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SOUTH AFRICA'S AGRICULTURE BROAD BASED BLACK ECONOMIC EMPOWERMENT (AGRIBEE) POLICY: IMPLICATIONS FROM A DOMESTIC CONTENT MODEL

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ABSTRACT

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By

Kudzai Mukumbi

The problem of market access for previously disadvantaged producers in the South African agricultural market has remained despite the removal of the apartheid policy. The South African Agricultural Broad Based Black Economic Empowerment policy (AgriBEE) seeks to redress this issue. This study examines the potential economic effects of the preferential procurement aspect of the proposed AgriBEE policy. The AgriBEE policy has a target that fifty percent of agricultural produce sold by retailers must be procured from previously disadvantaged producers. The study is an empirical analysis of the potential effects of the policy using a partial equilibrium framework. The welfare implications of the proposed AgriBEE policy on retailers, large and small-scale producers are analyzed. An international trade tool, (the domestic content policy) was adapted to analyze a domestic issue (AgriBEE policy) in the context of a single dualistic economy composed of previously disadvantaged farmers and large-scale commercial farmers. Data from the tomato, cabbage and butternut squash markets was used to quantify the welfare implications of the policy. Results from the analysis indicate that consumers are penalized with the policy but there is potential for the previously disadvantaged farmers to benefit from the policy. Another key result is that the higher the target set for preferential procurement under AgriBEE the higher the dead weight loss of the policy.

DEDICATION

I would like to dedicate this work to my family: my parents Dr. N.E Mukumbi, Mrs. J. Mukumbi and my siblings Kudakwashe, Kupakwashe, Kufaramunashe and Tinodaishe. Thank you guys for your support, encouragement and for always believing in me. I would also like to thank God for providing me strength as I worked on my thesis.

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KEY TO ABBREVIATIONS

AgriBEE	Agriculture Black Economic Empowerment
BEE	Black Economic Empowerment
DCP	Domestic Content Policy
WTO	World Trade Organization
ZAR or R	South African Rand
GATT	General Agreement on Tariffs and Trade
CUSFTA	Canada-United States Free Trade Agreement
NEP	New Economic Policy
ROO	Rules of Origin

CHAPTER 1

INTRODUCTION

1.1 Background

The proposed South African Agriculture Black Economic Empowerment (AgriBEE) policy has the potential to dramatically change the structure, conduct and performance of the South African agricultural industry. The AgriBEE policy is a policy framework whose main objective is to set guidelines that promote an environment that is conducive for the participation of previously disadvantaged Black producers in the mainstream agricultural economy. In other words, the aim of the AgriBEE policy is the re-distribution of economic opportunity among the farmers. The AgriBEE policy is not merely an affirmative action program that provides preferential treatment to previously disadvantaged farmers[1] but it is an important social/economic reengineering tool. It is part of the broader Black Economic Empowerment (BEE) policy which includes all economic sectors in South Africa and seeks to correct economic injustices from the past apartheid era.

The current structure of South Africa's agricultural sector is dualistic and consists of two groups of farmers – the large-scale White commercial farmers and the small-scale previously disadvantaged Black farmers. The large-scale commercial farming sector is made up of sixty thousand producers who occupy 87% of the total agricultural land. These large-scale commercial farmers are well financed and have many years of experience in production and marketing of agricultural produce. However the small-scale

[1] The term 'previously disadvantaged' refers to those groups of individuals that were discriminated against the during the apartheid era. These groups include Blacks, Indians, Coloureds and women.

previously disadvantaged farming sector is made up of nearly three million households that occupy 13% of the agricultural land (Statistics South Africa, 2005). Other challenges that the small-scale farmers face include the lack of access to inputs such as land. In addition, participating in agricultural markets has only recently become an option. This dualistic structure occurred due to the discriminatory laws used during the Apartheid regime.

According to Statistics South Africa (2007), agriculture accounts for 2.9% of the GDP of South Africa. Despite this low level of contribution to GDP, agriculture in South Africa is still important because it contributes to poverty alleviation in rural and urban areas by reducing food prices, creating employment, increasing real wages and improving farm income. Empirical evidence from a FAO (2004) study conducted in Indonesia for example, found that agricultural growth reduced the level of poverty by 50% in rural areas and by 36% in urban areas. Delgado (2005) notes that "smallholder agriculture is simply too important to employment, human welfare and political stability in Sub-Saharan Africa to be neither ignored nor treated as just another small adjusting sector of a market economy" (Delgado in Development Report, 2005). However according to the FAO (2004) unless small holder agriculture involves some degree of commercialization, the impact of agricultural growth on food insecurity and poverty alleviation is limited. As a means of accomplishing these objectives, the AgriBEE policy applies to the entire South African agricultural sector value chain, from the provision of agricultural inputs to distribution of products.

The objective of the AgriBEE policy is therefore to merge the two separate agricultural economies into one. "Economic empowerment of previously disadvantaged people will be facilitated through: increasing the number of people that manage, own and control agricultural enterprises; facilitating ownership and management of agricultural enterprises by communities, workers cooperatives and other collective enterprises; human resource and skills development; achieving equitable representation in all occupational categories and levels in the agricultural workforce, preferential procurement, and investment in enterprises that are owned or managed by blacks" (Department of Agriculture South Africa, 2005).

One of the main objectives of the policy is the economic empowerment of previously disadvantaged people through preferential procurement and this aspect of the AgriBEE policy will be the main focus of this study. The AgriBEE policy has a target that at least 50% of the volume or value of agricultural produce that is sold by a retailer must be procured from previously disadvantaged producers. The 50% preferential procurement target should be reached by the year 2017. The first year of implementation of the policy is proposed for 2007. This is an enormous task and challenge for the agricultural sector to increase the previously disadvantaged farmers supply to the formal markets from below 1% to at least 50% in just 10 years.

The realization of the AgriBEE policy goals will be measured against a scorecard. Agricultural-related firms will be awarded points based on the attainment of each of the objectives of the scorecard. If an industry and its firms do not obtain the minimum level

or score that is required by the policy, as a penalty, they may be excluded from access to government contracts and public resources. For example, the government could withhold: state funds for research purposes; duty free access to European export markets; Land bank loans; and access to irrigation water (Williams, 2005). In addition, retailers will need to obtain a favorable score for them to remain competitive. This is a credible threat because firms that fail to comply with the AgriBEE policy requirements are likely to lose business since it is assumed that customers (75.2 % of South Africans are Black) will prefer to do business with firms that are AgriBEE compliant.

1.2 Research Objectives

The main objective of this study is to empirically estimate the welfare effects of implementation of the preferential procurement aspect of the AgriBEE policy. The specific objectives of this research are:

1. To analyze the current structure of the South African agricultural sector and give a description of the context in which the AgriBEE policy is set.
2. To review literature on the South African AgriBEE policy and determine which policies it is similar to.
3. To conduct a welfare analysis of the potential effects of the policy using fresh produce data for specific vegetables.
4. To estimate the potential economic welfare effects of the AgriBEE policy on large-scale commercial producers, small-scale previously disadvantaged producers; consumers and retailers.

5. To provide policy recommendations that help to minimize the costs of the AgriBEE policy and recommendations that help to maximize the potential benefits of the policy.

The study also seeks to answer the following research questions:

a) How will the policy affect large-scale commercial producers and small-scale previously disadvantaged producers?

b) How will the preferential procurement requirement affect retailers?

c) What can the policymakers, government, private and public sector and supply chain members do to ensure the success of the policy?

d) What is the effect of varying the level of AgriBEE preferential procurement requirement on the estimated value for welfare loss to society?

To analyze this problem we utilize a modified version of a domestic content policy[2] model. The approach allows us to conduct welfare analysis on the effects of the policy on the following markets: tomatoes, butternut squash and cabbage. The domestic content approach was adopted for a single dualistic economy.

1.3 Contribution of the Research

This study is unique in three ways. First, this is the first time in South Africa that a law has been proposed that has the potential to require retailers to be involved directly

[2] A domestic content policy is a regulation that requires that some specified fraction of a final good be produced domestically (Krugman and Obstfeld, 2006)

with the burden of correcting the economic injustice resulting from the apartheid policies and the dualistic agricultural structure. However, it is important to note that the principles of the AgriBEE policy are similar to the (New Economic Policy, NEP) affirmative action programs in Malaysia. Second, this study uses a domestic content model within a one country context to illuminate who benefits and loses as a result of the AgriBEE policy. Third, past literature on domestic content policies focuses only on the situation when the content requirement is fulfilled. However in the case of the AgriBEE policy if the preferential procurement target is set too high, the previously disadvantaged producers may not be able to supply the quantity of produce required by the policy. In addition, we analyze the potential situation when the price of produce from both large-scale and small-scale producers is equal, this would imply that the retailer would be indifferent of where (s)he procures produce and (s)he can decide to procure more than is required under the AgriBEE policy.

The study quantifies potential economic effects of the AgriBEE policy with the objective of informing policy makers and agribusiness supply chain players on the potential effects. This will enable the parties affected by the policy to identify how benefits of the policy can be maximized and how the costs can be minimized.

1.4 Organization of the Thesis

The paper begins with a literature review that focuses on the South African context, followed by a description of the AgriBEE Law. The final section of the literature review consists of a review of the domestic content policy. Chapter 3, the Methodology Section,

derives the domestic content model and incorporates various assumptions resulting in a modified version from which the welfare analysis is carried out. Chapter 4 discusses the estimation method and results of the analysis and Chapter 5 ends with the conclusion and implications.

CHAPTER 2

LITERATURE REVIEW

2.1 Contextualization of the Problem

A history of apartheid policies has led South Africa to have very high levels of income inequality. South Africa's Gini coefficient[3] is currently 0.68 (Machethe, 2004) which is one of the highest in the world. Government policies after 1910 turned Black farmers into laborers through subsidies to White farmers and closing down of markets to Black farmers (Goebel, 2005). The table below demonstrates the preferential treatment of Whites under the apartheid regime.

Table 2.1 Discrimination under apartheid

	Blacks	**Whites**
Population	19 million	4.5 million
Land Allocation	13%	87%
Share of National Income	<20%	75%
Ratio of earnings (compares value of earnings between the two groups)	1	14

Source: Chokshi et al 1995

[3] Inequality is reflected by the Gini coefficient, which measures the distribution of a country's national income. The Gini coefficient varies between 0 and 1 - the closer to 1, the more unequal a society; the closer to 0, the more equal a society

It is important to note that "rural underdevelopment and impoverishment among Black farmers is still rampant in South Africa because in the past Black farmers were systematically undermined with inadequate access to inputs, markets and infrastructure" (Goebel, 2005). As a result, the AgriBEE policy seeks to address the issue of inequality.

2.1.1 Dualism in South African Agriculture

One of the main features of the South African agricultural economy is its dualistic structure. There exists a group of large-scale commercial producers as well as a group of small-scale producers; this division is generally along racial lines. The large-scale commercial farming sector is capital intensive, export oriented, engaged in large-scale production and, operated by 60,000 producers who occupy 87% of total agricultural land, and employ 10% of the formal labor force (Statistics South Africa, 2005). On the other hand, there is the small-scale holder farming sector which is primarily still located in the former homelands. It is an impoverished sector, dominated by low input - labor intensive forms of production and poor access to markets. Up to 3 million households subsist in this sector which occupies 13% of agricultural land (Development Bank South Africa, 2005).

In terms of production, estimates from Statistics South Africa (2002), which is the government statistics office, suggest that small-scale producers in homelands contribute 0.7% of the total production of fresh vegetables, and only 0.13% is for sale, the rest is consumed within the household. Producers in homelands also contribute 1.09% of the total production of fruits, and they sell only 0.33% of their produce. Due to policies of

apartheid in South Africa (before 1994), a large proportion of the population was denied the opportunity to engage in many forms of economic activity. The small-scale previously disadvantaged Black farmers currently face many challenges in farming due to these past apartheid policies. For example, the previously disadvantaged farmers lack access to: land, water, markets, finance, communications infrastructure, education, skills development and market information (Hendricks, 2004).

From this background in which the proposed AgriBEE policy is set, it is clear that due to the challenges the previously disadvantaged farmers face it is very difficult for them to be competitive in the agricultural industry. The AgriBEE policy seeks to redress this issue. The challenge is to increase the contribution of previously disadvantaged farmers in terms of the volume and value of fresh produce they sell from less than 1% to 50%. If successful, the policy could be used as a model by other countries in Sub-Saharan Africa, for example Namibia.

2.2 Importance of the Issue

Hendricks (2004) notes that the AgriBEE policy is crucial to the success of the South African economy. She states that in order for South Africa to increase its GDP growth rate from the current levels of 2.5 to 3% to at least 5%, economic empowerment of previously disadvantaged groups is essential. Hendricks (2004) also notes that the low and narrow entrepreneurship base in South Africa is one of the major constraints to economic growth. This low entrepreneurship base resulted from past apartheid policies that prohibited Black farmers in participating in the formal agricultural markets. Hence

the AgriBEE policy seeks to remove this constraint of a low entrepreneurship base by increasing the opportunity for more previously disadvantaged groups to start or manage businesses and hence economically empower them.

Another reason why the AgriBEE policy is important is because equality and economic empowerment of previously disadvantaged farmers has the potential to reduce the incidence of political instability. When we look at other countries within the Southern Africa region that have faced similar challenges with past apartheid policies or colonialism such as Zimbabwe and Namibia, the significance of the AgriBEE policy is enhanced.

The AgriBEE policy is also important because in the past the policy making and service delivery has been focused on the two agricultural economies; one for the large-scale commercial agriculture value chain and the other one for the previously disadvantaged farmers (Hendricks, 2004). However the AgriBEE seeks to merge the two agricultural economies into one unified sector. The AgriBEE policy therefore has the potential to dramatically change the structure of the agricultural sector in South Africa.

2.3 Review of the AgriBEE Law

"The AgriBEE Law applies to the entire value chain in the South African agricultural sector, including all economic activities relating to the provision of agricultural inputs, services, farming, processing, distribution, logistics and allied

activities that add value to agricultural producers" (Department of Agriculture South Africa, 2005). The AgriBEE law has four main components with the objective of correcting economic and social injustices: direct empowerment, human resource development, indirect empowerment, corporate social investment. Direct empowerment of previously disadvantaged farmers includes equity in ownership, management and control of agriculturally related enterprises. Human resource development of previously disadvantaged farmers includes employment equity and skills development. In addition, indirect empowerment includes: provisions of access to markets, finance resources,, support for facilitation of BEE enterprise development, and preferential procurement.

The objectives of the policy are to facilitate empowerment in the agricultural sector by: first, promoting equitable access and participation of Black people in the entire agricultural value chain. Second, empowerment will be through the de-racialization of land and enterprise ownership, control, skilled occupations and management of existing and new agricultural enterprises. A third method of empowerment is by, facilitating structural changes in agricultural support systems and development initiatives to assist Black South Africans in owning, establishing, participating in and running agricultural enterprises (Department of Agriculture South Africa, 2005). Fourth, the empowerment will also be facilitated by increasing the extent to which communities, workers, cooperatives and other collective enterprises own and manage existing and new enterprises, thereby increasing their access to economic activities, infrastructure and skills training. Fifth, rural and domestic communities will be provided with access to agricultural economic activities, land agricultural infrastructure, ownership and skills

(Department of Agriculture South Africa, 2005). The indicators of empowerment are based on seven key elements of the AgriBEE policy, these are: ownership, management control, employment equity, skills development, preferential procurement, enterprise development, and corporate social investment.

2.3.1 Preferential Procurement

This study focuses on the preferential procurement aspect of the AgriBEE law. The aim of preferential procurement is to provide preference in allocation of contracts, supply chain commercial transactions or procurement of materials and services to people that were previously or historically disadvantaged. Under the preferential procurement aspect of the AgriBEE policy there is a requirement that 50% of the agricultural produce sold by a retailer must be procured from previously disadvantaged producers by the year 2017.

The AgriBEE policy states that "the agri-industry will undertake to proactively identify and implement targeted procurement strategies and policies to realize AgriBEE objectives. In addition, the agri-industry also undertakes to progressively provide Black people and small and medium scale enterprises preferred supplier status including the supply of services and goods" (Department of Agriculture South Africa, 2005). Under the AgriBEE policy the role of the government is to utilize all legislative and other measures available to influence the attainment of AgriBEE objectives. In addition, the government will provide previously disadvantaged producers preferred supplier status in the supply of goods and services to the government.

2.3.2 Monitoring and Evaluation of the AgriBEE policy

Monitoring and evaluation of the implementation of the AgriBEE policy by firms is based on a scorecard. Each of the seven elements[4] of the AgriBEE policy is given a weight in the scorecard. A firm will be allocated points on the attainment of each of the requirements of the policy. If a firm does not score high enough on the scorecard, they may be excluded from access to government contracts and public resources. For example, the government could withhold: state funds for research purposes; duty free access to European export market; Land bank loans; and or access to irrigation water (Williams, 2005). In other words a firm that refuses to comply with AgriBEE requirements will have major interruptions in their business.

The proposed implementation of the AgriBEE law is based on a ten year scorecard from 2007 to 2017, with 2007 as the first year of compliance when all the indicators will be measured (Department of Agriculture, 2005). Figure 2.1 illustrates the time line for the discussion and implementation of the AgriBEE policy.

[4] The seven elements include: ownership, management control, employment equity, skills development, preferential procurement, enterprise development, corporate, and social investment.

Figure 2.1. AgriBEE Policy Time Line

Source: Department of Agriculture, South Africa (2007)

2.4 Literature Review on Preferential Procurement in South Africa

The literature review on preferential procurement in South Africa is limited to the two case studies below that analyze the benefits and costs of a preferential procurement system. Bienabe and Vermeulen (2007) analyzed two case studies of local procurement by rural-based retail chain stores from small-scale farmers in South Africa. These cases

occurred before the proposed AgriBEE policy was written but they provide information on the details of how a preferential procurement system could operate in South Africa. Bienabe and Vermeulen (2007) carried out a qualitative analysis of the benefits and costs of a local procurement scheme. The cases involved two rural based retailers in Giyani and Thohoyandou, South Africa. These retailers, out of their own initiative, began to procure from small-scale farmers that were located close to the stores.

According to Bienabe and Vermeulen (2007) over time some of the adjustments that had to be made by the small-scale farmers in order to sustain their relationship with the retailers included: "use of good quality seed; improved production planning; application of higher quality retailer approved fertilizer and pesticides; improved technology for adequate irrigation capacity and employment of more workers due to increased production levels. In addition, due to the increased production and use of more expensive inputs, the farmers had to learn how to manage their cash flows. "The farmers also had to develop better technical skills in order to produce the higher quality produce required by the store," Bienabe and Vermeulen (2007).

One of the benefits of procuring from small-scale farmers was that it provided the farmers with a secure market to sell their produce which improved the farmers' household income and food security status. The case studies showed that participating in the supermarket chain procurement gave farmers incentives to invest in farming assets such as vehicles and drip irrigation. The retailers also benefited from the local procurement scheme with respect to freshness of produce since the small-scale farmers

supplied the retailer with frequent small deliveries of produce. In these case studies, local procurement was established as part of the retailers' community involvement.

From the case studies it is concluded that the main risk and cost implications associated with the retailers' procurement schemes was that the risk of shortages increased. This occurred because of the challenges faced by the small-scale farmers in production failure. In addition, the retailers faced higher transactions costs. In these case studies the authors note that success and sustainability of the procurement program heavily depends on the retail stores "communication and coordination functions, and provision of technical and financial support" (Bienabe and Vermeulen, 2007). We expect similar results after the AgriBEE policy is implemented.

2.5 Literature Review of Economic Empowerment and Affirmative Action Policies

Two examples of countries that have addressed the problem of economic inequality along racial lines using affirmative action programs are Malaysia and India. These two countries were chosen as examples because their affirmative action policies have been in place for a long time and therefore provide useful information to compare with the AgriBEE policy. The policies implemented in Malaysia and India are similar in many ways to the South African AgriBEE policy. Analyzing these two case studies provides insight into some of the potential economic effects of the AgriBEE policy.

Malaysia

The Malaysian case has been both one of the most successful and controversial cases. The occurrence of violent racial clashes between native Malays and Chinese

Malays in 1969 necessitated the implementation of the New Economic Policy (NEP) (Darity, 2005).The NEP was implemented in 1971 with the objective of reducing the wealth gap between native Malays and Chinese Malays. According to Darity (2005), although native Malays constitute 60% of the Malaysian population in 1970 they only owned 2% of Malaysia's corporate wealth. The NEP target was to ensure that 30% of the corporate wealth would be in the hands of native Malays by 1990. However after implementation of the NEP policy the share of corporate wealth had risen to only 18.7% by 2004. A unique aspect of the Malaysian NEP was that the government purchased shares of Malaysian corporations and put them in a trust fund for native Malays (Darity, 2005). Although in the case of the South African AgriBEE policy case the government is not purchasing shares directly, in many other aspects the Malaysian NEP policy and AgriBEE policy are similar as they are both used as tools for reducing the wealth gap between two social groups and reducing poverty. It is also important to note that although the NEP policy officially ended in 1990 because it was not able to reach its 30% target, the government found it necessary to implement other similar policies.

The NEP had both negative and positive effects on Malaysia. According to Island Business International (2007), one of the drawbacks of the NEP was that: although corporate wealth between native and Chinese Malays increased, the policy was not able to achieve its set target. In addition once in place the policy was difficult to remove because of the preferential treatment the policy offered to native Malays. One of the positive effects of the policy was that absolute poverty for the Malaysian population as a whole declined from 52% to 6.8% between 1971 and 1997. Another positive effect was

that Gini coefficient decreased from 51.3 in 1970 (Gerson, 1998) to and 49.2 in 2003 (Netto, 2003)

Table 2.2 NEP benchmarks

	Year		
	1970	**1990**	**2004**
Native Malay (Bumiputra) equity	2.4%	19.3%	18.7%
Overall poverty	52%	17.1%	5%
Household Income	RM[5]660	RM1,254	RM2,996

Source: Malaysian Dream (2007)

India

India is known for having one of the oldest affirmative action programs in the world. According to Darity (2005), preferential treatment is given to specific lower social classes/castes in the form of a 22.5% quota in allocation to civil service positions, parliamentary seats and university student positions. It is important to note that in India's affirmative action programs were implemented in the public sector whereas with the AgriBEE policy preferential treatment and economic empowerment will be implemented in both the private and public sectors.

[5] Where 1US$ = 3.37 Malaysian Ringgits (RM)

2.6 Alternative Methods for Policy Analysis

This section discusses alternative methods to analyzing the AgriBEE policy. Economists usually classify methods used in policy analysis according to the following three groupings: partial equilibrium or general equilibrium analysis; benefit - cost or cost analysis; or the policy can be analyzed at the regional, national or multinational level. Below, each of the three approaches is detailed.

2.6.1 General and Partial Equilibrium Analysis

Economists define general equilibrium analysis as the simultaneous analysis of all capital, product, and labor markets throughout the economy; for example, it shows the impact on exchange rates, savings, investment, and government transfer on the market equilibrium. One of the disadvantages of the general equilibrium analysis is that it is relatively empirically more difficult to analyze than partial equilibrium analysis. General equilibrium was not an appropriate to use in this study because the objective of this study is to analyze the potential effects of the policy on the agricultural sector without looking the effect of the policy on backward and forward linkages in other sectors. Using a general equilibrium analysis framework would lead to general economy wide results on the effects of the AgriBEE policy.

Mas-Collel et al (1995) note that "partial equilibrium models of markets or systems of markets determine prices, profits, productions, and other variables of interest adhering to the assumption that there are no feedback effects from these endogenous magnitudes to the underlying demand or cost curves that are specified in advance." The

partial equilibrium analysis was chosen to analyze the potential effects of the AgriBEE policy because it was more useful in analyzing the effects of the policy on large-scale commercial, small-scale previously disadvantaged producers and consumers on the agriculture sector for selected vegetables. According to Mas-Collel et al (1995) one advantage of the partial equilibrium analysis is that it "allows us to determine the equilibrium outcome in the particular market under study in isolation from all other markets" .The partial equilibrium analysis is therefore useful in analyzing the effects of the AgriBEE policy because it examines potential changes in the agricultural sector in isolation using data from selected vegetables.

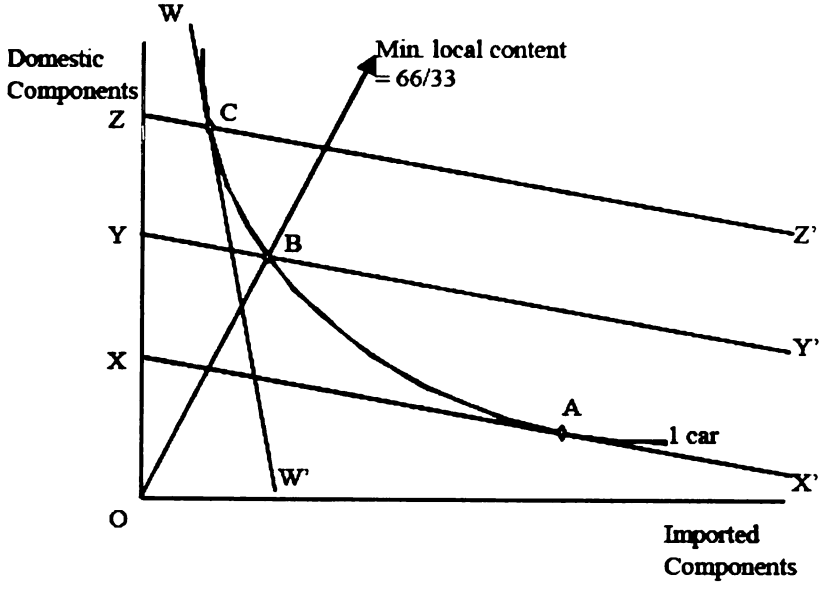
2.6.2 Benefit Cost Analysis and Cost Analysis

Another alternative analysis tool that could have been used to analyze the potential effects of the AgriBEE policy was the benefit-cost analysis method. Benefit-cost analysis is a tool used in policy decision making processes which weighs the potential economic benefits and costs of a proposed policy. It provides a monetary measure of whether a proposed regulation is desirable or not. However one disadvantage of the benefit-cost analysis approach would be that the accuracy of the outcome or results heavily relies on the accuracy of the estimates of the benefits and costs of the policy (Sewell and Marczak, 2006). In addition, in order to give estimates of the benefits and costs of the policy, researchers often use information from similar past research or projects and the method is therefore prone to the researcher's biases.

In the case of the AgriBEE policy, the policy is unique and there is no similar policy in South Africa that places the burden of past economic injustice on other members of society from which analysts can obtain estimates of benefits and costs therefore this method was inappropriate. Sewell and Marczak (2006) note that although benefit- cost analysis may be useful in revealing unexpected costs, it does not provide information on whether or not the policy is having a significant net effect on the desired outcomes.

Another alternative approach that could be used to analyze the potential effects of the AgriBEE policy is the Black and Mitchell (2002) model which analyzes the welfare effects of a domestic content policy in the auto industry in South Africa from a cost perspective. Figure 2.2 shows the cost analysis method.

Figure 2.2. Effects of a Domestic Content Policy on the South African Motor Industry



Source: Black and Mitchell (2002)

In the Fig 2.2 the curve CA represents an isoquant for a firm producing a car using both domestic and imported parts. The isoquant represents the tradeoff between the domestic and imported car parts. The slope of line XX' represents the free trade relative price of imported to domestic parts. Point A represents the minimum cost of producing a car with both domestic and imported parts before a domestic content policy is put in place.

Line OX represents the cost of making the car in terms of world prices. The slope of line OB represents the 66%-local-33% percent imported requirement. Line YY' is parallel to line XX' therefore OY shows the cost of making a car when a domestic content requirement is in place. From the diagram we therefore note that the effect of the domestic content requirement is to increase the cost of producing a car from OX to OY. This approach was not used because the objective of this study is to analyze both the benefits and the costs of the policy. Therefore using the cost analysis method would not capture both the benefits and the costs of the policy.

An alternative type of method is to assess qualitatively the main costs and benefits of the AgriBEE policy for previously disadvantaged farmers and retailers. This approach was used by Bienabe and Vermeulen (2007) who analyzed the benefits and costs of local procurement schemes from small-scale farmers by rural based retail stores. Some of the benefits that result from the local procurement system were that small-scale farmers benefited from access to the "secure and stable market provided by the store" (Bienabe & Vermeulen, 2007) and this improved the farmers income through the bigger market

opportunity provided by the local procurement scheme. An example of a qualitative cost that they identified was a higher risk of shortages of produce from the small farmers. The qualitative analysis approach was not adopted in analyzing the potential effects of the AgriBEE policy because the objective of the study was to provide empirical estimates of the benefits and costs to society of the AgriBEE policy. However, the qualitative analysis provided a background on which to identify the types of benefits and costs associated with preferential procurement system.

2.6.3 Analysis at Regional, National or Multinational Market Level

One of the models that could be used to analyze the potential effects of the AgriBEE policy is an analysis of the dualistic structure of the South African agriculture sector using a regional trade market model (Tomek and Robinson, 1990). In this case, the analysis could be based on analyzing the large-scale commercial producers as one regional market and the previously disadvantaged producers as another regional market. Spatial markets or interregional trade can be described as trade between two markets that are dispersed geographically. In South Africa, the location of the majority of the previously disadvantaged farmers is concentrated in specific geographic areas within the country. For example, there is a high concentration of previously disadvantaged farmers in the Limpopo province. Applying this regional trade model would mean the two regions that would be analyzed would include: a region where the large-scale commercial farmers are concentrated and another region where the small-scale previously disadvantaged farmers are concentrated. We would then analyze the quantities of agricultural produce that are procured from each region and sold by the retailer (supermarket) using the

regional market trade model. Potential implications of the AgriBEE policy on trade between the two markets could then be investigated. However, a limitation of this approach is that it does not cater to the possible cases of under fulfillment, over fulfillment and fulfillment of the AgriBEE policy requirement that are crucial for the analysis therefore this method was not used.

Another reason why this method was not used is because the fundamental issue to be analyzed is not the geographic dispersion of the two types of farmers. However the focus of this analysis is the problem of asymmetric access to markets and resulting patterns of low-vs-high value production between the large-scale commercial farmers and previously disadvantaged farmers, hence the regional trade model could not used.

This study carries out the analysis of the potential effects of the AgriBEE policy at the national level within a dualistic structure of the agriculture sector using a modified domestic content model. The analysis in this study was not carried out at the multinational level because the objective of this study was to analyze the potential effect of the AgriBEE policy on the domestic South African markets.

2.7 Domestic Content Protection Policies (DCPs)

2.7.1 Definition of a Domestic Content Requirement and its Objectives

Economists define a domestic content requirement/policy as a regulation that requires that some specified fraction of a final good be produced domestically. A

domestic content regulation provides protection in the same way a quota does. Krugman and Obstfeld (2006) note that for firms that must procure parts domestically, the domestic content regulation does not place a strict limit on imports but it allows the firms to import more provided that they also buy more domestically. As a result, the effective price of the inputs to the final goods producer is an average weighted price of the domestic and foreign inputs. The final price of a good produced under a domestic content policy is higher than that of a good produced under free trade.

Munson and Rosenblatt (1997) state that domestic content policies differ by definition and by inducements (penalties) for compliance. For example, a foreign firm must promise to adhere to domestic content requirements before being allowed to operate a business in the host country. Non compliance, in this case would result in the breach of the contract and the foreign firm can not do business in the host country. Other penalties may include high penalty tariffs on intermediate goods imported by a firm that has violated the domestic content policy. Hollander (1997) points out that governments often have inducements for DCPs such as duty free imports of intermediate goods provided that the firm complies with the DCP rule.

Domestic content policies have been used in both developing countries such as India and the Philippines (Ministry of Economy, Trade & Industry Japan, 2001) and in industrialized countries such as Canada (Richardson, 2002), USA (Crandall, 1987) and Australia (Pursell, 2001). The DCP policies have been widely used in the automobile, agricultural and television and radio industries. For example, Australia has used DCPs

extensively in the past in the following industries: automobile parts, petrochemicals, tobacco leaf, peanut oil, coffee, fruit juices, industrial machinery and agricultural tractors (Grossman, 1981).

In developing countries and especially in the automobile industry, DCPs have been used as a tool to encourage the intermediate good production instead of assembly functions they were carrying out previously. The domestic content policy is therefore justified by some authors on the basis of the infant-industry argument[6]. In industrialized countries the DCPs have been used as a way of protecting their domestic industry from competition with foreign firms. In other cases the DCPs have been implemented as a way of "supporting the domestic industry, developing domestic technological capability and ensuring protection for the domestic workforce" (Munson and Rosenblattt, 1997).

The use of domestic content policies has always been a controversial issue because under the WTO regulations, domestic content policies are prohibited as they are a form of a non tariff trade barrier. However the goals of domestic content requirements are not merely based on trade issues but include issues such as the protection of a nation's culture in the case of DCP in the TV, radio and film industry or other issues such as correcting inequalities in resource allocations or business opportunities as in South Africa's AgriBEE policy. As a result of this fact, DCPs have been used by many countries despite the fact that sometimes they may have an overall negative effect on society's welfare.

[6] The infant industry argument is used to argue that a domestic industry does not yet have the capacity to be competitive with larger foreign firms when they start and hence protection is necessary to enable them to succeed

However it is important to note that rules of origin (ROOs) are a form of DCP. Rules of origin are used to determine the "nationality" of goods that are traded internationally (Ministry of Economy Trade and Industry Japan, 2000). Some ROOs are used to give preferential treatment to goods from specific countries within a preferential trade area. ROOs are permissible under WTO regulations and they have the same effects as DCPs.

2.7.2 Review of Studies on the Effects of Domestic Content Protection Policies

Most of the theoretical literature on DCPs has focused on welfare and resource allocation effects of the DCP (Grossman, 1981) and (Mussa, 1984). Other authors have expanded the work by Grossman and Mussa and have explored the effects of DCPs in the context of a variety of market structures such as monopoly (Beghin and Sumner, 1992), monopsony (Kuroda, 2004) and oligopoly (Krishna and Itoh, 1988) cases.

The first published paper on DCPs by Grossman (1981) was based on the resource allocation effects of content protection under alternative assumptions. The assumptions include: the manner in which domestic content is defined, the number of intermediate goods and the market structure of the domestic intermediate industry. Grossman (1981) concluded that a domestic content policy aimed at increasing domestic value added in a multi-stage industry may in fact have the opposite effect. Grossman also noted that a domestic content policy that seeks to raise the output level of the intermediate good may fail in this objective if the intermediate good producers are larger relative to the domestic market for outputs. This is similar to the case of the AgriBEE

policy where the large-scale commercial producers are much larger than the previously disadvantaged in terms of the output level of fresh produce.

Mussa (1984) also performed an analysis on the economic effects of content protection and observed that content protection creates a production distortion by forcing inefficient choice of domestic and imported inputs. However in a competitive market situation, Mussa (1984) noted that the introduction of a marginally effective domestic content policy can lead to increased demand for the domestic input. He observed that a domestic content policy generally has a propensity to enhance monopoly power and when scale economies are significantly important, there is often a danger that the content protection will artificially create a 'natural monopoly'. The natural monopoly would consist of a single, efficient domestic producer who has the power to keep out domestic competitors who can not reach an efficient size.

Moran (1998) illustrates that the effects of domestic content policies have been largely negative in both developing and industrialized countries, regardless of the objectives of the policy. Research has shown that DCPs have technical, economic, social-political and managerial effects on a country in which they are implemented. Many examples of the use of the DCP in industrialized and developing economies exist and are illustrated in Table 2.3.

Table 2.3 Economic, Technological, Managerial and Socio-Political Effects of DCPs Across Countries and Industries

AUTHOR	Balkrishnan (2005)	Pursell (2001)	Richardson (2002)	Beghin (1997)
COUNTRY	**India**	**Australia**	**Canada**	**USA**
INDUSTRY	**Auto**	**Auto**	**TV and Radio**	**Tobacco and Cigarettes**
ECONOMIC EFFECTS				
Profitability	Decrease		Increase	
Demand of local inputs	Increase		Increase	Increase
Competitiveness of industry	Increase	Decrease	Increase	
Prices	Competitive	Increase		
Volume of production	Decrease		Increase	
Volume of exports	Increase	Increase		Decrease
Production costs				Increase
TECHNOLOGICAL EFFECTS				
Productivity	Increase			
Quality of product	Increase		Decrease	
Employment		Decrease		
Technological change	Increase			
MANAGERIAL EFFECTS				
Transactions costs		Increase		
SOCIO-POLITICAL EFFECTS				
Conflicts between foreign investors and host country				Increase
Difficulties in removal		Increase		Increase

From Table 2.3 we note that the effects of DCPs have been both negative and positive. The next section begins by describing DCP in the auto industry followed by DCP in the television and film industry and finally DCP in the agriculture industry.

2.7.3 DCP in the Auto Industry

A study conducted by Pursell (2001) focusing on Australia's experience with domestic content protection policies in the automobile industry led to the following economic effects from implementing the policy: high prices; incompatibility of DCPs with open non-discriminatory international trade; market fragmentation; reduced national income and counter-competitiveness due to government cartelization of the industry. However a positive economic effect of the DCP was that there was an increase in the volume of exports.

One of the major technological effects of the DCP was that it resulted in reduced employment in auto production, distribution and repair industries. In addition, the DCP retarded technological change. Under the managerial effects, the DCPs led to increased transactions costs for government, the private sector, and the micro-management of industry. The socio-political effect of the DCP was that there were major difficulties in removing the DCPs once implemented due to populist appeal, lack of transparency and vested interests of multinational and domestic firms who had become dependent on the policies.

In India's auto industry, Balakrishnan et al, (2005) concluded that the economic effect of India's government (indigenization) DCP was positive in terms of the production of low cost, high domestic content cars. The cars were competitively priced due to the adoption of a low cost mass production strategy. The results from the study show that there was an increase in exports of cars from India and an increase in the competitiveness of the small car industry. However, despite the positive technological effects of the DCP with respect to quality and productivity improvements through use of advanced technologies, there have also been some negative economic effects of the policy such as a decline in the total volume of cars produced and the level of profitability for the firms.

Crandall (1987) analyzed the effects of US trade protection for autos during the 1970s and 1980s. He found that in terms of economic effects, import restraints reduced competitive pressure from abroad and raised industry prices and profits. One of the major technological effects of the DCP was that it influenced industry wage bargains[7]. The restraints allowed the United Auto Workers to maintain their premium over manufacturing wages. He notes that the protection of the auto industry in the 1980s increased cash flows but did not raise output or employment. The fact that the imported cars and domestically assembled cars from Japan were not perfect substitutes in terms of quality, made it difficult for U.S. auto manufacturers to compete with products produced by the Japanese on U.S. soil.

[7] It is important to note that U.S automobile producer's continue to face further competitive difficulties because of continuing wage increases.

2.7.4 DCP in the Television and Radio Industry

DCPs have also been used widely in the television and radio industry. Richardson (2002) notes that "many countries have expressed concerns that domestic culture is threatened by an international cultural hegemon (i.e. the USA), be it in film, television or music played on radio stations". As a result of this observation, many DCPs have been implemented all over the world in countries such as Canada, Australia and New Zealand. Richardson (2002) notes that some of the economic effects were that the policies: induced an increase in the volume of artists entering the market, increased demand for the output of new domestic artists, increased profitability but there was also a reduction in the quality of products.

Studies on the Canadian DCP by Richardson (2002) showed that one social effect of the policy was to produce domestic artists that produced products with similar style and quality to that found on the international market. In this case the DCP produced an effect that was opposite of the desired effect by "encouraging the domestic artists to become more like international ones rather than preserving any perceived cultural distinctiveness" (Richardson, 2002)

In Australia the effects of DCPs were studied by Mason (2003). The effects were similar to those found in Canada; there was a significant increase in the volume of Australian recordings from 20 per year in 1942 (when the DCP ratio was 2.5%) to 97 recordings per year in 1946 (when the DCP ratio was 5%). However in 1989 and 1990 it was noted that only 26% of the domestic content releases appeared on the top 100 charts.

From this case it is important to note that although the volume of products increased as a result of the DCP policy the quality of products under the DCP did not improve.

2.7.5 DCP in Agriculture

The effects of DCPs on the U.S. tobacco and cigarette industries were studied by Beghin et al, (1997). They applied Grossman's (1981) model and empirically analyzed the welfare and trade effects of the policy on U.S. tobacco growers, manufacturers and competing tobacco imports. The 1994 -1995 DCP policy required that 75% of all tobacco used in U.S. cigarette manufacturing had to be of domestic origin. Some of the effects of the policy were that it: had a small negative output effect (total demand for U.S. cigarettes declined by 0.55% and the total export demand for U.S. cigarettes by 1.71%); increased domestic use of U.S.-grown tobacco; decreased imports; and the export demand for U.S. tobacco decreased due to the higher price induced by the content requirement. The DCP caused controversy and was found to be inconsistent with GATT principles. The DCP policy was then removed but replaced by a tariff rate quota which provided protective effects similar to those provided by the DCP to the U.S. tobacco growers.

Canada has also used a DCP in the form of blending requirements for wine. Before the implementation of the Canada-United States Free Trade Agreement (CUSFTA) in 1989, the province of British Columbia protected its grape and wine industry through a policy that stated that "domestic wines had to have an 80% British Columbian grape content with the remaining 20% coming from either imports or local

sources. More imports could be used only after the entire provincial grape crop had been bought and used in production" (Heien and Sims, 2000). However, demand for British Columbian grown grapes was so high that most British Columbia labeled wines contained only 60% British Columbia grapes. The effects of the removal of the DCP under the CUSFTA were that: the number of grape producers declined from 200 growers to 111 growers and the total grape production area in British Columbia was drastically reduced by approximately 38%. The economic effect of the policy was that it cost the Canadian government vine removal subsidies worth Can$8,000 per acre (Heien and Sims, 2000).

2.7.6 Key Points About DCPs

Moran (1998) notes that one of the reasons why domestic content requirements often have a negative domestic impact is because they attempt to improve on functioning markets and this generates technical, economic, managerial and socio-political problems for the investors and the host country. However, in the case of the South African AgriBEE policy, the policy is set in a context where there is market failure in the agriculture markets due to the effects of apartheid. The market failures include market failure in: access to information on markets, access to capital and access to transportation. For example there are high transactions costs for the previously disadvantaged producers in obtaining information about the markets and high transaction costs in access to markets.

Moran (1998) also points out that one of the negative effects of DCPs is that they are "difficult for projects that do not capture economies of scale to become globally competitive". In other words, the presence of economies of scale has a significant role to play in determining the success of a DCP policy. Currently the previously disadvantaged producers do not have scale economies in production and marketing of fresh produce. In order for the previously disadvantaged producers to benefit from the AgriBEE policy they will have to obtain economies of scale, one possibility is through forming cooperatives and or creating joint ventures with large-scale commercial producers .

Moran (1998) also notes that the three most important factors that determine the potential effects of a policy include: economies of scale, cutting-edge technology and best practice management. With respect to the political economy, domestic content policies have often led to conflicts between investors and the host country authorities. In the case of the AgriBEE policy, there is potential for conflict to arise between small-scale and commercial producers, retailers and the lawmakers of the AgriBEE policy.

A study by Veloso (2001) on domestic content policies concluded that domestic content policies are likely to be effective in regions where the overall technology gap of the components that are forced into domestic production is small. Veloso (2001) suggests that coupling of DCP with subsidies can help to drive investors to make choices that optimize welfare of the domestic economy without hurting their competitive ability. He also notes that "domestic content requirements have a clear upper bound" (Veloso, 2001). This implies that if governments demand too high a level of content requirement, they are

likely to severely hurt the economy. For example, with small production volumes from the domestic market, it is nearly impossible for any positive gains to be realized by the domestic content policy. In the case of the AgriBEE policy, if the previously disadvantaged producers fail to produce sufficient volumes of fresh produce to meet the 50% preferential procurement target, the content ratio is underfulfilled and it will be difficult for the objectives of the policy to be attained.

According to the Ministry of Economy, Trade and Industry Japan (2001) DCPs have both short term advantages and long term disadvantages. This occurs because they "force a foreign affiliated producer to use domestic parts, the short term advantage is that there is an immediate increase in the sales of domestic parts. However the long term disadvantage is that the industry is protected from competition and in the end will fail to improve its international competitiveness. The consumer also suffers when the DCP is implemented because they have to pay a higher price and domestic demand will stagnate therefore hindering long-term economic development of domestic industries" (Ministry of Economy, Trade and Industry Japan, 2001).

The next chapter discusses the conceptual model or framework and methodology used in the analysis of the potential effects of the AgriBEE policy.

CHAPTER 3

METHODOLOGY

A model of international trade policy (the domestic content policy), was modified to analyze the welfare effects of a domestic issue (AgriBEE Policy). To domesticate the policy, the foreign country is represented by the large-scale commercial producers and the domestic country by the previously disadvantaged producers. It is important to note that the two groups of producers that are being compared have different resource allocations. In this context the previously disadvantaged producers can be viewed as farmers in a developing country with limited resources and the large-scale commercial producers as the industrialized country that has the latest technology for production and less binding resource constraints.

This analysis uses a partial equilibrium model to analyze the potential economic welfare effects of the AgriBEE policy. The policies of apartheid that were used before 1994 created advantages and granted market access among White large-scale commercial producers. However the AgriBEE policy seeks to create advantages or minimize disadvantages for the previously disadvantaged farmers, hence the AgriBEE policy acts as a subsidy or quota to the previously disadvantaged farmers. The AgriBEE policy can also be viewed as a tax on large-scale commercial farmers. However, before 1994 the previously disadvantaged farmers were being taxed.

The AgriBEE policy is therefore a tool used for redistributing wealth or economic opportunity and it shifts the tax burden from the previously disadvantaged farmers to the large-scale commercial farmers.

3.1 Justification of the Use of an International Trade Tool to Analyze the Effects of Domestic Policy

The justification of the use of an international trade tool to analyze the effects of a domestic policy is based on the comparison of the similarities between the domestic content model and the AgriBEE policy. First, the objectives of both policies are similar: both policies are aimed at protecting a special interest group using the infant-industry argument. In the case of the DCP, the policy is designed to stimulate development of the domestic industry and to protect domestic producers from foreign producers competing in the market. In the case of the AgriBEE policy, the goal is to stimulate an increase in the participation of the small-scale producers in the agricultural supply chain.

Second, both policies involve a market consisting of two groups of participants that compete. In the case of the DCP the market includes the domestic and foreign producers and in the case of the AgriBEE policy the market includes the large-scale producers and the previously disadvantaged small-scale producers.

Third, both policies include quantitative restrictions. In the case of the DCP the policy makers set a restriction on the ratio of domestic to imported input used to produce

the final good. With the AgriBEE policy, retailers are required to procure 50% of the total agricultural produce they sell from previously disadvantaged producers.

Fourth, both the DCP and AgriBEE policies are government intervention tools; they are used to make markets more favorable for domestic producers. However, unlike the AgriBEE policy, they are not correcting past economic injustices. With free trade and no DCP, the domestic producer would be driven out of the market by foreign producers who have a cost advantage. Without the implementation of the AgriBEE policy, access to agriculture supply chains for small-scale producers is limited. One of the major objectives of the AgriBEE policy is to create economic opportunities for previously disadvantaged farmers. Similarly, the objective of a DCP is to create economic opportunities for the domestic firms.

The fifth important factor is that the effects of the policies are similar: both policies affect the equilibrium price and quantity of the products available in the market. Both are protectionist policies and therefore have a cost attached to their implementation. The DCP increases the use of domestic inputs and the AgriBEE policy could increase the amount of produce procured from the previously disadvantaged groups. The AgriBEE policy is therefore a tool that affects the procurement decisions of final good producers (retailers).

The interaction between supply and demand in the domestic content model will provide the foundation for welfare analysis. Results similar to those of the Australian,

USA and Indian automobile industry are expected to be found. This is because the situations are similar; however in the case of South Africa's AgriBEE policy a single dualistic economy will be analyzed.

3.2 MODEL SPECIFICATION AND DEVELOPMENT

Modified Grossman-Kuroda Model

The Grossman (1981) domestic content protection model was modified to accommodate a simple dualistic economy within a one country context. The derivation of the model follows given the assumptions from section 3.2.2.

3.2.1 Profit Maximization Problem

The short run production possibility function of the final goods industry can be represented by an industry production function: $F(l, Q_{pd} + Q_{ls})$. As noted earlier, the AgriBEE policy requires that 50% of agricultural produce be procured from previously disadvantaged producers. Thus the profit maximization problem of the retailer subject to the constraint or requirement of 50% procurement from previously disadvantaged producers imposed by the AgriBEE policy, when making procurement or purchasing decision is:

$$\text{Max } \Pi$$

$$\text{Max } PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls}(1 + t) Q_{ls} - wl$$

Subject to the constraint:

$$(1)\ t_m^* = 0, \quad \text{if } Q_{ls} < (1-k)(Q_{pd} + Q_{ls})$$

$$(2)\ t_m^* = t_m, \quad \text{otherwise}$$

Where:

Q_{pd} = quantity of fresh produce procured from previously disadvantaged producers before the AgriBEE policy is implemented

Q_{ls} = the quantity of fresh produce procured from large-scale commercial producers

P_{pd} = the price of the fresh produce procured by previously disadvantaged producers

P_{ls} = the price of fresh produce procured from large-scale commercial farmer

$P_{ls}(1 + t_m)$ = the AgriBEE (or DCP-augmented) price

w = the per unit labor cost

l = quantity of labor representing a vector of non traded primary inputs

L = the Lagrangian multiplier

t_m = represents the penalty/tariff rate or increase in price that results from implementation of the AgriBEE policy

k = the AgriBEE preferential procurement requirement or content ratio.

3.2.2 Assumptions of the Modified Model

Before the AgriBEE policy is implemented, the retailer uses Q_{pd} units of goods from small-scale producers and procures $(Q_t - Q_{pd})$ units from the large-scale producers. With the introduction of the AgriBEE policy the retailer (final good's producer) uses Q_{pd}' units of the goods from small-scale producers and $(Q_t' - Q_{pd}')$ from the large-scale commercial producers.

In order to analyze the potential implications of the AgriBEE policy the following assumptions were made: first, in the modified model the content requirement operates like a quota. This implies that when the quantity of produce from large-scale commercial farmers are limited at the initial price, the demand for the produce exceeds the quantities supplied by small-scale previously disadvantaged farmers plus the quantity supplied by large-scale commercial farmers. This will cause the price to bid up until the market clears, the effect of the AgriBEE policy will therefore be to increase the price of the produce sold by the retailer.

Second, in the analysis it is assumed that the agricultural produce from both the large-scale commercial and small-scale previously disadvantaged producers are perfect substitutes. In reality, with the AgriBEE policy there may be problems in substitutability of products between small and large-scale producers as the produce may differ in terms of quality and production method used in the short run. In this analysis we will assume that the previously disadvantaged farmers will have to upgrade the quality of their produce after the AgriBEE policy is implemented, and this leads to a higher cost of production for them. (See section 4.3.2 on treatment of this issue in the actual estimation)

Third, it is assumed that the marginal cost can increase to high levels such that the AgriBEE requirement will not be fulfilled due to the prohibitive costs. The results of those modifications result in Figure 3.2 where the effects of different levels of marginal costs were analyzed using S_1, S_2 and S'.

Fourth, for the purposes of this analysis we will assume that a perfectly competitive market exists. However the effects of the AgriBEE may vary depending on the structure of the South African agricultural market. For example, if the product has a large export market, the effect of the AgriBEE policy may be minimal. Another example could include a product that is heavily supplied to the informal markets and the modern retailers do not sell much of, such as Amadumbe *(Colocasia esculenta)* in this case the effect of the policy would also be minimal.

Fifth, the price/cost of fresh produce from previously disadvantaged producers is higher than that from large-scale commercial producers. This is due to the higher production costs faced by previously disadvantaged producers. The high costs emanate from: lack of economies of scale in production; high transportation costs since farms of previously disadvantaged producers are located very far away from markets; lower quality of land and lower productivity than farms for large-scale commercial producers; inadequate access to capital; and difficulties in gaining access to supermarket supply chain leading to high transactions costs.

3.2.3 Mathematical Derivation[8] for the three Cases: Fulfillment, Underfulfillment and Overfulfillment of the AgriBEE policy

Case 1: Fulfillment of Content Requirements

From equation (1) where content requirements are met, the Lagrangian formulation is:

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd}Q_{pd} - P_{ls}(1 + 0)\,Q_{ls} - wl - \lambda\{Q_{ls} - (1-k)(Q_{pd} + Q_{ls})\}$$

[8] See Appendix 7 for a more detailed mathematical derivation

$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd}Q_{pd} - P_{ls}Q_{ls} - wl - \lambda(-Q_{pd} - kQ_{pd} - kQ_{ls})$

First order conditions for profit maximization are:

i) $\delta L / \delta l = w$

ii) $\delta L / \delta Q_{pd} = P_{pd} - \lambda(1-k) \leq 0$

iii) $\delta L / \delta Q_{ls} = P_{ls} + \lambda k \leq 0$

iv) $\delta L / \delta \lambda = kQ_{ls} - (1-k)Q_{pd} \geq 0$

Equating (ii) and (iii)

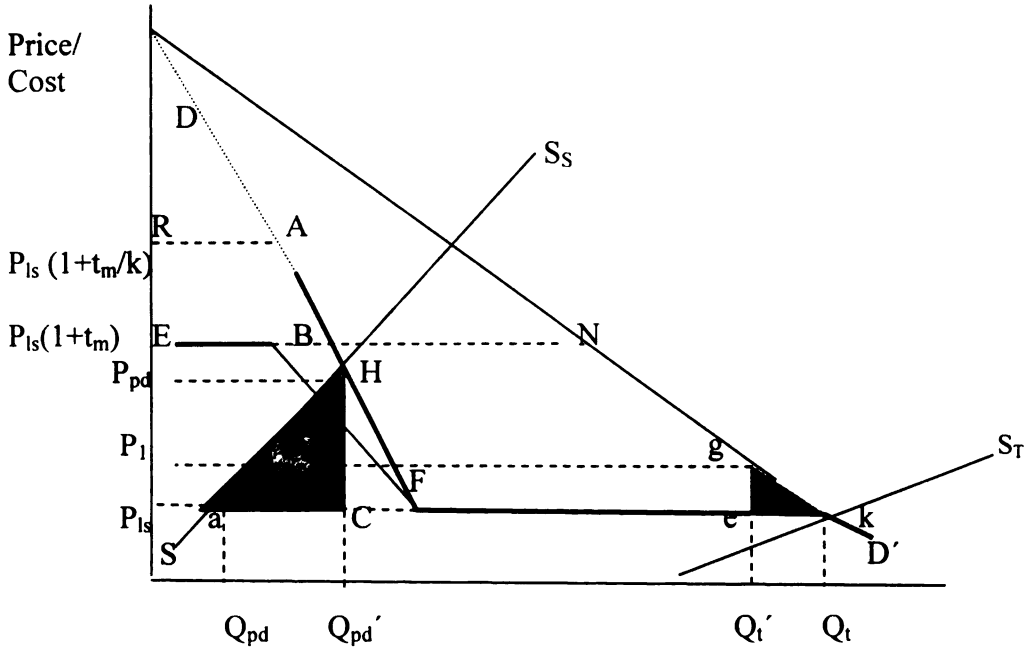
$P_{pd} - \lambda(1-k) = P_{ls} + \lambda k$

v) $P_{pd} - P_{ls} = \lambda$

Substituting (v) into (ii) we get: $k P_{pd} + P_{ls}(1-k)$

Under the AgriBEE policy (DCP), when the content requirements are met exactly, the price of produce sold by the retailer will be: $k P_{pd} + P_{ls}(1-k)$ and the ratio of the quantity of fresh produce procured from previously disadvantaged producers to the quantity procured from large-scale commercial producers should be $k/(1-k)$. This is represented in Figure 3.1 as the line AF.

Figure 3.1 Welfare Analysis of AgriBEE Policy



P = MC = industry supply curve and P_l is the average weighted price of the total produce under the restriction of the AgriBEE policy, $P_l = k\,P_{pd} + (1-k)\,P_{ls}$.

When the AgriBEE policy is implemented, k is the 50% AgriBEE target that requires that 50% of the fresh produce must be procured from the previously disadvantaged producers. If we substitute k = 0.5 into the Lagrangian formulation:

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd}\,Q_{pd} - P_{ls}(1+0)\,Q_{ls} - wl - \lambda\{Q_{ls} - (1-0.5)(Q_{pd} + Q_{ls})\}$$

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd}\,Q_{pd} - P_{ls}\,Q_{ls} - wl - \lambda(-Q_{pd} - 0.5\,Q_{pd} - 0.5\,Q_{ls})$$

First order conditions will be

i) $\delta L/\delta l = w$

ii) $\delta L/\delta Q_{pd} = P_{pd} - 0.5\lambda \leq 0$

iii) $\delta L / \delta Q_{ls} = P_{ls} + 0.5\lambda \leq 0$

iv) $\delta L / \delta \lambda = 0.5 Q_{ls} - 0.5 Q_{pd} \geq 0$

but

$P_{pd} - 0.5\lambda = P_{ls} + \lambda 0.5$

v) $P_{pd} - P_{ls} = \lambda$

Substituting (v) into (ii):

Price of composite good: $0.5 P_{pd} + 0.5 P_{ls}$

Case 2: Over-fulfilling of Content Requirements

Allowing the firms to over-fulfill the content requirements necessitates the use of Kuhn-Tucker conditions to maximize profits:

Max PF $(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls} (1 + t) Q_{ls} - wl$

Subject to:

$t_m^* = 0$, *if* $Q_{ls} < (1-k) (Q_{pd} + Q_{ls})$, this constraint holds as a strict inequality only if $P_{pd} < P_{ls}$ under one of the Kuhn-tucker conditions.

The line *Fk* (see Fig. 3.1) represents over-fulfillment of the content requirements. Along *Fk* retailers are indifferent between the two sources of supply.

Case 3: Under-fulfillment of Content Requirements

If firms in the final good industry choose to satisfy but not over-fulfill the content ratio requirement then the constraint $t_m^* = 0$ holds. The profit function is non-increasing in factor prices and a sufficient condition for the firms to opt to under-fulfill the content requirement is:

$$P_{ls}\,(1 + t_m) < k\,P_{pd} + P_{ls}\,(1 - k),$$

$$P_{pd} > Pls\,(t_m/k + 1)$$

Under-fulfillment of the content requirements is represented by *EN* in Figure 3.1. This occurs when the input price of intermediates is $P_{ls}\,(1 + t_m)$.

3.2.4 Explanation/Description of Modified Domestic Content Model Diagram

This section provides a more detailed description of the components of Figure 3.1

In Fig 3.1:

line *DD'* = represents the total derived demand curve of both the previously disadvantaged producers and large-scale commercial producers

k = the AgriBEE requirement or content ratio represented in the diagram by EB/BN and RA/BN

line S_S = the industry marginal cost of intermediate good (fresh produce) production from small-scale previously disadvantaged producers.

S_T = the industry supply curve for both the large-scale commercial producers and small-scale previously disadvantaged producers.

Line *EBAFK* (in bold) = the net demand for fresh produce from previously disadvantaged producers.

BF = the weighted average price

line *AF* = the demand for the previously disadvantaged producers fresh produce as a function of $P_{ls}\,(1 + t_m)$.

Q_{pd}' = the quantity of fresh produce procured from previously disadvantaged

farmers with the implementation of the AgriBEE policy

Q_t = total quantity of fresh produce procured from both large and small scale producers before the AgriBEE policy is implemented

Q_t' = total quantity of fresh produce procured from both large and small-scale previously disadvantaged producers after the AgriBEE policy is implemented

The discontinuity in the line at point *B* is due to the fact that when the AgriBEE content requirement is fulfilled there is no tariff or penalty charged to the final goods producer (retailer). From the graph we note that the costs of the previously disadvantaged producers are higher than that of the large-scale commercial producers.

According to Grossman (1981) the net demand curve consists of segments that accord with whether the content ratio is underfulfilled, exactly met, or overfulfilled. The retailer behaves competitively in the previously disadvantaged goods markets and the use of fresh produce from previously disadvantaged producers is determined at point *H* where the line *AF* intersects S_S' and the total use of produce is determined at point *g* .The retailer will therefore use Q_{pd}' units of fresh produce from previously disadvantaged producers and will procure $(Q_t' - Q_{pd}')$ units from large-scale commercial producers.

Above Point R

If the price is above *R* all of the produce is procured from large-scale commercial producers and net demand is zero for previously disadvantaged producers' fresh produce.

Above R the final good producers (retailers) prefer to pay the penalty than to pay the much higher price under the AgriBEE policy content requirement.

Underfulfillment of the Content Ratio

If the ratio is underfulfilled, the input price of intermediates is $P_{ls}\ (1 + t_m)$ and total intermediate demand is *EN*. Along *EB* the content requirement is underfulfilled, net demand is infinitely elastic at domestic price $P_{ls}\ (1 + t_m)$. In this case the final goods producer (retailer) is indifferent of purchasing from either previously disadvantaged producers or large-scale commercial producers because the price of fresh produce from previously disadvantaged producers is equal to the price of fresh produce from large-scale commercial producers along *EB*.

Fulfillment of the Content Ratio

Any point along the line *AF* the content requirement is fulfilled, that is the content ratio is binding. The line *BF* represents the average weighted price. At point *F* the content ratio, *k*, is no longer binding. This means that at point *F* the policy content requirement is not fulfilled.

Overfulfillment of the Content Ratio

Along *FK* the price of produce from previously disadvantaged producers is equal to the price of fresh produce from large-scale commercial producers so the retailer is indifferent in its purchasing decision, only the total quantity of goods procured matters but the retailer is indifferent on the proportion of intermediate goods procured from

previously disadvantaged producers and large-scale commercial producers. Along *FK* the fresh produce from the previously disadvantaged producers is low cost and the retailer could purchase all the fresh produce from them.

3.3 Welfare Analysis

The economic welfare effects of the AgriBEE policy are measured through changes in consumer surplus and producer surplus. Economists define consumer surplus as the amount that consumers benefit by being able to purchase a product for a price that is less than they would be willing to pay. Producer surplus is defined as the amount that producers benefit by selling at a market price that is higher than they would be willing to sell for (Investopedia, 2007).

After implementation of the AgriBEE policy, the change in consumer surplus is represented by the area $P_1 P_{ls}kg$ (Figure 3.1) and this area has a negative value due to the increase in the price that is charged to consumers. The change in producer surplus for previously disadvantaged farmers is $P_{pd}HaP_{ls}$ (Figure 3.1) and this has a positive value due to the increase in the price they receive. The welfare loss is represented by areas *acH* and *ekg* (Figure 3.1).

The triangle *acH* (Figure 3.1) represents the technical efficiency loss to society as a whole, this is a loss that occurs on the supply side. The loss occurs because resources are taken from other sectors in the economy and are used in the protected small-scale producer sector. The welfare loss cost includes the loss from the increased use of fresh produce from previously disadvantaged producers who are high cost producers. The area

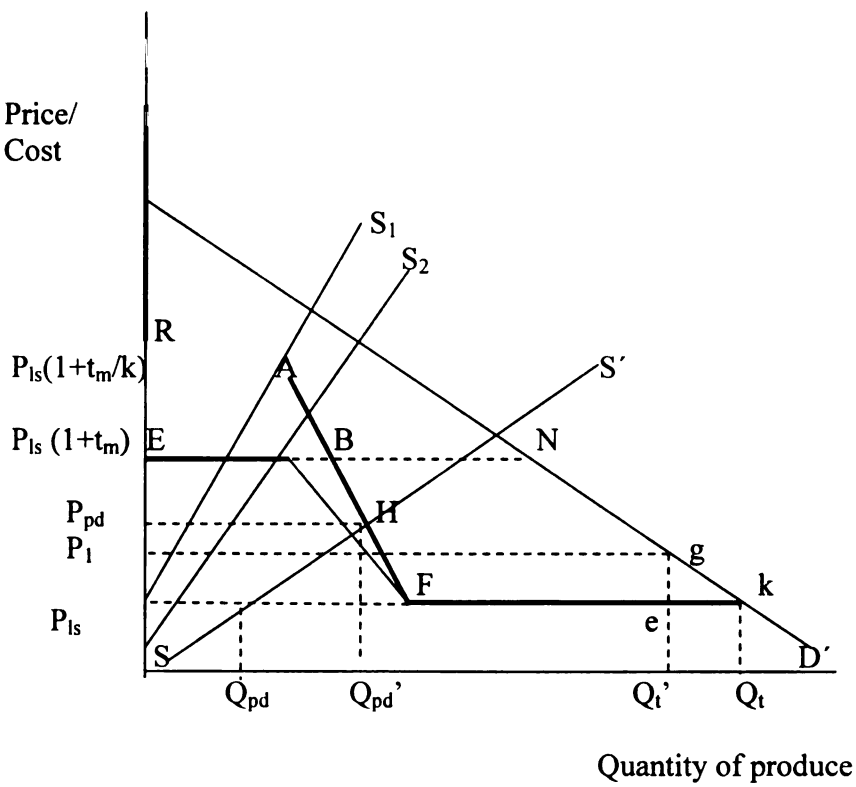
ekg represents the consumer dead weight loss with the restriction of the AgriBEE policy that occurs on the demand side.

3.4 Effect of Location of Supply Curve

This section summarizes the effect of the location of the supply curve within the modified DCP model.

Fig. 3.2 Modified Version of Fig 3.1 Showing Different Locations of the Supply Curve

The diagram below (Fig 3.2) is a modified version of the Grossman model



In Figure 3.2 the AgriBEE content requirement is satisfied in equilibrium provided that the industry supply curve (SS') intersects the net demand curve at a point of the right of point A. If industry marginal costs rise so steeply that the only intersection of the industry supply curve (S_1) and the net demand curve is along EB, then the content protection is not fulfilled in the new equilibrium. If the supply curve (S_2) intersects the net demand curve twice, along EB and along AF, then two possible equilibria exist. However the equilibrium along AF would dominate because both types of producers make larger profits at this equilibrium.

This implies that for the previously disadvantaged farmers to benefit from the policy the supply curve should shift to the right. Factors that will cause the supply curve for the previously disadvantaged farmers to shift to the right i.e. those that would decrease production and marketing costs are: an increase in extension services, improved access to transport; capital, land, increased, productivity and use of good quality inputs.

CHAPTER 4

DATA, ESTIMATION METHODS AND RESULTS

The objective of this chapter is to elaborate on the data, estimation methods and results of the welfare effects of the AgriBEE policy. This study is an ex-ante analysis of the estimated potential welfare effects of the AgriBEE policy. A modified domestic content model is used to estimate values for the change in social welfare due to the AgriBEE policy. Estimates of the price elasticity of supply and demand for the selected vegetables are used to obtain estimates for: consumer surplus, producer surplus and the welfare loss. This information is utilized to determine the potential costs and benefits from the AgriBEE policy. Simulations were carried out for the welfare effects under different scenarios by varying: the content ratio level and the price elasticity of supply. This chapter begins with a description and justification for the data used, followed by a discussion of the results.

4.1 Data Sources

The data for the prices and quantities of the tomatoes, butternut squash and cabbages sold at the fresh produce terminal markets in South Africa were obtained from the Department of Agriculture South Africa (2007). The equivalent to the world price in Grossman (1981) is represented by the large-scale commercial producer's price of fresh produce which is the five-year average price of produce.

In addition, data from enterprise budgets of large-scale commercial farmers and previously disadvantaged farmers was used in the analysis. The data provided insight

into the differences in production and marketing costs of both the two types of farmers. (See Appendix 4 and 5). From the appendices we note that in order for the previously disadvantaged farmers to increase the quantity and quality of their produce they will need to increase expenditure on some inputs (e.g. the quantity of chemicals they use in production). However for some costs such as labor the previously disadvantaged farmers will have to decrease their costs through increased use of machinery. The data from the enterprise budgets were therefore useful in comparing the producer costs before the AgriBEE policy is implemented versus estimates of the producer costs after implementing the AgriBEE policy. The data on the enterprise budgets was obtained from Fort Hare University in South Africa.

4.2 Fresh Vegetables Selection Criteria

To analyze the potential implications of the AgriBEE policy on preferential procurement of fresh vegetables, it is important to focus on the following types of vegetables: first, vegetables that are most important to the previously disadvantaged producers in terms of contribution to farm revenue and experience in growing them (for example, cabbage and butternut squash). Second, the selected vegetables must be representative of the full range of perishability (tomatoes and butternut squash). It is important to look at both highly perishable vegetables and those that are not highly perishable because perishability affects capital investment and procurement decisions. This is crucial because the majority of previously disadvantaged producers often do not have cold storage facilities. Third, it is crucial to consider vegetables that are being currently grown by both large and small-scale producers, (tomatoes). Fourth, vegetables

that are currently produced predominantly by large-scale producers, but have the potential for previously disadvantaged producers to enter those markets must be considered, such as tomatoes. Fifth, vegetables which are mainly produced and consumed domestically within South Africa were selected i.e., those that are not exported in large volumes. This was important in order to ensure that we analyze the effect of the AgriBEE policy on the domestic fresh produce supply chain. For heavily exported vegetables, the AgriBEE policy might not have an effect on large-scale commercial farmers who produce those products. This could occur because the large-scale commercial farmers could respond to the policy by exporting more of those vegetables and ignore the local market.

Taking into consideration these five factors, the following vegetables were chosen for the analysis: tomatoes, butternut squash and cabbages. Sections 4.2.1 - 4.2.3 provide some background information on production and sales of tomatoes, butternut squash, and cabbage.

4.2.1 Tomatoes

From Fig 4.1 we illustrate that there is little variation in the level of production of tomatoes over the past 10 years in South Africa. Participation of previously disadvantaged farmers in tomato production and marketing is crucial because it may help alleviate poverty since it is a high value crop. According to Statistics South Africa's Survey of Large and Small-Scale Agriculture (2002), previously disadvantaged producers sold only 27% of the tomatoes they produced. However it is important to note that although previously disadvantaged producers contribute to only 0.8% of total tomato

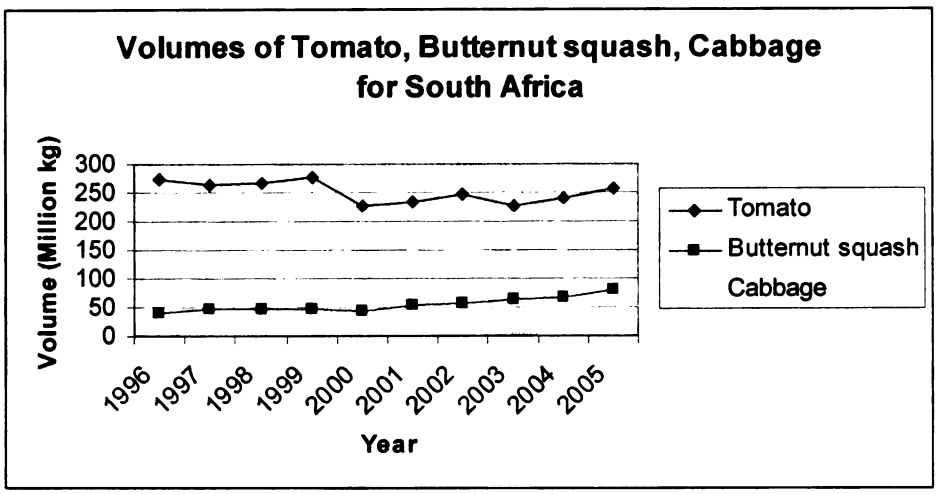
production in South Africa, tomatoes are the most important vegetable for hawkers[9]. Tomatoes were therefore chosen for use in estimating welfare effects of the AgriBEE policy because they have potential to make a significant contribution to poverty alleviation through provision of employment opportunities. (Louw et al, 2004)

4.2.2 Butternut Squash

Figure 4.1 shows that between 1993 and 2005 sales of butternut squash have increased significantly. This increase implies that there is a growing market for butternuts and that the previously disadvantaged producers could benefit from participation in this market after implementation of the AgriBEE policy. In addition, butternut squash is a crop that previously disadvantaged farmers already have experience in producing for local markets and home consumption. It will be important to focus on butternut squash and not pumpkins in general because the average price for butternut squash is higher than that of pumpkins.

[9] Hawkers are small-scale entrepreneurs that buy and resell goods for a living (usually informally).

Figure 4.1 Total Volume of Tomato, Butternut Squash and Cabbage Produced in South Africa



Source: Department of Agriculture South Africa (2007)

4.2.3 Cabbage

Results from the Survey of the Large and Small-Scale Agriculture (Statistics South Africa, 2002) suggest that the previously disadvantaged producers sell 42% of their cabbage production. This is the highest percentage of vegetables sold by the previously disadvantaged producers when compared to the percentage they consume at home. Another reason why cabbages were selected for use in the welfare analysis is that the previously disadvantaged producers already have experience in growing cabbage and therefore it may be easier for them to supply the quantity and volumes required by the fresh produce markets and supermarket chains. It is important to study the policy implications of the AgriBEE policy on cabbage production because since 1993 there has been a decline in the production of cabbages in South Africa as shown in Fig 4.1.

Studying the potential impact of the AgriBEE policy on the production and marketing of cabbages will therefore be useful in this analysis.

4.2.4 Income Contribution of Selected Vegetables to Previously Disadvantaged Farmers

Table 4.1 provides a summary of the contribution levels of the selected vegetables to the total income of the previously disadvantaged farmers. We note that cabbages provided previously disadvantaged farmers with a total income of 183 million South African Rands during the survey year (for the Survey of Large and Small-scale Agriculture, 2002) and they contributed to 55% of their total income. It is also important to note that pumpkins and squashes contribute 12.2% of the total income to the previously disadvantaged farmers while tomatoes only contribute 1.3%.

Table 4.1 Percentage Contribution of Various Vegetables to Total Income of Previously Disadvantaged Farmers

Vegetable Crop	Farming Income (Million Rands[10])	% of Total Income
Amadumbe[11] (*Colocasia esculenta*)	12	3.6
Beetroot	11	3.4
Cabbage	183	55.1
Carrots	30	9.2
Green beans	2	0.7
Green peas	1	0.3
Lettuce	1	0.2
Onions	5	1.4
Pumpkins and Squashes	41	12.2
Spinach	40	12
Tomatoes	4	1.3
Turnips	1	0.3

Source: Statistics South Africa (2002)

[10] Exchange Rate: 1 United States Dollar = 7 South African Rands

[11] Amadumbe is a root vegetable grown by previously disadvantaged farmers in South Africa (Slowfood Movement, 2007)

4. 3 Welfare Analysis Estimation

This section elaborates on the parameters that were used in the welfare analysis estimation and describes the estimation procedure.

4. 3.1 Parameters Used in Analysis

The parameters used in the analysis include: the prices of the selected vegetables, quantities of the selected vegetables, current percentage estimates of the quantity of produce procured by retailers, price elasticities of supply and demand; and the price wedge/difference between previously disadvantaged farmers and large-scale commercial farmers. In this section a detailed description on where data came from for each variable is discussed. This section is necessary because of the limitations of the data. In assessing the potential economic welfare impacts of the proposed AgriBEE policy, there are four main limitations that need to be acknowledged in this study:

a) It is important to note that data on prices and quantities of fresh produce from previously disadvantaged farmers over a long period of time, for example 30 years is scarce and difficult to obtain. As a result, this analysis uses an estimated percentage contribution of fresh produce from previously disadvantaged farmers obtained from the Survey of Large and Small-Scale Agriculture (2002) to estimate the quantity of produce from previously disadvantaged farmers. Given this limitation of data it was not possible to carry out an econometric analysis to estimate the supply curve of the previously disadvantaged farmers.

b) The analysis is based on a policy that is still in the discussion phase. The first year of implementation of the policy is 2007. However during the period when this study was carried out some of the details of the policy were still being discussed.

c) Since an econometric study was not conducted, simulations were used where the levels of price elasticities of supply were varied from 0.5; 1.0; 1.5 and 2.0.

d) Although general implications on the potential effect of the AgriBEE policy can be drawn from the analysis, some of the results such as values of welfare losses are specific to the selected vegetable.

The symbols and formulas used in the welfare analysis estimation are described in Table 4.2.

Table 4. 2 Summary of Data Source or Calculation Method

Symbol	Description	Data available	Data not available[12]
k	Content ratio under AgriBEE	Source: AgriBEE Policy Draft, (Department of Agriculture , RSA, 2004)	
P_{pd}	Price for produce from previously disadvantaged farmers After the AgriBEE policy		Equation: $P_{pd} = P_{ls} + u$
P_{ls}	Price for produce from large-scale commercial farmers Before the AgriBEE policy	Source: 5 year average price, Abstract of Agricultural Statistics South Africa (2007)	
P_t	Weighted average price		Equation: $P_t = k P_{pd} + (1-k) P_{ls}$
Q_{pd}	Quantity of fresh produce procured from previously disadvantaged farmers Before AgriBEE policy		Equation: Q_{pd} = % contribution of previously disadvantaged farmers * Q_t
Q_{pd}'	Quantity of fresh produce procured from previously disadvantaged farmers After AgriBEE policy		Equation: $Q_{pd}' = k * Q_t'$
Q_t	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers Before AgriBEE policy	Source: Abstract of Agricultural Statistics South Africa (2007)	

[12] The data for the specific variable were not available and had to be derived from the existing data

Table 4.2 (cont'd).

SYMBOL	DESCRIPTION	DATA AVAILABLE	DATA NOT AVAILABLE
Q_t'	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers After AgriBEE		Equation: $E_D = \frac{((Q_t - Q_t')/ Q_t)}{(P_1 - P_{ls})/ P_{ls}}$
E_S	Price elasticity of supply		Source: Simulation values: E_S= 0.5; 1.0; 1.5;2.0.
E_D	Price elasticity of demand		Source: Ortmann (1981)
t_m	Tariff or penalty		(Not specified under current draft of AgriBEE policy)
y	Change in price 1		Equation: $y = P_1 - P_{ls}$
u	Change in price 2		Source: Estimated value (based on past studies & enterprise budgets) Equation : $u = P_{pd} - P_{ls}$
CS	Change in consumer surplus		Equation: $CS=0.5*(Q_t'+Q_t)(P_1- P_{ls})$
PS	Change in producer surplus for previously disadvantaged farmers		Equation: $PS=0.5*(Q_{pd}'+Q_{pd})*(P_1- P_{ls})$
DW_1	Welfare loss represented by triangle *ekg* in Fig 3.1		Equation: $DW_1 = 0.5(P_1 - P_{pd})(Q_t - Q_t')$ or $DW_1 = -0.5x^2 E_D P_{ls} Q_t$ *Where:* $x = (P_1 - P_{ls})/ P_{ls}$

Table 4.2 (cont'd)

SYMBOL	DESCRIPTION	DATA AVAILABLE	DATA NOT AVAILABLE
DW_2	Welfare loss represented by triangle *acH* in Fig 3.1		Equation: $DW_2 = 0.5(P_{pd} - P_{ls})(Q_{pd}' - Q_{pd})$ or $DW_2 = 0.5v^2 E_S P_{ls} Q_{pd}$ *Where:* $v = (P_{pd} - P_{ls})/P_{ls}$

4.3.2 Data Calculation Methods

When the data were not available economic theory was used to calculate the needed information. These procedures were as follows:

1. Q_t, the total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before implementation of the AgriBEE policy was obtained from the Abstract of Agricultural Statistics (Department of Agriculture, 2007). The price elasticity of demand (E_D) estimate from a previous study by Ortmann (1981) was then used to obtain Q_t', the total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after implementation of the AgriBEE policy.

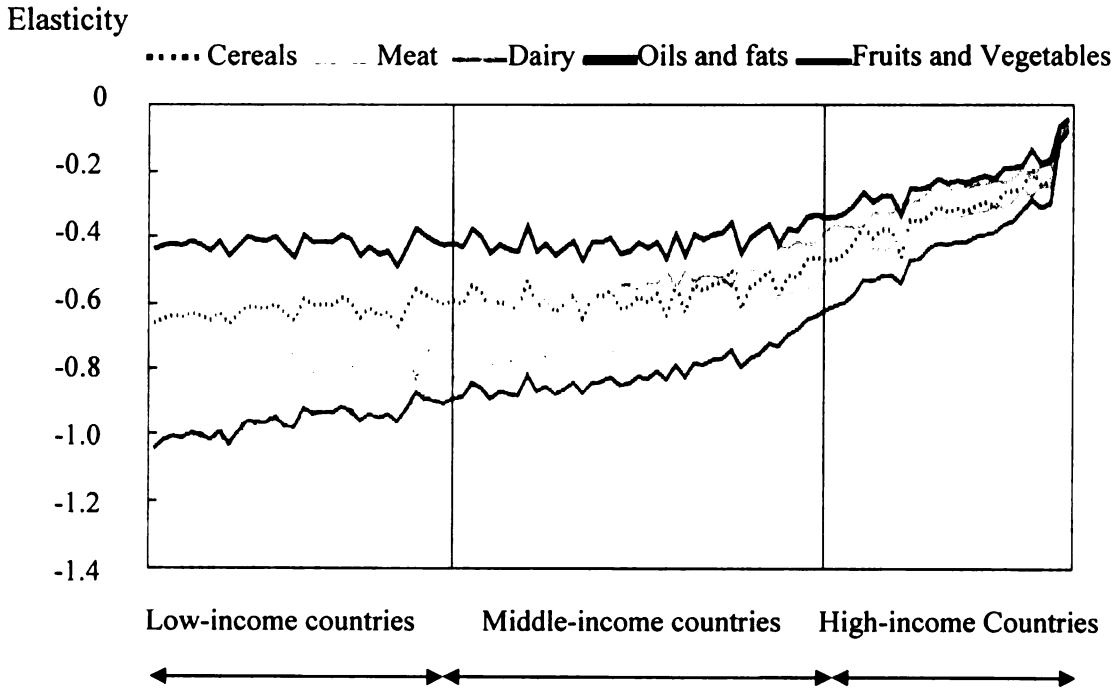
   The formula that is used to derive Q_t' was: $E_D = \dfrac{[((Q_t - Q_t')/Q_t)]}{[(P_1 - P_{ls})/P_{ls}]}$

   Justification for the use of the selected price elasticity of demand values

   In the analysis the values used for the price elasticity of demand were obtained from Ortmann (1981). These price elasticities of demand were based on

data from 1950-1970 for fresh vegetables in South Africa. The price elasticities from this study was used because data on recent values for the specific vegetables for previously disadvantaged farmers are not available. The values obtained from the Ortman (1981) study are reasonably within the range of the elasticities of other studies as illustrated in Figure 4.2 and Table 4.3.

Figure 4.2 Comparison of Price Elasticities of Demand for Fruit and Vegetables Between Low, Middle and High Income Countries



Source: Seale (2003)

Table 4.3 Published Price Elasticity of Demand Estimates for Selected Vegetables

AUTHOR	Huang (1985)	Huang (1993)	You (1998)	San Juan (1978)	Kunkel (1978)	Ortmann (1982)
COUNTRY	USA	USA	USA	Philippines	Philippines	South Africa
VEGETABLE						
Tomatoes	-0.558	-0.622	-0.379	----------	----------	-0.77
Cabbage	-0.038	-------	0.012	----------	----------	-0.21
Butternut Squash	--------	-------	-------	----------	----------	-0.50

Table 4.3 (cont'd)

AUTHOR	Huang (1985)	Huang (1993)	You (1998)	San Juan (1978)	Kunkel (1978)	Ortmann (1982)
COUNTRY	USA	USA	USA	Philippines	Philippines	South Africa
Fruit vegetables	--------	--------	--------	----------	-0.78	----------
Leafy vegetables	--------	--------	--------	----------	-0.60	----------

In addition, Seale et al (2003) found that low income countries have aggregate price elasticities of demand for fruits and vegetables that range between -0.471 and -0.562. For example, the price elasticity of demand for the fruits and vegetables for Kenya was -0.530. Middle income countries such as Botswana and Swaziland had price elasticities between -0.326 and -0.465. The high income countries such as the US and UK had elasticities between -0.056 and – 0.306. Seale et al. (2003) found that the average price elasticity of demand for fruits and vegetables was -0.516 for low income countries, -0.415 for middle income countries and -0.221 for high income countries.

South Africa is a middle income country and we would expect that its aggregate price elasticity of demand would be within the range noted in the Seale et al. (2003) study. For the purpose of comparison, the US price elasticity of demand for fruits and vegetables is the most inelastic value among other high income countries with a value of -0.056. This implies that the values used in the analysis for the AgriBEE policy are reasonable estimates of the price elasticities. For the price elasticities of supply we would expect South Africa to have an inelastic price elasticity of supply for its vegetables.

The price elasticities of supply that were used in the simulations were 0.5; 1.0; 1.5 and 2.0. Utilizing simulations is the best approach to understanding the effects of AgriBEE policy because actual price elasticities of supply for the previously disadvantaged farmers have never been estimated or recorded.

Table 4.4 Published Price Elasticity of Supply Estimates for Selected Vegetables

AUTHOR	Dinan (1988)	Huffman (1996)
COUNTRY	USA	USA
VEGETABLE		
Tomatoes	1.35	-------
Cabbage	-------	-------
Butternut Squash	-------	-------
Other vegetables (SR)	-------	0.2
Other vegetables (LR)	-------	0.8

Source: DeCanio (2005)

2. From Q_t' we estimated the quantity of fresh produce procured from previously disadvantaged farmers after the AgriBEE policy is implemented (Q_{pd}') The formula for estimating Q_{pd}' was $Q_{pd}' = k * Q_t'$.

3. The value for the quantity of fresh produce procured from previously disadvantaged farmers before the AgriBEE policy was implemented (Q_{pd}) was estimated by multiplying Q_t with the percentage contribution of the previously disadvantaged farmers to the total volume of produce sold. Values for the percentage contribution of the previously disadvantaged farmers are summarized

in Table 4.5. The formula for estimating Q_{pd} was Q_{pd} = % contribution of previously disadvantaged farmers * Q_t

Table 4.5 Percentage of Fresh Produce Procured from Large-Scale Commercial Producers and Previously Disadvantaged Producers

	Tomato	**Butternut squash**	**Cabbage**
Before AgriBEE			
Previously disadvantaged producers	0.76%	2.19%	26.37%
Large-scale commercial producers	99.24%	97.81%	73.63%
After AgriBEE			
Previously disadvantaged producers	50%	50%	50%
Large-scale commercial producers	50%	50%	50%

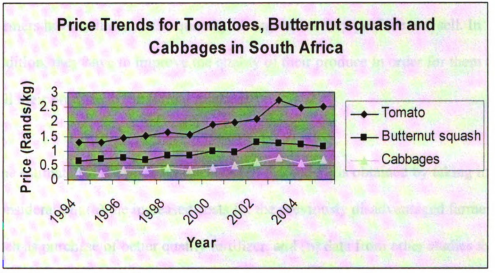
Source: Statistics South Africa (2002) Survey of Large and Small-Scale Agriculture.

4. The price of produce from large-scale commercial farmers (P_{ls}) was obtained from the Abstract of Agricultural Statistics - 2006 (Department of Agriculture South Africa, 2007). P_{ls} represents a five- year average price for fresh vegetables sold at the fresh produce markets in South Africa.

Justification for Choice of the 5 year Average of the Prices

An illustration of the price movements for the selected vegetables is given in Figure 4.3.

Figure 4.3 Price Trends for Tomatoes, Butternut Squash and Cabbages in South Africa



Source: Source: Department of Agriculture South Africa (2007)

We note that the 5 year average price gives a reasonable estimate for prices of vegetables before the AgriBEE policy because: (1) the five year average price reflects the current situation and (2) it eliminates outlier years which occur in agricultural prices. For example, from Figure 4.3, the price of cabbage in 2003 was much higher than average, therefore, using 2003's price for the base year would be misleading.

Table 4.6 Average Prices for Selected Vegetables in South Africa, R/kg

Average price	Tomatoes	Cabbage	Butternut Squash
10 year average	1.87	0.47	0.97
5 year average	2.35	0.62	1.17
3 year average	2.57	0.67	1.20

Source: Department of Agriculture South Africa (2007)

5. The price of fresh produce from the previously disadvantaged farmers (P_{pd}) represents the price or cost of their produce after the AgriBEE policy has been implemented. The value of P_{pd} is obtained by using an estimate of the percentage increase in the cost of produce from previously disadvantaged farmers. ($P_{pd} = P_{ls} + u$ (see table 4.2)). This increase occurs because previously disadvantaged farmers have to increase the quantity of vegetables they produce and sell. In addition, they have to improve the quality of their produce in order for them to sell their produce to the formal markets.

6. The estimate for the price wedge between P_{pd} and P_{ls} is obtained by taking into consideration: (a) the increased costs for the previously disadvantaged farmers such as purchase of better quality fertilizer, and (b) data from other studies that analyzed effects of a domestic content policy on the prices of goods. The estimate of the price wedge is within the range of other studies where a domestic content policy was implemented. These previous studies had a range from 19% to 60% (Pursell, 2001).

Justification for Price Wedge/Difference Values:

After the AgriBEE policy is implemented, we expect the price wedge/difference between the price of produce procured from previously disadvantaged farmers and the price from large-scale commercial farmers to increase. This price difference reflects the extra costs that are included when the retailer procures from previously disadvantaged farmers.

Some of the reasons why previously disadvantaged farmers are considered high cost producers are: they require more start up capital for them to be able to produce high quality produce for the retailer; they are often located further way from retailers than large-scale commercial farmers and hence they face higher transportation costs; their production is small-scale so they can not utilize economies of scale in production and this makes their production and marketing costs higher than those of large-scale commercial farmers; the retailer faces more costs in dealing with many small-scale previously disadvantaged farmers than with a few large-scale commercial farmers (See Appendix 4 and 5).

Bienabe and Vermeulen (2007) concluded that the previously disadvantaged farmers should use "better quality seed; carry out improved production planning; apply a higher quality retailer approved fertilizer and pesticides; use improved technology for adequate irrigation capacity and employ more workers due to increased production levels. In addition, due to the increased production and use of more expensive inputs, the farmers had to learn how to manage their cash flows. The farmers also had to develop better technical skills in order to produce the higher quality produce required by the store".

Based on the assumption that as the level of AgriBEE content requirement increases the price differences increases, values for the price differences were assumed based on data from past case studies where DCPs were implemented in

other industries such as in the case of India's auto industry (Balakrishnan et al., 2005). The table below summarizes the price differences used in this study.

Table 4.7 Summary of Price Difference Values

AGRIBEE PREFERENTIAL PROCUREMENT REQUIREMENT OR CONTENT RATIO (%)	PRICE DIFFERENCE (%)
25	30
50	43
75	60

The values in the table were based on results from analysis of similar case studies where domestic content policies were implemented. The extra costs that are incurred by previously disadvantaged farmers when the AgriBEE policy is implemented occur because they have to increase the volume and quality of the produce they sell. The AgriBEE requirement levels of 25% and 75% were chosen arbitrarily to analyze the effect of varying the level of the AgriBEE preferential procurement requirement on the size of the welfare loss.

7. The weighted average price (P_I) is obtained from the formula:

   $P_I = k\,P_{pd} + (1\text{-}k)\,P_{ls}$ that was theoretically derived in Chapter 3.

8. The welfare loss values are estimated by simply calculating the areas of the triangles acH and eKg as shown in Figure 3.1.

4.4 Empirical Scenarios

In this section we begin by analyzing the welfare effects of the AgriBEE policy in the baseline scenario. In order to carry out an in depth analysis simulations were also carried out by varying the following factors:

1. The price wedge and content ratio level simultaneously;
2. The level of AgriBEE preferential procurement requirement or content ratio at k = 25%, 50% and 75%; and
3. The price elasticity of supply at 0.5; 1.0; 1.5; 2.0.

4.4.1 Baseline Scenario

The baseline scenario is the main focus of this analysis because it uses data based on the current description of the AgriBEE policy. For the baseline scenario, the following assumptions were made:

1. AgriBEE preferential procurement requirement or content ratio is 50%; and
2. The price difference between large-scale commercial farmers and the previously disadvantaged farmers is 43%.

(See Appendix 8 for a summary of the data that was used in the baseline scenario)

4.4.1.1 Economic and Welfare Impacts of the AgriBEE Policy: Discussion for Baseline Scenario

This section summarizes the key economic and welfare impacts of the AgriBEE policy. The discussion is based on the results in Table 4.8.

1. **After the AgriBEE policy is the implemented there is a decrease in the total quantity of produce procured from both large-scale commercial farmers and previously disadvantaged farmers**

From the table we note that the potential impact of the AgriBEE policy is that it will decrease the total quantity of fresh produce procured by retailers with values ranging from -4.8% for cabbage to -16.8% for tomatoes. The change in quantity of produce procured from large-scale commercial farmers declines by -35.4% for cabbage and -58.1% for tomatoes. The results from the analysis therefore imply that the large-scale commercial farmers will be negatively impacted by the AgriBEE policy. This result is similar to results obtained when domestic content policies were implemented in the auto industry in the past (this was discussed in Chapter 2).

2. **The price of produce sold by retailers increases after the AgriBEE policy is implemented**

Table 4.8 shows that the change in price of the produce sold by the retailer or supermarket is nearly 22% higher for all three vegetables. In addition, the value of the price difference between the large-scale commercial farmers and previously disadvantaged farmers is set at 43%. (This figure was obtained from analyzing impacts of domestic content policies in past studies). This result is similar to the effects observed in case studies of domestic content policies that were implemented in the auto, television, radio and agricultural industries.

3. **The revenue of previously disadvantaged farmers will increase substantially after the AgriBEE policy is implemented.**

The previously disadvantaged farmers will benefit substantially from the AgriBEE policy as indicated by the high level of increase in their revenue. For example, the percentage increase in the revenue for tomatoes is 2372% while those for butternut squash and cabbage are 913% and 122% respectively. These high values are consistent with the large changes in prices and quantities of produce sold under the AgriBEE policy. It is important to note that if previously disadvantaged farmers are not able to increase their production capacity to the set levels it will be difficult for them to obtain the maximum desired benefits from the policy. This result is similar to the result obtained when domestic content policies were implemented in the auto, television and radio and agricultural industries in the past.

4. **The AgriBEE policy places a large burden on consumers**

In reviewing the change in consumer surplus we can conclude that the AgriBEE policy will have a negative impact on the consumers. Tomato consumers stand to lose approximately [13]R111.4 million after the AgriBEE policy is implemented. The loss is due to the increased costs faced by the retailer. The consumer loss also occurs as a result of the increase in the cost of the produce sold by the retailer due to procurement of produce from both high and low cost producers. Butternut squash and cabbage consumers will lose R15.2 million and R18.9 million respectively. It is important to note that the consumer loss is much

[13] R represents the South African Rand, where 1 US$ = R7.

higher than the change in producer surplus. For example, the change in producer surplus is less than half the change in consumer surplus. This implies that the AgriBEE policy places a large burden on the consumers who have to purchase the fresh produce at a higher price.

5. The welfare loss is greatest for the high value produce

The welfare loss 1 (represented by triangle ekg) and welfare loss 2 (represented by triangle acH) are a cost to society that occurs due to the distortion in market efficiency brought by the increase in price due to the AgriBEE policy. It represents the difference between producer surplus and consumer loss when procurement decisions are restricted under the AgriBEE policy.

We also note that the welfare loss values for the tomato market are much higher than for the butternut squash and cabbage. This is because of differences in the quantity of the fresh produce sales and differences in the prices of the three selected vegetables. For example, the total quantity of tomatoes sold at the fresh produce terminal markets before the AgriBEE policy is implemented is nearly 4 times the quantity of butternut squash sold and 1.7 times the quantity of cabbage sold. In addition tomatoes are a high value product. This is illustrated by the fact that the five year average price per kilogram of tomatoes is double the price of butternut squash and 3.8 times the price of cabbage. The welfare impacts are lower for butternut squash and cabbage because the previously disadvantaged farmers are already active in these markets.

Table 4.8 Economic and Welfare Impacts of the AgriBEE Policy: Baseline Scenario

	Unit	Tomato	Butternut Squash	Cabbage
Change in total quantity of fresh produce	%	-16.8	-10.8	-4.8
Change in quantity of produce from large-scale commercial farmers	%	-58.1	-54.4	-35.4
Change in quantity of produce from previously disadvantaged farmers	%	5372.2	1936.7	80.4
Change in price of produce sold by the retailer/supermarket	%	21.5	21.4	21.8
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	%	-58.1	-54.4	-35.4
Change in revenue for previously disadvantaged farmers	%	2,372.0	913.1	122.1
Change in consumer surplus	Million Rand	-111.4	-15.2	-18.9
Change in producer surplus for previously disadvantaged farmers	Million Rand	51.0	7.5	14.4
Welfare loss 1 (triangle ekg)	Million Rand	10.2	0.9	0.5
Welfare loss 2 (triangle acH)	Million Rand	49.7	6.8	4.1

Exchange Rate: 1 United States Dollar = 7 South African Rands

Baseline Scenario: k =50% and price difference value = 43%

4.4.2 Simulation Scenarios for Varying the Level of AgriBEE Requirement

In order to fully understand the potential effects of the AgriBEE preferential procurement policy, simulations were carried out by first varying the AgriBEE requirement content ratio. In Scenarios 1 and 2 data for the tomatoes was used to analyze the effect of varying the AgriBEE preferential procurement requirement (k) by setting k at 25% in Scenario 1 and at 75% in Scenario 2. In Scenarios 3 and 4 data for the butternut squash was used to analyze the effect of varying the AgriBEE preferential procurement requirement (k) by setting k at 25% in Scenario 3 and at 75% in Scenario 4. In Scenarios 5 and 6 data for the cabbages was used to analyze the effect of varying the AgriBEE preferential procurement requirement (k) by setting k at 25% in Scenario 5 and at 75% in Scenario 6. (See the Appendices 9, 10 and 11 for a more detailed summary of the data used for Scenarios 1 to 6).

4.4.2.1 Tomato, Butternut Squash and Cabbage Simulations for Varying the Level of AgriBEE Preferential Procurement Requirement (Scenarios 1 to 6)

The assumptions for these simulations are as follows:

1. AgriBEE preferential procurement requirement or content ratio is set at the following levels: 25%, 50% and 75%; and
2. The price difference between the prices of produce from the large-scale commercial farmer and the previously disadvantaged farmer is 43%.

4.4.2.2 Economic and Welfare Impacts of the AgriBEE Policy: Discussion for Scenarios 1 to 6

From the results obtained in Tables 4.9; 4.10 and 4.11 we can conclude that:

1. The higher the AgriBEE preferential requirement (k) the higher the revenue, producer surplus, and consumer surplus and welfare loss.

This is best illustrated in the tomato simulation (see Table 4.9). In this example the welfare loss 1 value increases substantially from R2.5 million when the AgriBEE requirement is set at 25% to R22.6 million when the AgriBEE requirement is set at 75%. From this result we note that the welfare loss value is very sensitive to changes in the AgriBEE requirement ratio. This result is similar to results obtained when analyzing the effects of domestic content policies in the auto industry (Munk, 1969).

2. If the AgriBEE requirement is set at a level below the current market level, the policy could have a negative impact on the previously disadvantaged farmers.

From the cabbage simulation (See Table 4.11) we note that when the AgriBEE requirement is set at 25% which is below the current percentage contribution of the previously disadvantaged farmers (26.37 %), the change in quantity of produce procured from previously disadvantaged farmers' declines by 7.5% (Scenario 5). We note that when we compare results from the baseline scenario (where the AgriBEE preferential procurement requirement (k) is set at 50%) with those from Scenario 6 (where the k is set at 75% for cabbages), the quantity of produce procured from previously disadvantaged farmers' increases by 80.4% and 164.6% respectively. In addition, the revenue of

previously disadvantaged farmers actually declines by 22.7% when the AgriBEE requirement is set at 25%. We can therefore conclude that for cabbage, setting the AgriBEE requirement at 25% has a negative impact on previously disadvantaged farmers.

Table 4.9 Economic and Welfare Impacts of the AgriBEE Policy: Scenarios 1 and 2 for Tomatoes[14]

		Scenario 1	Baseline	Scenario 2
Content ratio under AgriBEE		**0.25**	**0.5**	**0.75**
Change in total quantity of fresh produce	%	-8.2	-16.8	-26.6
Change in quantity of produce from large-scale commercial farmers	%	-30.6	-58.1	-81.5
Change in quantity of produce from previously disadvantaged farmers	%	2,919.9	5,372.2	7,139.8
Change in price of produce sold by the retailer/supermarket	%	10.7	21.5	32.2
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	%	-30.6	-58.1	-81.5
Change in revenue for previously disadvantaged farmers	%	1,328.5	2,372.0	3,704.9
Change in consumer surplus	Million Rand	-58.3	-111.4	-158.2
Change in producer surplus for previously disadvantaged farmers	Million Rand	28.6	51.0	79.7
Welfare loss 1 (triangle ekg)	Million Rand	2.5	10.0	22.6
Welfare loss 2 (triangle acH)	Million Rand	27.0	49.7	66.0

[14] Scenario 1: Tomatoes, k= 25% and price difference value = 43%
Scenario 2: Tomatoes., k= 75% and price difference value = 43%

Table 4.10 Economic and Welfare Impacts of the AgriBEE Policy: Scenarios 3 and 4 for Butternut Squash[15]

	Unit	Scenario 3	Baseline	Scenario 4
Content ratio under AgriBEE		**0.25**	**0.5**	**0.75**
Change in total quantity of fresh produce	%	-5.6	-10.8	-16.5
Change in quantity of produce from large-scale commercial farmers	%	-27.6	-54.4	-78.7
Change in quantity of produce from previously disadvantaged farmers	%	977.7	1936.7	2758.4
Change in price of produce sold by the retailer/supermarket	%	10.7	21.4	32.1
Change in price of produce from previously disadvantaged farmers	%	43	43	43
Change in revenue for large-scale commercial farmers	%	-27.6	-54.4	-78.7
Change in revenue for previously disadvantaged farmers	%	503.30	913.1	1264.3
Change in consumer surplus	Million Rand	-7.8	-15.2	-22.1
Change in producer surplus for previously disadvantaged farmers	Million Rand	4.1	7.5	10.4
Welfare loss 1 (triangle ekg)	Million Rand	0.2	0.9	2
Welfare loss 2 (triangle acH)	Million Rand	3.4	6.8	9.7

[15] Scenario 3: Butternut squash, k= 25% and price difference value = 43%
Scenario 4: Butternut squash., k= 75% and price difference value = 43%

Table 4.11 Economic and Welfare Impacts of the AgriBEE Policy: Scenarios 5 and 6 for Cabbage[16]

	Unit	Scenario 5	Baseline	Scenario 6
Content ratio under AgriBEE		**0.25**	**0.5**	**0.75**
Change in total quantity of fresh produce	%	-2.4	-4.9	-7.0
Change in quantity of produce from large-scale commercial farmers	%	-0.6	-35.4	-68.4
Change in quantity of produce from previously disadvantaged farmers	%	-7.5	80.4	164.6
Change in price of produce sold by the retailer/supermarket	%	10.9	21.8	32.7
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	%	-0.6	-35.4	-68.4
Change in revenue for previously disadvantaged farmers	%	-22.70	22.1	58.8
Change in consumer surplus	Million Rand	-9.6	-18.9	-28.1
Change in producer surplus for previously disadvantaged farmers	Million Rand	9.1	14.4	18.7
Welfare loss 1 (triangle ekg)	Million Rand	0.1	0.5	1.0
Welfare loss 2 (triangle acH)	Million Rand	0.4	4.1	8.4

[16] Scenario 5: Cabbage, k= 25% and price difference value = 43%
Scenario 6: Cabbage., k= 75% and price difference value = 43%

4.4.3 Effect of Simultaneously Varying the AgriBEE Requirement Level and the Price Difference

Past literature on the domestic content policies indicates that there is a relationship between the level of content ratio and the price difference between goods from domestic and foreign producers, as the content ratio increases, the price or cost difference between domestic and foreign producer goods increases (Munk, 1969).This section analyzes the effects of simultaneously varying the level of AgriBEE preferential procurement ratio and the price wedge between large-scale commercial farmers and previously disadvantaged farmers.

4.4.3.1 Assumptions for Scenarios 7, 8 and 9

In Scenario 7 the estimation is carried out using data for tomatoes, while Scenario 8 and Scenario 9 use data for butternut squash and cabbages respectively. For each of the three Scenarios[17] 7, 8 and 9 the AgriBEE preferential procurement requirement (k) and the price difference value were varied as follows:

1. When the AgriBEE preferential procurement requirement or content ratio is set at 25%, the price difference between the prices of produce from the large-scale commercial farmer and the previously disadvantaged farmer is set at 30%.

2. When the AgriBEE preferential procurement requirement or content ratio is set at 50%, then the price difference between the prices of produce from the large-scale commercial farmer and the previously disadvantaged farmer is 43%.

[17] See appendices 12, 13 and 14 for a more detailed description of the data used in Scenarios 7-9

3. When the AgriBEE requirement or content ratio is set at 75%, then the price difference between the prices of produce from the large-scale commercial farmer and the previously disadvantaged farmer is set at 60%.

4.4.3.2 Discussion of Simulation Results for Scenarios 7 and 8

The results obtained in Scenarios 7 and 8 are generally similar to those obtained in the baseline scenario. (See Appendix 17 for a summary of the results). However it is important to note that the higher the price wedge the greater the welfare loss to society.

4.4.4 Price Elasticity of Supply Simulations

4.4.4.1 Scenarios 9, 10 and 11

Scenarios 9, 10 and 11 were carried out to analyze the effect that changing the price elasticity of supply has on the consumer surplus, producer surplus and welfare loss. Scenario 9 analyzes the impact of the price elasticity of supply values of 0.5, 1.0, 1.5 and 2.0 for tomatoes. Scenario 10 analyzes the impact of price elasticity of supply on butternut squash and Scenario 11 analyzes the impact on cabbage. (See Appendices 14, 15 and 16 for a summary of the data that was used in the price elasticity of supply simulations).

4.4.4.2 Discussion of Simulation Results for Scenarios 9, 10 and 11

From Scenarios 9, 10 and 11 we note that the following results:

1. The estimated value for Q_{pd}' is lower than that set by the AgriBEE preferential procurement requirement.

It is important to note that the actual estimated quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE policy is implemented, for example, in Scenario 9 for tomatoes when k is 0.5, Q_{pd}' should be 100.2 million kilograms (See Appendix 14). The true estimated value for Q_{pd}' (of 2.2 million kilograms) is however lower than that set by the AgriBEE preferential procurement requirement. This lower Q_{pd}' values implies that it will be difficult for the previously disadvantaged farmers to meet the AgriBEE requirement in the short run within the given ranges of price elasticity of supply.

This result is similar to the effect of Malaysia's National Economic Policy (NEP) that was discussed in Chapter 2. We note that although the NEP has been in place for more than 30 years it has not yet reached its target of ensuring that 30% of the businesses in Malaysia are owned by indigenous/ethnic Malays. Currently the 19% of the businesses in Malaysia are owned by indigenous Malays. This result is therefore important because it shows that it will be very difficult for the AgriBEE policy to reach its preferential procurement target of 50% in 10 years.

2. The more elastic the supply curve of the previously disadvantaged farmers the greater the possibility of meeting the AgriBEE requirement.

A common observation in Scenarios 9, 10 and 11 is that as the price elasticity of supply is increased, the quantity of produce that is procured from previously disadvantaged farmers increases substantially. For example, in Scenario 10 when the price elasticity of supply of butternut squash is set at 0.5, the percentage change in

quantity of produce that is procured from previously disadvantaged farmers is 24.1%. However if the price elasticity of supply is increased to 2, the percentage change is 85.5%. This observation is important because the more elastic the supply curve is the greater the possibility of the previously disadvantaged farmers being able to meet the AgriBEE produce supply requirement.

3. There is potential for previously disadvantaged farmers to benefit from the AgriBEE policy.

From the results of Scenarios 9, 10 and 11 it is clear that previously disadvantaged farmers can potentially benefit from the AgriBEE policy. The results also indicate that as the price elasticity of supply is increased, the change in producer surplus for previously disadvantaged farmers (that is the revenue) also increases but the margin is not substantial. For example, for Scenario 11 the producer surplus increases from R11.36 million when the price elasticity of supply is 0.5 to R14.74 million when the price elasticity of supply is 2.0.

4. The percentage change in quantity of produce from large-scale commercial farmers is the equal to their change in revenue.

This situation occurs because in this analysis we are only focusing on the change in quantity of produce procured from previously disadvantaged farmers. In Scenarios 9, 10 and 11 we have pegged the price elasticities of supply for previously disadvantaged farmers values and the price difference value (i.e. price difference between produce from previously disadvantaged farmers and large-scale commercial farmers). This specific case

therefore implies that the change in revenue for large-scale commercial farmers will be equal to the change in quantity of fresh produce procured from the large-scale commercial farmers. Tables 4.12 to 4.14 summarize the results for Scenarios *9, 10 and 11*

Table 4.12 Welfare Implications of AgriBEE Policy Results for Scenario 9[18]: Tomatoes

		SCENARIO 9			
		Price Elasticity of Supply			
		0.5	**1**	**1.5**	**2**
Change in total quantity of fresh produce	%	-16.8	-16.8	-16.8	-16.8
Change in quantity of produce from large-scale commercial farmers	%	-17.1	-17.3	-17.4	-17.6
Change in quantity of produce from previously disadvantaged farmers	%	21.5	43.0	64.5	86.0
Change in price of produce sold by the retailer/supermarket	%	21.5	21.5	21.5	21.5
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	Million Rand	-17.1	-17.3	-17.4	-17.6
Change in revenue for previously disadvantaged farmers	Million Rand	78.40	73.10	69.23	66.00
Change in consumer surplus	Million Rand	-111.4	-111.4	-111.4	-111.4
Change in producer surplus for previously disadvantaged farmers	Million Rand	2.05	2.25	2.45	2.64
Welfare loss 1 (triangle ekg)	Million Rand	10.23	10.23	10.23	10.23
Welfare loss 2 (triangle acH)	Million Rand	0.20	0.40	0.60	0.80

[18] Scenario 9: Tomatoes Price Elasticity of Supply = 0.5; 1.0; 1.5; 2.0. and k = 50%

Table 4.13 Welfare Implications of AgriBEE Policy Results for Scenario 10: Butternut Squash

		SCENARIO 10			
		Price Elasticity of Supply			
	Unit	0.5	1	1.5	2
Change in total quantity of fresh produce	%	-10.8	-10.8	-10.8	-10.8
Change in quantity of produce from large-scale commercial farmers	%	-11.5	-12.0	-12.5	-12.9
Change in quantity of produce from previously disadvantaged farmers	%	21.4	42.8	64.1	85.5
Change in price of produce sold by the retailer/supermarket	%	21.4	21.4	21.4	21.4
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	Million Rand	-11.5	-12.0	-12.5	-12.9
Change in revenue for previously disadvantaged farmers	Million Rand	47.30	52.20	56.40	61.30
Change in consumer surplus	Million Rand	-15.22	-15.22	-15.22	-15.22
Change in producer surplus for previously disadvantaged farmers	Million Rand	0.78	0.86	0.93	1.01
Welfare loss 1 (triangle ekg)	Million Rand	0.87	0.87	0.87	0.87
Welfare loss 2 (triangle acH)	Million Rand	0.08	0.15	0.23	0.30

Note: Scenario 10: Butternut squash, Price Elasticity of supply =0.5;1.0;1.5;2.0. and k = 50%

Table 4.14 Welfare Implications of AgriBEE Policy Results for Scenario 11: Cabbage

	SCENARIO 11				
	Unit	Price Elasticity of Supply			
		0.5	1	1.5	2
Change in total quantity of fresh produce	%	-4.8	-4.8	-4.8	-4.8
Change in quantity of produce from large-scale commercial farmers	%	-14.4	-22.3	-30.2	-38.1
Change in quantity of produce from previously disadvantaged farmers	%	22.0	44.0	65.9	87.9
Change in price of produce sold by the retailer/supermarket	%	21.8	21.8	21.8	21.8
Change in price of produce from previously disadvantaged farmers	%	43.0	43.0	43.0	43.0
Change in revenue for large-scale commercial farmers	Million Rand	-14.4	-22.3	-30.2	-38.1
Change in revenue for previously disadvantaged farmers	Million Rand	48.30	53.10	57.90	62.7
Change in consumer surplus	Million Rand	-18.94	-18.94	-18.94	-18.94
Change in producer surplus for previously disadvantaged farmers	Million Rand	11.36	12.49	13.61	14.74
Welfare loss 1 (triangle ekg)	Million Rand	0.47	0.47	0.47	0.47
Welfare loss 2 (triangle acH)	Million Rand	1.13	2.25	3.38	4.50

Note: Scenario 11: Cabbage, Price Elasticity of supply =0.5;1.0;1.5;2.0. and k = 50%

4.5 Summary of Chapter

This chapter has analyzed the potential welfare effects of the AgriBEE policy for the selected vegetables: tomato, butternut squash and cabbage. The analysis was carried out for the baseline scenario and for the simulation scenarios where the AgriBEE content level and price elasticities of supply were varied. The results obtained from this study where we analyze the potential effects of the AgriBEE policy are similar to the results obtained in studies on the effects of domestic content policies that were discussed previously in Chapter 2. In the next chapter policy implications of the AgriBEE policy are discussed.

CHAPTER 5

POLICY IMPLICATIONS AND CONCLUSION

5.1. Summary of Key Results

There are twelve key results from this study. First it is noted that when the AgriBEE policy is implemented the price retailers and therefore consumers pay for vegetables increases. This is due to the fact that the price of the vegetables sold in the retail store is an average weighted price of the produce from the higher cost producers (the previously disadvantaged farmers) and low cost producers (large-scale commercial farmers).

Second, when the AgriBEE policy is implemented, the total quantity of fresh produce procured from both large and small-scale producers decreases. This occurs due to the fact the price increase will lead to a decrease in the quantity of fresh produce demanded by consumers.

Third, the AgriBEE policy reduces the percentage of produce procured from large-scale commercial farmers by retailers as dictated by the proposed AgriBEE law. The percentage contribution of large-scale commercial farmers to the total quantity of produce procured will decrease from levels of over 80% to only 50%. Due to this decrease in the demand for their produce, the large-scale commercial farmers will be negatively impacted by the AgriBEE policy because they will lose revenue. This implies that unless the large-scale commercial farmers form joint ventures with the previously disadvantaged farmers they will have an overall negative impact from this policy.

Fourth, consumers will be affected the most negatively by the AgriBEE policy. The consumer surplus has high values that range between – 15.2 million South African Rands for butternut squash to approximately - 111.4 million Rands for tomatoes in the baseline scenario. This implies that AgriBEE policy places a large burden on the consumers.

Fifth, the effect of the AgriBEE policy on small-scale previously disadvantaged farmers is that they may benefit from the policy due to the increased quantity of produce they sell. From the baseline scenario results we note that the change in quantity of produce for previously disadvantaged farmers is 5372.2%. In addition the change in producer surplus for previously disadvantaged farmers in the baseline scenario is approximately R51 million for tomatoes; R 7.5 million for butternut squash and R14.4 million for cabbages.

Sixth, from the results it is also clear that in the short run when we look at the three possible cases of fulfillment, under-fulfillment or over-fulfillment of the AgriBEE preferential procurement requirement that could occur, it is most likely that in the short run under-fulfillment of the AgriBEE requirement will occur. From the results it will be extremely difficult in the short run for the previously disadvantaged farmers to increase the quantities of vegetables they supply to retailers from contribution levels of less than 1% before the AgriBEE policy to a contribution level of 50% after the AgriBEE policy is implemented. In addition, it will also be difficult for them to meet the quality standards.

Seventh, the results also imply that the presence of economies of scale in production for the previously disadvantaged are important for the policy to be successful in attaining its objective. To reach the production levels required for economies of scale, for most vegetables, an upgrade in production technologies is required. In the long run when the previously disadvantaged farmers have increased their production and supply capacity and reduced their production costs, the AgriBEE preferential procurement can be fulfilled or over-fulfilled.

Eighth, retailers also have the potential to benefit or lose from the AgriBEE policy. If they are able to minimize transactions costs when dealing with previously disadvantaged farmers they could benefit from the policy through fulfillment of the AgriBEE requirements. However if the retailers are not able to minimize these transactions costs, these extra costs will be a burden to the retailers and they could also face government and social penalties.

Ninth, from the results it is also noted that there is a technical efficiency loss to society in production that occurs on the supply side. The loss occurs because resources are taken from other sectors in the economy and are used in the small-scale previously disadvantaged farmer sector. The other welfare cost occurs to society due to the increase in use of high cost fresh produce from previously disadvantaged farmers.

Tenth, from the results it is also noted that the higher the level of AgriBEE preferential procurement target the higher will be the cost to society. In addition, the

more elastic the supply or demand curve is, the greater the cost the policy will be to society. This result is also associated with a greater positive change in producer surplus for previously disadvantaged farmers.

Eleventh, a key insight from the study is that the retailer plays a key role in the sustainability or success of the AgriBEE policy preferential procurement requirement. If the cost of procuring produce from previously disadvantaged farmers is too high for the retailers they may opt to pay the penalty of non-compliance of the policy. This implies that if the retailers are not able to minimize costs, for example, the transactions costs of dealing with previously disadvantaged farmers, the burden of implementation costs of the policy is shifted to them.

Lastly, we note that gains in revenue for previously disadvantaged farmers as a result of the AgriBEE policy are highest in the case of high value products such as tomatoes.

5.2. Policy Implications and Recommendations

Important implications for previously disadvantaged farmers; large-scale commercial farmers; retailer's procurement strategies and policy makers arise from both the theoretical domestic content policy and its application to the AgriBEE policy. The following section is a summary of the policy implications and recommendations.

1. In order for the AgriBEE policy to be effective in achieving its objectives, the previously disadvantaged farmers will have to substantially increase the quantity of produce they supply to retailers.

From the results it is important to note that for the two welfare triangles acH and ekg (from Figure 3.1) the welfare loss is larger for triangle acH. This implies that policy makers need to focus on ensuring that the size of triangle acH is made as small as possible. This objective can be attained by shifting the supply curve of previously disadvantaged farmers outward. The outward shift could only occur when the production costs of previously disadvantaged farmers decrease. It is therefore crucial that policies that address other market failures in the South African agricultural sector be put in place for the AgriBEE policy to be effective.

For example, programs which provide access to: capital, land, water, transportation, improved production methods, post harvest methods and market information will enable the previously disadvantaged farmers to meet the requirements set by the AgriBEE policy and shift the supply curve of the previously disadvantaged farmers outwards. By providing these resources to previously disadvantaged farmers production costs will be lowered thus making previously disadvantaged farmers competitive and leading to fulfillment or overfulfillment of the AgriBEE policy requirement. For these programs to be effective it is essential for both private and public sector including retailers and farmers organizations to participate.

2 (a)All food supply chain players need to assist previously disadvantaged farmers in developing ways to increase the quantity and quality of produce they supply

This implies that food supply chain players have an important role in assisting the previously disadvantaged farmers in fulfilling the requirements of the AgriBEE policy and ensuring that the benefits from the policy are maximized while the costs or negative effects are minimized. However, in the long run, previously disadvantaged farmers may be able to supply the required quantities of produce under the AgriBEE policy. This situation will occur when the transaction, production and marketing costs of previously disadvantaged farmers are reduced. In this situation the previously disadvantaged farmers will become more competitive in production and this could lead to fulfillment of the AgriBEE policy requirement.

(b) Previously disadvantaged farmers need to gain economies of scale.

In order to reduce some of the costs of production and marketing of fresh produce previously disadvantaged farmers need to be organized in cooperatives/associations so that they can benefit from economies of scale. This will enable the previously disadvantaged farmers to supply the quantities of produce required under the AgriBEE policy.

(c) Retailers need to minimize transactions costs of dealing with previously disadvantaged farmers.

From the results we note that preferential procurement requirement of the AgriBEE policy affects the consumers the most. This occurs due to the fact that the retailer will be procuring produce from both the high cost producers (previously disadvantaged farmers) and the lower cost producers (large-scale commercial farmers) which raise the retail price of the produce. In addition, the high consumer loss values may indicate that the retailers could pass on the increased costs of dealing with previously disadvantaged farmers to the consumers. In order to minimize the impact of the AgriBEE policy on consumers, the retailers need to develop ways of minimizing these transaction costs. If these transactions are too high, the retailer may choose not to comply with AgriBEE requirements but prefer to pay the penalty.

(d) The price or cost difference of produce from large-scale commercial farmers needs to be minimized.

This is important because the size of the dead weight loss depends on the price or cost difference between large-scale commercial farmers and previously disadvantaged farmers. The source of this price difference is that there are costs involved in improving the quantity and quality of produce procured from previously disadvantaged farmers. Examples of these extra costs that the previously disadvantaged farmers face in order to produce higher quality produce include: use of higher quality inputs, use of improved technology and costs in

obtaining knowledge and better technical skills. In addition, retailers face higher transactions costs when dealing with numerous previously disadvantaged farmers than when they have contracts with a few large-scale commercial farmers.

(e) Mutual benefit can be gained by both large-scale commercial farmers and previously disadvantaged farmers when they form joint ventures.

The ownership equity aspect of the AgriBEE policy requires that large-scale commercial farmers form joint ventures with the previously disadvantaged farmers. These relationships can be mutually beneficial in that the large-scale commercial farmer contributes knowledge and some capital to the joint venture farm while the previously disadvantaged farmers have water rights and therefore supply water for crop production, for example.

3. Previously disadvantaged farmers need to focus on high value agricultural products.

From the results we note that the AgriBEE policy had the greatest benefit to previously disadvantaged farmers (i.e., the highest values for producer surplus) with high value agricultural produce such as tomatoes. From the results we note that there are drastic differences in the estimates of welfare between the three vegetables analyzed. It is therefore important to note that the effects of the AgriBEE policy are sensitive to the characteristics of each type of vegetable which include: the volume of the vegetable sold, the current quantity of a specific vegetable procured from previously disadvantaged farmers, whether a vegetable is

a high value product or not and the quantity of produce demanded for a specific vegetable. All these characteristics affect the value of producer surplus for the previously disadvantaged farmer. In order to maximize the gains from the AgriBEE policy, previously disadvantaged farmers need to increase their production of high value agricultural crops.

4. Setting the AgriBEE preferential requirement below the current market level has a negative impact on previously disadvantaged farmers.

From the results for the cabbage analysis we need to note that when the AgriBEE policy requirement policy is set at 25%, the quantity of cabbage procured from previously disadvantaged farmers and their revenue will actually decline. This implies that the level at which the AgriBEE content requirement is set is important in determining the success of the AgriBEE policy in attaining its objectives of promoting participation of previously disadvantaged farmers.

5. The level of AgriBEE preferential requirement has an upper bound.

From the theoretical model we conclude that the AgriBEE preferential requirement or content ratio that is set has an upper bound. If the content ratio is set too high, the retailers may choose not to comply with the requirements but will prefer to pay the penalty. In addition when the AgriBEE preferential procurement requirement is set too high such that the previously disadvantaged farmers find it difficult to supply the required quantities of produce then it will be difficult for the objectives of the AgriBEE policy to be attained.

6. Policy makers could consider providing specific quantifiable incentives to retailers to encourage their compliance with the AgriBEE policy requirements.

The proposed AgriBEE policy currently states that complying with the requirements grants the participating firm an AgriBEE compliant status. In addition, other incentives that are currently in place are access to government loans and contracts. However provision of specific quantitative incentives may also encourage compliance with the AgriBEE policy and minimize conflicts between supply chain participants. For example, the policy makers could place a provision for tax deductions for firms that comply with the AgriBEE requirements.

5.3 Conclusion

This study has shown the potential economic welfare effects of the AgriBEE policy on the fresh vegetable industry using the tomato, butternut squash and cabbage industries as examples. The baseline scenario results showed that the previously disadvantaged farmers can benefit from the AgriBEE policy. However large-scale commercial farmers and consumers are substantially penalized under the AgriBEE policy. Simulation results of a lower AgriBEE preferential procurement requirement of 25% may be undesirable especially for the cabbage sector since previously disadvantaged farmers are already selling more than 25% of their produce at the terminal markets.

In the short run it will be very difficult for previously disadvantaged farmers to benefit from the AgriBEE policy. In order for the AgriBEE policy to be successful in

attaining its objectives, the government needs to invest substantially into reducing the costs faced by the previously disadvantaged farmers. It is therefore essential that the policy makers ensure that enough time is set aside for building of skills of the previously disadvantaged farmers to enable them to supply the desired quantities and quality of produce to retailers in order to prevent food shortages.

A major conclusion that is drawn from this analysis is that introducing the AgriBEE policy increases procurement of produce from the previously disadvantaged farmers and decreases the total quantity of fresh produce procured from both large-scale producers and previously disadvantaged farmers. When comparing the case when the AgriBEE content requirement is 50% and when it is 75%, the degree of change in the total quantity of fresh produce increases the most when the AgriBEE content requirement ratio is set at 75%.

Second when the AgriBEE content requirement ratio is set below the current market level as in the case of cabbages (when k is set at 25% in the simulations), the quantity of produce procured from previously disadvantaged farmers could decline. These results are similar to those found in other industries when DCPs are implemented and illustrate the fact that the AgriBEE policy has both benefits and undesirable side effects. The important issue then becomes how the benefits can be maximized whilst the negative outcomes are minimized.

The results suggest that the AgriBEE policy may have a positive effect on the welfare of some supply chain players but it may also severely hurt others. If the policymakers force an extremely high level of AgriBEE preferential procurement requirement with a high penalty, then the retailers may prefer to pay the penalty and pass the extra costs on to consumers. However if retailers and large-scale commercial farmers are offered incentives to comply with the requirements they may have a positive attitude to the policy and both the large and small-scale commercial farmers would benefit from the policy.

The overall conclusion is that the AgriBEE policy has the potential to improve the welfare of previously disadvantaged farmers under specific conditions. These conditions include improved access to capital, land, markets, extension services and high quality inputs.

APPENDICES

APPENDIX 1: Previously Disadvantaged Farmers Contribution to Total Sales and Production

	Vegetables	Fruits
Percentage contribution to production	0.70	1.09
Current percentage contribution to sales	0.13	0.33
Target percentage contribution to sales	50.00	50.00

Source: Statistics South Africa (2002)

APPENDIX 2: Number of Producers Growing Selected Vegetables in South Africa

	Number of producers (1000s)		
CROP	Large-Scale Commercial Producers	Previously disadvantaged producers	South Africa (includes both large-scale producers and previously disadvantaged producers)
Cabbage	6	100	106
Pumpkins and Squashes	5	133	138
Tomatoes	4	35	38

Source: Statistics South Africa (2002) Survey of Large and Small-Scale Agriculture

APPENDIX 3: Comparison of Asset and Labor Costs for Large-Scale Commercial Farmers and Previously Disadvantaged Farmers

	Total	Large-Scale Commercial Farmers	Previously Disadvantaged Farmers
Total Assets (ZAR billions)	424.9	384.9	**40.1**
Labor Costs (ZAR billions)	10.2	0.1	**10.1**

Source: Statistics South Africa, 2002

APPENDIX 4:Comparison of Costs for Cabbage Production

	Large-Scale Commercial Producers	Previously Disadvantaged Producers
Item	**R/ha**	**R/ha**
Seedlings	3,400	4,400
Packaging	3,680	3,060
Labor	549	5,000
Transport	7,200	14,400
Fertilizer	1,785	3,060
Chemicals	300	158
Insurance	2,820	0
Operations - ploughing, discing	450	750
Gross Income/ha	99,600	22,200
Yield/ha	80,000	30,000

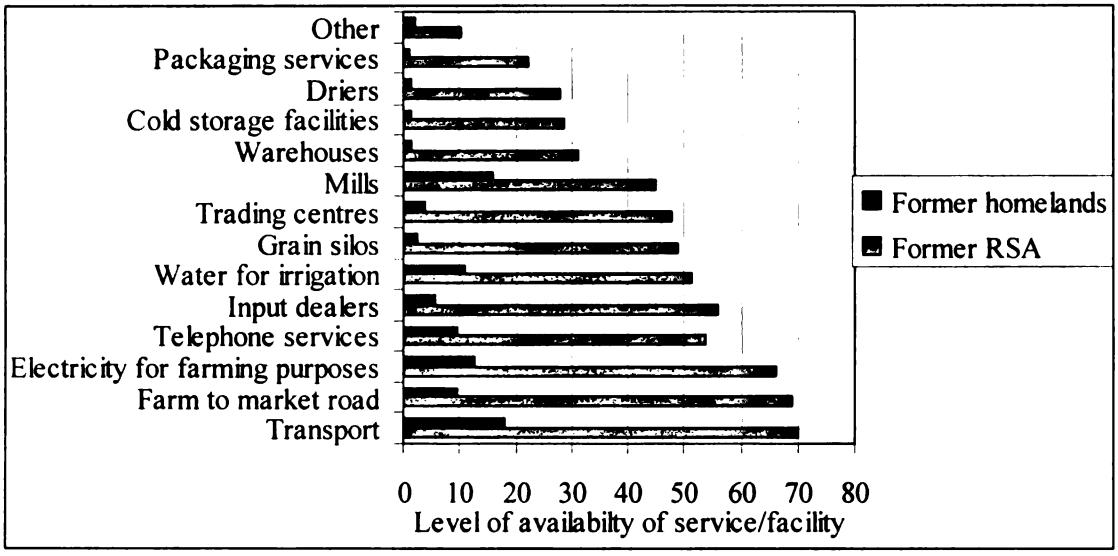
Source: Bediako (2007) and Griqualand West Koporasie (Coop) (2007)

APPENDIX 5:Comparison of Costs for Butternut Squash Production

	Large-scale Commercial Producers	Previously Disadvantaged Producers
Item	**R/ha**	**R/ha**
Seeds	2,925	722
Packaging	1,698	3,060
Labor	146	5,750
Transport	7,650	15,300
Fertilizer	1,920	1,850
Chemicals	300	162
Insurance	1,205	0
Operations	450	850

Source: Bediako (2007) and Griqualand West Koporasie (Coop) (2007)

APPENDIX 6: Availability of Services and Facilities Among Farming Operations That Require Them by Type of Farmer



Source: Statistics South Africa (2002)

NB: Former RSA represents the large-scale commercial farmers and former homelands represents the previously disadvantaged farmers

APPENDIX 7: Mathematical Derivation for the Three Cases: Fulfillment, Underfulfillment and Overfulfillment of the AgriBEE policy

Max Π

$$\text{Max } PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls}(1 + t) Q_{ls} - wl$$

Subject to the constraint:

(1) $t_m^* = 0, \quad if\ Q_{ls} < (1-k)(Q_{pd} + Q_{ls})$

(2) $t_m^* = t_m, \quad$ otherwise

Fulfillment of Content Requirements

For the case when the content requirements are met:

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls}(1 + 0) Q_{ls} - wl - \lambda\{ Q_{ls} - (1-k)(Q_{pd} + Q_{ls})\}$$

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls}(1) Q_{ls} - wl - \lambda\{ Q_{ls} - (Q_{pd} + Q_{ls} - k Q_{pd} - k Q_{ls})\}$$

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls} Q_{ls} - wl - \lambda\{ Q_{ls} - Q_{pd} - Q_{ls} + k Q_{pd} + k Q_{ls})\}$$

$$L = PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls} Q_{ls} - wl - \lambda(-Q_{pd} - k Q_{pd} - k Q_{ls})$$

F.O.C

Where $F_i = \delta F(x_1, x_2)/ \delta x_i$

i) $\delta L/ \delta L \qquad PF_1 = w$

ii) $\delta L/ \delta M \qquad PF_2 = P_{pd} - \lambda(1 - k)$

iii) $\delta L/ \delta Q_{ls} \qquad PF_2 = P_{ls} + \lambda k$

iv) $\delta L/ \delta \lambda$ $\quad k Q_{ls} = (1-k) Q_{pd}$

but

$P_{pd} - \lambda (1 - k) = P_{ls} + \lambda k$

$P_{pd} - P_{ls} - \lambda + \lambda k - \lambda k = 0$

v) $P_{pd} - P_{ls} = \lambda$

Substituting (v) into (ii)

$PF_2 = P_{pd} - (P_{pd} - P_{ls})(1 - k)$

$PF_2 = P_{pd} - (P_{pd} - k P_{pd} - P_{ls} + k P_{ls})$

$PF_2 = P_{pd} - P_{pd} + k P_{pd} + P_{ls} - k P_{ls}$

$PF_2 = k P_{pd} + P_{ls} - k P_{ls}$

$PF_2 = k P_{pd} + P_{ls} (1 - k)$

Under the LCP (AgriBEE policy) the price of a composite good will be:

$k P_{pd} + P_{ls} (1 - k)$ and the ratio of produce from small and large-scale farmers should be k/ (1-k)

Overfulfilling content requirements

Allowing the firms to overfulfill the content requirements necessitates the use of Kuhn-Tucker conditions to maximize:

Max $PF(l, Q_{pd} + Q_{ls}) - P_{pd} Q_{pd} - P_{ls} (1 + t) Q_{ls} - wl$

Subject to

$t_m^* = 0$, if $Q_{ls} < (1-k) (Q_{pd} + Q_{ls})$,

this constraint holds as a strict inequality only if $P_{pd} < P_{ls}$ under one of the Kuhn-tucker conditions

Underfulfillment of content requirements

Due to the fact that the profit function is non increasing in factor prices, a sufficient condition for the firms to opt to underfulfill the content requirement is:

$$P_{ls}(1 + t_m) < k\,P_{pd} + P_{ls}(1 - k)$$

$$k\,P_{pd} > P_{ls}(1 + t_m) - P_{ls}(1 - k)$$

$$k\,P_{pd} > P_{ls} + t\,P_{ls} - P_{ls} + P_{ls}\,k$$

$$k\,P_{pd} > P_{ls} - P_{ls} + t_m\,P_{ls} + P_{ls}\,k$$

$$k\,P_{pd} > t_m\,P_{ls} + P_{ls}\,k$$

$$k\,P_{pd} > P_{ls}(t_m + k)$$

$$P_{pd} > P_{ls}(t_m + k)/k$$

$$P_{pd} > P_{ls}(t_m/k + 1)$$

APPENDIX 8: Summary of Values Used in Welfare Estimations For the Baseline Scenario

Symbol	Description	Unit	Tomatoes	Butternut Squash	Cabbage
k	Content ratio under AgriBEE	%	0.5	0.5	0.5
P_{pd}	Price for previously disadvantaged farmers	ZAR	3.36	1.67	0.89
P_{ls}	Price for large-scale commercial farmers	ZAR	2.35	1.17	0.62
P_I	Weighted average price[19]	ZAR	2.86	1.42	0.76
Q_{pd}	Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	kg	1,830,840	1,409,046	37,920,060
Q_{pd}'	Quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	kg	100,186,842	28,697,777	68,420,000
Q_t	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	kg	240,900,000	64,340,000	143,800,000
Q_t'	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	kg	200,373,684	57,395,555	136,840,000

Where ZAR= South African Rands

[19] The weighted average price is estimated by using the following formula: $P_I = kP_{pd} + (1-k)P_{ls}$

APPENDIX 9: Summary of Values Used in Welfare Estimations For the Scenarios 1 and 2 Tomatoes

Description	Unit	Scenario 1	Baseline	Scenario 2
Content ratio under AgriBEE	%	0.25	0.50	0.75
Price for previously disadvantaged farmers	ZAR	3.36	3.36	3.36
Price for large-scale commercial farmers	ZAR	2.35	2.35	2.35
Weighted average price	ZAR	2.60	2.86	3.11
Quantity of fresh produce procured from previously disadvantaged farmers Before AgriBEE	kg	1,830,840	1,830,840	1,830,840
Quantity of fresh produce procured from small-scale previously disadvantaged farmers After AgriBEE	kg	55,289,103	100,186,842	132,550,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers Before AgriBEE	kg	240,900,000	240,900,000	240,900,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers After AgriBEE	kg	221,156,410	200,373,684	176,733,333

APPENDIX 10: Summary of Values Used in Welfare Estimations For the Scenarios 3 and 4 – Butternut Squash

Description	Unit	Scenario 3	Baseline	Scenario 4
Content ratio under AgriBEE	%	0.25	0.5	0.75
Price for previously disadvantaged farmers	ZAR	1.67	1.67	1.67
Price for large-scale commercial farmers	ZAR	1.17	1.17	1.17
Weighted average price	ZAR	1.30	1.42	1.55
Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	kg	1,409,046	1,409,046	1,409,046
Quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	kg	15,185,719	28,697,778	40,276,277
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	kg	64,340,000	64,340,000	64,340,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	kg	60,742,877	57,395,555	53,701,702

APPENDIX 11:Values Used in Welfare Estimations For the Scenarios 5 and 6 – Cabbage

Description	Unit	Scenario 5	Baseline	Scenario 6
Content ratio under AgriBEE	%	0.25	0.5	0.75
Price for previously disadvantaged farmers	ZAR	0.89	0.89	0.89
Price for large-scale commercial farmers	ZAR	0.62	0.62	0.62
Weighted average price	ZAR	0.69	0.76	0.82
Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	kg	37,920,060	37,920,060	37,920,060
Quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	kg	35,089,344	68,400,000	100,350,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	kg	143,800,000	143,800,000	143,800,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	kg	140,357,377	136,800,000	133,800,000

APPENDIX 12: Summary of Values Used in Welfare Estimates for Scenario 7

Description	Unit	Tomato	Butternut Squash	Cabbage
Content ratio under AgriBEE	%	0.25	0.25	0.25
Price for previously disadvantaged farmers	ZAR	3.06	1.52	0.81
Price for large-scale commercial farmers	ZAR	2.35	1.17	0.62
Weighted average price	ZAR	2.53	1.26	0.67
Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	kg	1,830,840	1,409,046	37,920,060
Quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	kg	56,660,185	15,466,188	35,349,535
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	kg	240,900,000	64,340,000	143,800,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	kg	226,640,741	61,864,752	141,398,140

APPENDIX 13: Summary of Values Used in Welfare Estimations for Scenario 8

Description	Unit	Tomato	Butternut Squash	Cabbage
Content ratio under AgriBEE	%	0.75	0.75	0.75
Price for previously disadvantaged farmers	ZAR	3.76	1.87	0.99
Price for large-scale commercial farmers	ZAR	2.35	1.17	0.62
Weighted average price	ZAR	3.4075	1.70	0.90
Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	kg	1,830,840	1,409,046	37,920,060
Quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	kg	84,425,000	37,225,588	97,380,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	kg	240,900,000	64,340,000	143,800,000
Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	kg	112,566,667	49,634,118	129,840,000

APPENDIX 14: Summary of Tomato Data Used in Welfare Estimations for Scenario 9

Symbol	Description	Unit	Price Elasticity of Supply			
			0.5	**1**	**1.5**	**2**
k	Content ratio under AgriBEE	%	0.50	0.50	0.50	0.50
P_{pd}	Price for previously disadvantaged farmers	ZAR	3.36	3.36	3.36	3.36
P_{ls}	Price for large-scale commercial farmers	ZAR	2.35	2.35	2.35	2.35
P_I	Weighted average price	ZAR	2.86	2.86	2.86	2.86
Q_{pd}	Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	Million kg	1.8	1.8	1.8	1.8
Q_{pd}'	Actual estimated quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	Million kg	2.2	2.6	3.0	3.4
Q_t	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	Million kg	240.9	240.9	240.9	240.9
Q_t'	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	Million kg	200.4	200.4	200.4	200.4

APPENDIX 15: Summary of Butternut Squash Data Used in Welfare Estimations for Scenario 10

Symbol	Description	Unit	Price Elasticity of Supply			
			0.5	1	1.5	2
k	Content ratio under AgriBEE	%	0.5	0.5	0.5	0.5
P_{pd}	Price for previously disadvantaged farmers	ZAR	1.67	1.67	1.67	1.67
P_{ls}	Price for large-scale commercial farmers	ZAR	1.17	1.17	1.17	1.17
P_l	Weighted average price	ZAR	1.42	1.42	1.42	1.42
Q_{pd}	Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	Million kg	1.4	1.4	1.4	1.4
Q_{pd}'	Actual estimated quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	Million kg	1.7	2.0	2.3	2.6
Q_t	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	Million kg	64.3	64.3	64.3	64.3
Q_t'	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	Million kg	57.4	57.4	57.4	57.4

APPENDIX 16: Summary of Cabbage Data Used in Welfare Estimations for Scenario 11

Symbol	Description	Unit	Price Elasticity of Supply			
			0.5	1	1.5	2
k	Content ratio under AgriBEE	%	0.5	0.5	0.5	0.5
P_{pd}	Price for previously disadvantaged farmers	ZAR	0.89	0.89	0.89	0.89
P_{ls}	Price for large-scale commercial farmers	ZAR	0.62	0.62	0.62	0.62
P_l	Weighted average price	ZAR	0.76	0.76	0.76	0.76
Q_{pd}	Quantity of fresh produce procured from previously disadvantaged farmers before AgriBEE	Million kg	37.92	37.92	37.92	37.92
Q_{pd}'	Actual estimated quantity of fresh produce procured from small-scale previously disadvantaged farmers after AgriBEE	Million kg	46.25	54.59	62.92	71.25
Q_t	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers before AgriBEE	Million kg	143.80	143.80	143.80	143.80
Q_t'	Total quantity of fresh produce procured from both previously disadvantaged farmers and large-scale commercial farmers after AgriBEE	Million kg	136.84	136.84	136.84	136.84

APPENDIX 17: Economic Welfare Analysis Results for Scenarios 7 and 8

	Unit	Tomato			Butternut squash			Cabbage		
Scenario		**7**	**Base line**	**8**	**7**	**Base line**	**8**	**7**	**Base line**	**8**
Price wedge value		**30%**	**43%**	**60%**	**30%**	**43%**	**60%**	**30%**	**43%**	**60%**
AgriBEE preferential procurement requirement	%	25%	50%	75%	25%	50%	75%	25%	50%	75%
Change in total quantity of fresh produce	%	-5.9	-16.8	-35.5	-3.8	-10.8	-22.9	-1.7	-4.8	-9.7
Change in quantity of produce from large-scale commercial farmers	%	-28.9	-58.1	-83.8	-26.3	-54.4	-80.3	0.2	-35.4	-69.3
Change in quantity of produce from previously disadvantaged farmers	%	2,994.8	5,372.2	6,263.7	997.6	1,936.7	2,541.9	-6.8	80.4	156.8
Change in price of produce sold by the retailer/supermarket	%	7.6	21.5	45.0	7.5	21.4	44.9	7.7	21.8	44.9
Change in revenue for large-scale commercial farmers	%	-28.9	-58.1	-83.8	-26.3	-54.4	-80.3	0.2	-35.4	-69.3
Change in revenue for previously disadvantaged farmers	%	1,334.8	2,372.0	1,896.7	358.3	913.1	1,640.5	55.1	122.1	212.9
Change in consumer surplus	M. R	-41.5	-111.4	-209.5	-5.5	-15.2	-29.9	-6.8	-18.9	-37.9
Change in producer surplus for previously disadvantaged farmers	M. R	28.7	51.0	56.0	3.0	7.5	13.5	6.5	14.4	25.0
Welfare loss 1	M. R	1.3	10.2	45.2	0.12	0.9	38.6	0.06	0.5	1.9
Welfare loss 2	M. R	19.5	49.7	53.5	2.5	6.8	12.5	0.2	4.1	11.0

MR : Million South African Rands

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