 57%. During the corresponding period the agricultural sector shed about 130 000 jobs. The agricultural sector and rural areas therefore added 1.23 million people to the labour force between 2001 and 2010. It is uncertain, however, if the rest of the economy has the capacity to absorb this increase in the total labour force. It can therefore be argued that the agricultural sector, as a labour intensive one, could and should be leveraged to create employment for these additional workers. It is possible for the sector to do so because the literature has shown that capital and labour can be complementary factors of production. Trends within agricultural employment have also shown that agricultural employment increased at times of a scarcity of capital, such as during the period 1981 to 1987. This result is also in line with the government goal of creating agricultural employment (DTI, 2009; NPC, 2010, 2011).

In chapter 6 the capital transfers between the agricultural sector and the rest of the economy came under analysis. Previous research has shown that the sector enjoyed a net inflow of capital from the rest of the economy, and this chapter set out to establish whether this is still the case. In terms of public expenditure the sector still enjoys a net inflow, i.e. the tax revenue raised from the sector was surpassed by the expenditure on the sector. The sector received close to R2 of public expenditure for each R1 paid as tax by the sector. Government expenditure on agriculture increased in real terms since 2000, but the effect of this increase was not reflected in the sector's gross capital formation, while it was reflected in capital formation during the 1970s through to the 1990s. The increase in spending was mainly through larger government spending on

salaries of entry-level workers. One can therefore argue that the sector did not enjoy a greater actual transfer from government. The analysis also showed that gross capital formation and the capital intensity of the sector declined significantly during and after the mid-1980s. The sector, however, still has a higher capital intensity than the economy average, but has lost its status as the most capital intensive sector to the mining sector. The sector therefore still has a low capital contribution potential due to its own capital intensity, and this potential continues to decline along with the decline in the share of the sector in total value added in the economy. In the last section of this chapter the net private transfers of the agricultural sector came under analysis. The finding was that the sector achieved a strong increase in its capital efficiency since 1998, and probably made a net private capital contribution to the rest of the economy since 2006. In light of the above the conclusion of the chapter was that the sector has probably made a net contribution of capital to the rest of the economy since the mid-2000s.

In chapter 7 the market contribution of the agricultural sector, through its linkages with the rest of the economy, was analysed. The linkages were analysed according to four categories, namely production, consumption, factor and productivity linkages. These linkages were analysed according to two criteria: their strength and their importance. The strength of a linkage is an indication of the probability that the action in the sector in question will induce other activities in the economy. The importance of a linkage is given by the combined net output of all the industries affected by the relevant sector. In terms of production linkages the chapter found that the agricultural sector and the sectors with which it has the strongest linkages represent around 7% of the total economy. It was therefore concluded that the importance of the production linkages of the agricultural sector is low. The analysis of the consumption linkages of the sector indicated that the sector may have strong linkages with the rural non-farm economy, but that the consumption linkages with the rest of the economy are unimportant due to the small share of the sector in the economy. In terms of the sector's factor linkages the sector made a labour contribution to the economy during the full period of analysis, as well as a capital contribution since the mid-2000s. The importance of these linkages was low, however, due to the relatively small share of the sector in the economy. This chapter did not expand at length on the productivity linkages of the sector,

but it was noted that the sector had beneficial productivity linkages through its provision of food at lower prices and/or affording imported food through agricultural exports. On the whole the agricultural sector has strong linkages with some sectors of the economy, but these linkages are hardly important due to the low combined share of the agricultural and affected sectors in the total economy.

8.2 Synthesis

Brand (1969) and his contemporaries argued that the primary role of a country's agricultural sector is to supply in the domestic demand for food in order to prevent the adverse effects of rising food prices and the negative impact of an agricultural trade deficit on the economy. However, the sector does not have to be able to meet the domestic food demand if a trade and marketing policy is in place that allows for access to international markets. In South Africa for example, such a policy not only enabled the country to expand its imports of food items, such as wheat, that it couldn't produce competitively in sufficient quantities, but also allowed the country to expand the exports of agricultural products, such as fruit and wine, that can be produced competitively. In South Africa the imports of the main food items consumed increased to such an extent that the country became a net importer of these items by volume starting in 2000. This, however, was offset by the increase in the exports of other agricultural items, which enabled the sector to retain a positive trade balance during the full period of analysis.

A recurring theme in this dissertation was the small quantitative significance of the agricultural sector in the economy. By 2005, the primary agricultural sector constituted less than 3% of the economy and in this thesis it was estimated that primary agriculture together with the sectors with which it has strong linkages constituted less than 7% of the economy in 2010. This low quantitative significance makes it unlikely for the agricultural sector to play a growth-leading role through exports or the transfer of capital from the sector to the rest of the economy. This is also the reason for the low importance of the linkages between the sector and the rest of the economy, even though the sector has strong linkages with sectors such as food and beverage manufacturing.

Another important theme is that of agricultural employment. Brand and his contemporaries required the agricultural sector to transfer labour to the rest of the economy, where it would be utilised more productively. According to this requirement, the sector fared exceptionally well, transferring more than half of the number of people employed by the sector to the non-agricultural labour force between 1962 and 2010. Van Zyl *et al.* (1988), however, argued that the role of the agricultural sector regarding labour is to provide employment. The role of the sector as creator of employment has also received attention from government, especially the food processing sector (DTI, 2009; NPC, 2010, 2011). This study agrees with the claim that one of the main roles of the agricultural sector is to provide and expand employment. This view is justified in light of the sector's relatively high labour intensity, the existence of complementarities between capital and labour in the sector, and the existing unemployment in rural areas due to the demographic realities discussed in chapter 5.

This study therefore concurs with the main conclusion reached by Brand, namely that the South African agricultural sector does not play a growth-leading or initiating role in the economy, but rather plays a growth-permissive role. The sector does not play a leading role due to its relatively small quantitative significance in the economy, which limits the growth impact of agricultural exports, capital transfers from the sector and linkages with the rest of the economy. The sector plays a growth enabling role, however, by supplying food to consumers at the lowest possible price by either producing it domestically or affording food imports with the exchange earned in the export of agricultural produce. In addition to this role, the sector also has an important role in providing employment, especially in rural areas.

8.3 Policy Implications

Numerous policy recommendations can be drawn from this thesis. One of the main recommendations is that an agricultural marketing and international trade policy framework that is conducive to international agricultural trade and limits market distortions, is retained. A policy of protection of the sector will be to the benefit of producers, but is undesirable for two main reasons. The first is that it could lead to the cultivation of marginal land that would

not have been utilised without these distortions. Research has shown that the protection of the sector has led to cultivation of land that would not have been viable under an unprotected market environment. This led to the unnecessary destruction of the natural habitat and other detrimental environmental effects (Vink and Kirsten, 2002).

The second is the more complex issue of agricultural employment. Initially the transfers to the sector resulted in an increase in employment due to the expansion of the area planted, especially due to the cultivation of marginal areas. Over time the overcapitalisation of the sector resulted in the reduction of agricultural employment due to the substitution of labour with capital. This trend, however, was reversed when the sector experienced a shortage of capital, for example during the period 1981 to 1987. The increased international competition resulted in a decrease in agricultural employment, partly due to the removal of marginal land from production. The protection of the sector is often justified on the grounds that it will preserve employment (Edwards, 2001). A counter-argument, however, is provided by the increases in agricultural exports since the 1990s. The increased access to international markets during this period enabled the sector to expand its exports of higher value agricultural items such as fruit and wine. The production and processing of these items are more labour intensive than grain production (Vink and Kirsten, 2001; BFAP, 2011*b*). This increase therefore led to an expansion of agricultural employment that is set to continue with the increase in the production of these items. This serves as a justification for the current marketing and trade policy, but also provides a good example of the complementary use of capital and labour by the sector. Policymakers therefore should identify and channel spending so as to target these complementaries - by, for example, enabling the expansion of irrigation infrastructure and agricultural processing capacity (Vink and Kirsten, 2001; BFAP, 2011*b*). The food and wine sector also has strong linkages with other sectors, and therefore the expansion of this sector will reap the benefits of strong multipliers.

The size of South Africa's positive agricultural trade balance has been diminishing since 2005. It is therefore important that government respond via policy and investment to support the agricultural export sectors, especially the fruit and wine sector, in order to preserve this positive trade balance. One of the

most important contributions that government can make towards achieving this goal is to ensure a stable macroeconomic policy and a political environment that will be conducive to investment by the agricultural export sector. This will ensure the expansion of production and export capacity, which will increase both exports and employment.

Another policy recommendation is to increase investment in infrastructure. Investments in road, rail and food storing infrastructure will be beneficial to the whole economy due to the provision of food at lower prices. This will not only increase the competitiveness of agricultural exports in traditional markets such as the UK and EU, but will also be beneficial to intra-African trade. The importance of Africa as a trade partner has increased since 1994 (Vink and Kirsten, 2002), mainly due to the increase in fruit and wine exports. The expansion of domestic infrastructure will therefore increase this export market, especially if it can be synchronised with an infrastructure expansion in South Africa's neighbours. The Maputo development corridor is a good example.

8.4 Critique and suggestions for future research

This thesis, as a re-evaluation of the study by Brand (1969), was subject to a number of limitations. One of the most profound was that of the macroeconomic evaluation of the role of the sector solely from an economic growth perspective. The conclusions regarding the role of the sector in the economy as viewed using this framework are based mainly on a number of structural properties of the economy, as well as the current trade and agricultural marketing policy framework. These structural properties of the economy and the current policy environment are most probably going to prevail in future. Future studies within this framework are most probably going to reach very similar conclusions regarding the role of the sector. It is therefore proposed that the role of the sector should rather be investigated from a different perspective, possibly by focussing on the positive indirect externalities of the sector on the rest of the economy, as proposed by the FAO (2009). A related issue is the role of the sector in the rural non-farm economy, as presented by Haggblade and Hazell. It is proposed that the role of the sector can be better understood if investigated from a regional level, which is then expanded to a national level.

This study has also identified a number of themes that should be revisited. An important question that needs to be revisited is the quantification of the impact of food price increases on the economy, especially on lower-income households. Chapter 6 showed that agricultural capital flows are very poorly understood and require more in-depth attention. This chapter also showed that the efficiency of public expenditure on the sector has to be evaluated, because preliminary results indicate that the efficiency of such expenditure has declined significantly in recent years. Further research regarding agricultural employment and instances where the use of capital and labour are complementary is also required. Another issue that needs more attention is improving the international competitiveness of agricultural exports in order to ensure a positive trade balance and a concomitant expansion in the positive employment effects of increased agricultural trade. The possibility of import substitution of some agricultural items should also be considered - the local expansion of soybean production and oilcake manufacturing would be a good example.

Lastly it is recommended that the issues with the existing data on the sector are addressed. This calls for a systematic evaluation of the data on the sector by a reputable organisation in order to ensure the credibility of the data on hand, especially the datasets that were not covered by Liebenberg. It is recommended that measures are set in place that will ensure the credibility of data collected and compiled in future. It is also recommended that the evaluated data is incorporated into a user friendly electronic database.

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